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ICEST-2K24

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Organised by

Shahajirao Patil Vikas Pratishthan's
S B Patil College of Engineering, Indapur
Village-Vangali, Pune Solapur Highway, Tal-Indapur,
Dist-Pune, Maharashtra, India

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(ICEST-2K24)

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S B PATIL COLLEGE OF ENGINEERING, INDAPUR

Gat No. 58, Village-Vangali, Pune Solapur Highway,
Tal-Indapur, Dist- Pune 413106

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CONTENTS

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Subclass of Bi-Univalent Functions Using Salagean Derivative Operator

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ABSTRACT

Here we introduce a new subclass of the function class $\sum$ of bi-univalent functions defined by convolution using Salegean operator in the open unit disc. Furthermore, we obtain estimates on the coefficients $|a_2|$ and $|a_3|$ for functions of this class. Relevant connections of the results presented here with various well-known results are briefly indicated.

Keywords: Analytic; Univalent; Bi-univalent; Salagean derivative; convolution; starlike and convex functions; coefficients bounds.

I. INTRODUCTION

Let A denote the class of the functions f of the form

$$f(z) = z + \sum_{n=2}^{\infty} a_n z^n \qquad (1.1)$$

Which are analytic in the open unit disk and $U = \{ z \in C : |z| < 1 \}$ satisfy the normalization condition $f(0) = f'(0) - 1 = 0$. Let S be the subclass of A consisting of functions of the form (1.1) which are also univalent in U.

For $f(z)$ defined by (1.1) and $\Phi(z)$ defined by $\Phi(z) = z + \sum_{n=2}^{\infty} \phi_n z^n \quad (\phi_n \geq 0) \qquad (1.2)$

The Hadamard product $(f * \Phi)(z)$ of the function $f(z)$ and $\Phi(z)$ defined by

$$(f * \Phi)(z) = z + \sum_{n=2}^{\infty} a_n \phi_n z^n \qquad (1.3)$$

For $n \in N_0, 0 \leq \beta < 1, \lambda \geq 0$, we introduce the subclass $Q(n, \lambda, \beta)$ of S of functions of the form (1.1) and functions $h(z)$ given by

$$h(z) = z + \sum_{n=2}^{\infty} h_n z^n \quad (h_n > 0) \qquad (1.4)$$

and satisfying the condition

$$\operatorname{Re}\left\{\frac{\begin{array}{c}(1-\lambda)D^n(f*h)(z)\\ +\lambda D^{n+1}(f*h)(z)\end{array}}{z}\right\}>\beta,\ z\in U \quad (1.5)$$

Where D^n stands for Salagean derivative introduced by Salegean [1].

For $n=0$ it reduces to the class $Q_\lambda(\beta)$ studied by Ding et al. [2], (see also [3-6]).

It is well known that every $f\in S$ has an inverse f^{-1}, defined by

$$f^{-1}(f(z))=z,\quad (z\in U) \quad \text{and} \quad f^{-1}(f(w))=w,\quad \left(|w|<r_0(f), r_0(f)\geq\frac{1}{4}\right),$$

Where,

$$f^{-1}(w)=w-a_2w^2+(2a_2^2-a_3)w^3 -(5a_2^3-2a_2a_3+a_4)w^4+\ldots$$

A function $f(z)\in A$ is said to be bi-univalent in U if both $f(z)$ and $f^{-1}(z)$ are univalent in U.

Let $\sum$ denote the class of bi-univalent functions in U given by (1.1). For more basic results one may refer Srivastava et al.[7] and references there in.

Brannan and Taha [8] (see also [9]) introduced certain subclasses of the bi-univalent function class $\sum$ similar to the familiar subclasses $S^*(\alpha)$ and $K(\alpha)$ of starlike and convex functions of order $\alpha(0\leq\alpha<1)$ respectively (see [10]). Thus, following Brannan and Taha [8] (see also [9]), a function $f(z)\in A$ is in the class $S_\Sigma^*(\alpha)$ of strongly bi-starlike functions of order $\alpha(0\leq\alpha<1)$ if each of the following conditions is satisfied

$$f\in\Sigma \ \text{and}\ \left|\arg\left(\frac{zf'(z)}{f(z)}\right)\right|<\frac{\alpha\pi}{2},\ (0\leq\alpha<1, z\in U) \text{and}$$

$$\left|\arg\left(\frac{wg'(w)}{g(w)}\right)\right|<\frac{\alpha\pi}{2},\ (0\leq\alpha<1, w\in U)$$

Where g is the extension of f^{-1} on U. Similarly, a function $f\in A$ is in the class $K_\Sigma(\alpha)$ of strongly bi-convex functions of order $\alpha(0\leq\alpha<1)$ if each of the following conditions are satisfied

$$f\in\Sigma \ \text{and}\ \left|\arg\left(1+\frac{zf''(z)}{f'(z)}\right)\right|<\frac{\alpha\pi}{2},\ (0\leq\alpha<1, z\in U) \text{and}$$

$$\left|\arg\left(1+\frac{wg''(w)}{g'(w)}\right)\right|<\frac{\alpha\pi}{2},\ (0\leq\alpha<1, w\in U)$$

Where g is the extension of f^{-1} on U. The classes $S_\Sigma^*(\alpha)$ and $K_\Sigma(\alpha)$ of bi-starlike and bi-convex functions of order α, corresponding to the function classes $S^*(\alpha)$ and $K(\alpha)$, were also introduced analogously. For each

of the function classes $S_{\Sigma}^{*}(\alpha)$ and $K_{\Sigma}(\alpha)$, they found non-sharp estimates on the first two Taylor-Maclaurin coefficients $|a_2|$ and $|a_3|$ (for detail,see [8,9]).

Recently, several researchers such as ([7,11-13]) obtained the coefficients $|a_2|$, $|a_3|$ of bi-univalent functions for the various subclasses of the function class $\sum$. Motivating with their work, we introduce a new subclass of the function class $\sum$ and find estimates on the coefficients $|a_2|$ and $|a_3|$ for functions in these new subclass of the function class $\sum$ employing the techniques used earlier by Srivastava et al. [7] and Frasin and Aouf[11].

In order to prove our main results, we require the following lemma due to [14].

Lemma1.1. If $h \in P$ then $|c_k| \le 2$ for each k, where P is the family of all functions h analytic in U for which $\operatorname{Re}\{h(z)\} > 0$,

$h(z) = 1 + c_1 z + c_2 z^2 + c_3 z^3 + \ldots$ for $z \in U$

II. COEFFICIENT BOUNDS FOR THE FUNCTION CLASS $B_{\Sigma}(n,\alpha,\lambda)$

Definition2.1. A function $f(z)$ given by (1.1) is said to be in the class $B_{\Sigma}(n,\alpha,\lambda)$ if the following conditions are satisfied:

$f \in \Sigma$ *and*

$$\left|\arg\left\{\frac{(1-\lambda)D^n(f*h)(z)+\lambda D^{n+1}(f*h)(z)}{z}\right\}\right| < \frac{\alpha\pi}{2} \quad ; (0 \le \alpha < 1, \lambda \ge 1,\ z \in U) \quad (2.1)$$

$f \in \Sigma$ *and*

$$\left|\arg\left\{\frac{(1-\lambda)D^n(f*h)^{-1}(z)+\lambda D^{n+1}(f*h)^{-1}(z)}{z}\right\}\right| < \frac{\alpha\pi}{2} \quad ; (0 \le \alpha < 1, \lambda \ge 1,\ z \in U) \quad (2.2)$$

where the function $h(z)$ is given by (1.4) and $(f*h)^{-1}(w)$ is defined by:

$$(f*h)^{-1}(w) = w - a_2h_2w^2 + \left(2a_2^2h_2^2 - a_3h_3\right)w^3 - \left(5a_2^3h_2^3 - 5a_2h_2a_3h_3 + a_4h_4\right)w^4 + \ldots \quad (2.3)$$

We note that for $n = 0, \lambda = 1$ the class $B_{\Sigma}(n,\alpha,\lambda)$ reduces to the class H_{Σ}^{α} introduced and studied by Srivastava et al. [7] and for $n = 0$ the class $B_{\Sigma}(n,\alpha,\lambda)$ reduces to the class $B_{\Sigma}(\alpha,\lambda)$ introduced and studied by Frasin and Aouf [11]. We begin by finding the estimates on the coefficients $|a_2|$ and $|a_3|$ for functions in the class $B_{\Sigma}(n,\alpha,\lambda)$.

Theorem 2.1. Let the function $h(z)$ is given by (1.1) be in the class $B_{\Sigma}(n,\alpha,\lambda)$, $n \in N_0, 0 < \alpha \le 1$ and $\lambda \ge 1$ .Then

$$|a_2| \le \frac{2\alpha}{h_2\sqrt{4^n(1+\lambda)^2 + \alpha\left(2.3^n(1+2\lambda) - 4^n(1+\lambda)^2\right)}} \quad (2.4)$$

and

$$|a_3| \le \frac{1}{h_3}\left(\frac{2\alpha}{(1-\lambda)3^n + \lambda 3^{n+1}} + \frac{4\alpha^2}{\left[(1-\lambda)2^n + \lambda 2^{n+1}\right]^2}\right) \quad (2.5)$$

Proof. It follows from (2.1) and (2.2) that

$$\frac{\left[(1-\lambda)D^n(f*h)(z)+\lambda D^{n+1}(f*h)(z)\right]}{z}=\left[p(z)\right]^{\alpha}, \quad (2.6)$$

and

$$\frac{\left[(1-\lambda)D^n(f*h)^{-1}(w)+\lambda D^{n+1}(f*h)^{-1}(w)\right]}{w}=\left[q(w)\right]^{\alpha} \quad (2.7)$$

Where $p(z)$ and $q(z)$ in P and have the forms

$$p(z)=1+p_1z+p_2z^2+p_3z^3+... \quad (2.8)$$

and

$$q(w)=1+q_1w+q_2w^2+q_3w^3+... \quad (2.9)$$

Now, equating the coefficient in (2.6)

and (2.7), we obtain $\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]a_2h_2=\alpha p_1 \quad (2.10)$

$$\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]a_3h_3=\alpha p_2+\frac{\alpha(\alpha-1)}{2}p_1^2 \quad (2.11)$$

$$-\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]a_2h_2=\alpha q_1 \quad (2.12)$$

$$\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]\left(2a_2^2h_2^2-a_3h_3\right)=\alpha q_2+\frac{\alpha(\alpha-1)}{2}q_1^2 \quad (2.13)$$

From (2.10) and (2.12) , we obtain

$$p_1=-q_1 \quad (2.14)$$

and

$$2\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2a_2^2h_2^2=\alpha^2\left(p_1^2+q_1^2\right) \quad (2.15)$$

Now from (2.11) , (2.13) and (2.15) , we obtain

$$2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]a_2^2h_2^2=\alpha\left(p_2+q_2\right)+\frac{\alpha(\alpha-1)}{2}\left(p_1^2+q_1^2\right)$$

$$=\alpha\left(p_2+q_2\right)+\frac{\alpha(\alpha-1)}{2}\frac{\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]a_2^2h_2^2}{\alpha^2}.$$

Therefore we have

$$h_2^2a_2^2=\frac{\alpha^2\left(p_2+q_2\right)}{4^n(1+\lambda)^2+\alpha\left[2.3^n\left(1+2\lambda\right)-4^n(1+\lambda)^2\right]}$$

Applying Lemma 1.1 for the coefficients p_2 and q_2,

we immediately have $|a_2|\le\frac{2\alpha}{h_2\sqrt{4^n(1+\lambda)^2+\alpha\left(2.3^n\left(1+2\lambda\right)-4^n(1+\lambda)^2\right)}}$ Next, in order to find the bound on

$|a_3|$ by subtracting (2.13) and (2.11), we obtain

$$2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]\left[a_3h_3-a_2^2h_2^2\right]$$
$$=\alpha\left(p_2-q_2\right)+\frac{\alpha(\alpha-1)}{2}\left(p_1^2-q_1^2\right)$$

$$2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]a_3h_3$$
$$=\alpha\left(p_2-q_2\right)+\frac{2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]\alpha^2\left(p_1^2+q_1^2\right)}{2\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2}.$$

$$a_3h_3=\frac{\alpha\left(p_2-q_2\right)}{2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]}+\frac{\alpha^2\left(p_1^2+q_1^2\right)}{2\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2}.$$

Applying Lemma 1.1 once again for the coefficients p_1, p_2, q_1 and q_2, we obtain

$$|a_3|\le\frac{1}{h_3}\left(\frac{2\alpha}{(1-\lambda)3^n+\lambda 3^{n+1}}+\frac{4\alpha^2}{\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2}\right).$$

This completes the proof of Theorem 2.1.

III.COEFFICIENT BOUNDS FOR THE FUNCTION CLASS $H_\Sigma(n,\beta,\lambda)$

Definition 3.1. A function $f(z)$ given by (1.1) is said to in the class $H_\Sigma(n,\beta,\lambda)$ if following conditions are satisfied:

$$f\in\Sigma \text{ and}$$
$$\operatorname{Re}\left\{\frac{(1-\lambda)D^n(f*h)(z)+\lambda D^{n+1}(f*h)(z)}{z}\right\}>\beta$$
$$;\left(0<\beta\le 1,\lambda\ge 1,\ n\in N_0,z\in U\right)\quad(3.1)$$

and

$$f\in\Sigma \text{ and}$$
$$\operatorname{Re}\left\{\frac{(1-\lambda)D^n(f*h)^{-1}(w)+\lambda D^{n+1}(f*h)^{-1}(w)}{w}\right\}>\beta$$
$$;\left(0<\beta\le 1,\lambda\ge 1,\ n\in N_0,z\in U\right)\quad(3.2)$$

Where the function g is defined by (2.3).

We note that for $n=0$ and $\lambda=1$, the class $H_\Sigma(n,\beta,\lambda)$ reduce to the classes $H_\Sigma(\beta,\lambda)$ and $H_\Sigma(\lambda)$ studied by Frasin and Aouf [11] and Srivastava et al. [7], respectively.

Theorem 3.1. Let the function $f(z)$ given by (1.1) be in the class $H_\Sigma(n,\beta,\lambda)$, $n\in N_0$, $0<\beta\le 1$ and $\lambda\ge 1$.

Then
$$|a_2|\le\frac{1}{h_2}\sqrt{\frac{2(1-\beta)}{(1-\lambda)3^n+\lambda 3^{n+1}}}\qquad(3.3)$$

$$|a_3| \le \frac{1}{h_3}\left(\frac{4(1-\beta)^2}{\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2} + \frac{2(1-\beta)}{\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]}\right) \quad (3.4)$$

and

Proof: It follows from (3.1) and (3.2) that there exists $p(z) \in P$ and $q(z) \in P$ such that

$$\frac{(1-\lambda)D^n(f*h)(z)+\lambda D^{n+1}(f*h)(z)}{z}$$

$$= \beta + (1-\beta)\,p(z) \quad (3.5)$$

and

$$\frac{(1-\lambda)D^n(f*h)^{-1}(w)+\lambda D^{n+1}(f*h)^{-1}(w)}{w}$$

$$= \beta + (1-\beta)\,q(w) \quad (3.6)$$

Where $p(w)$ and $q(w)$ have the form (2.8) and (2.9), respectively. Equating coefficients in (3.5) and (3.6) yields

$$\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]a_2h_2 = (1-\beta)\,p_1 \quad (3.7)$$

$$\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]a_3h_3 = (1-\beta)\,p_2 \quad (3.8)$$

$$-\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]a_2h_2 = (1-\beta)\,q_1 \quad (3.9)$$

and

$$\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]\left(2a_2^2h_2^2-a_3h_3\right) = (1-\beta)q_2 \quad (3.10)$$

$$p_1 = -q_1 \quad (3.11)$$

From (3.7) and (3.9) , we have

$$2\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2 a_2^2h_2^2 = (1-\beta)^2\left(p_1^2+q_1^2\right) \quad (3.12)$$

and

Now from (3.8) , (2.13) and (3.10) , we find that

$$2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]a_2^2h_2^2 = (1-\beta)(p_2+q_2) \quad (3.13)$$

$$h_2^2\,a_2^2 = \frac{(1-\beta)(p_2+q_2)}{2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]} \qquad \left|a_2^2\right| \le \frac{(1-\beta)(|p_2|+|q_2|)}{2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]h_2^2} = \frac{(1-\beta)}{\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]h_2^2}$$

Which is the bound on $|a_2|$ as given in (3.3) .

Next, in order to find the bound on $|a_3|$ by subtracting (3.10) from (3.8), we obtain

$$2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]\left[a_3h_3-a_2^2h_2^2\right] = (1-\beta)(p_2-q_2)$$

or, equivalently

$$a_3 = \frac{1}{h_3}\left\{a_2^2h_2^2 + \frac{(1-\beta)(p_2-q_2)}{2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]}\right\}.$$

Upon substituting the value of a_2^2 from (3.12), we have

$a_3 = \frac{1}{h_3}\left(\frac{(1-\beta)^2\left(p_1^2+q_1^2\right)}{2\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]}+\frac{(1-\beta)(p_2-q_2)}{2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]}\right)$. Applying Lemma 1.1 once again for the coefficients p_1, p_2, q_1 and q_2, we obtain

$$a_3 = \frac{1}{h_3}\left(\frac{(1-\beta)^2\left(p_1^2+q_1^2\right)}{2\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2}+\frac{(1-\beta)(p_2-q_2)}{2\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]}\right). \qquad |a_3| \le \frac{1}{h_3}\left(\frac{4(1-\beta)^2}{\left[(1-\lambda)2^n+\lambda 2^{n+1}\right]^2}+\frac{2(1-\beta)}{\left[(1-\lambda)3^n+\lambda 3^{n+1}\right]}\right),$$

Which is the bound on $|a_3|$ as given in (3.4).

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Ambulance Detection and Traffic Flow Control System

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ABSTRACT

India is the most populated country in the world. As a result, the traffic problems have become more prevalent and efficient traffic control and the management has become an absolute and urgent requisite. Hence, it is the need of the hour to have a well maintained traffic control system particularly in busy traffic hours. In this Paper, we proposed a traffic control system for the emergency-vehicles like ambulances. The proposed system is clear Traffic flow, for emergency vehicles like ambulances through Radio Frequency Identification (RFID) Sensors and wireless devices. This proposed system aims to reduce and solve most problems related to traffic congestion by using an IoT based setup.

Keywords: Ambulance Detection, Traffic Control, RFID Sensors, IOT System.

I. INTRODUCTION

The vehicle traffic congestion in cities has been exponentially raised due to a large number of vehicles plying on the road. Due to this large traffic, often traffic jams occur on roads because of which the emergency medical vehicles like ambulance and fire engines get stuck in traffic congestion which may be the cause for losing human lives. Current traffic control systems are a static case wherein vehicles have to wait for a predefined amount of time until the microcontroller switches the green light for that lane. If the ambulance is stuck near to the traffic signal, then the traffic police can give priority to the ambulance by giving necessary symbols or signs to the vehicles so that the ambulance can get out of the traffic as quickly as possible. Moreover, if the emergency vehicles are stuck in a lane far from the traffic signal, the siren of the ambulance is unable to reach the traffic police, in which case the emergency vehicles have to wait until the traffic gets cleared or we have to depend on other vehicles to move aside which is not an easy task in traffic situations. We are creating this using IoT technology. In this system we control the traffic lights by connecting them to an Arduino Mega 2560. Similarly, we Install RFID readers at 100 meters Distance on the road starting from every traffic signal and the RFID reader is connected to the Arduino Mega 2560. The RFID tag has been fixed on the ambulance. When the ambulance passes through a pathway where an RFID reader has been installed, the RFID reader detects the ambulance. Once the ambulance is detected by the RFID reader, it forwards the message to Arduino Mega 2560. When the arduino receives a message from nodemcu, then the Arduino adjusts the traffic flow by creating a pathway for the ambulance, allowing it to pass through the road. When an ambulance arrives, then

traffic flow is temporarily adjusted and managed accordingly. IOT is one of the best ways for a smart transportation system.

II. LITERATURE SURVEY

1. "Ambulance Detection and Traffic Control System" 2019, The proposed system can be used by the Adaptive Traffic Control System to effectively manage the motion of Emergency Medical Services such as ambulances during high traffic congestion. GPS, IoT and Raspberry Pi technologies are used so that the traffic controller system can take immediate action ensuring the reduction in time delay between the emergency destination. The system proposed merely focuses on developing a way to let the ambulances pass traffic signals with minimum delay. As a result, many more areas can be explored to provide patients with high-quality ambulance service. The IoT is one of the best ways for smart transportation system [1].
2. "Emergency Vehicle Priority and Self-Organising Traffic Control at Intersections Using Internet-of-Things Platform" 2018, EVP-STC was proposed to maximize traffic throughput and minimize average vehicle waiting times at intersections. This scheme accelerates emergency response operations, by facilitating the transit of emergency vehicles through intersections in urban areas. In the proposed priority management scheme, an intersection controller communicates with force-resistive sensors and emergency vehicles via ZigBee communication, to resolve potential conflicts at intersections in order to assign higher priorities to specific roads or approaches. This system could be made completely automated as it could find the shortest path to the nearest hospital and if the ambulance halts at the signal, then the signal changes automatically according to the shortest path to the hospital. This saves more time and the patient is taken to the hospital in the minimum time possible.
3. "Intelligent Traffic Control System: Towards Smart City" 2019, Traffic problems have increased in the last few years and along with that, the present traffic light controllers have limitations because they use the same old traditional hardware. With this proposal, we present techniques to control traffic and prevent accidents in unplanned traffic systems as prevalent in most developing countries. We have proposed the use of sensors along with embedded technologies mainly focusing on the IoT aspect of it. The traffic on the road will decide the timings of the green or red traffic signals. This traffic light control system is more flexible and efficient than the ones in existence previously. Our proposed algorithm was tested real time in a single location and during similar times of day. Further it is to be tested in other circumstances as well to get a much more efficient and generalized system of traffic control.
4. "Smart Ambulance System using IoT" 2017, we have different problems in ambulance services in case of emergency. Different types of MAC protocols are studied for data dissemination for the SMART ambulance system. Performance of the CSMA MAC protocol is drastically better for PDR, PLR, End to End delay and throughput in the network. It gives 30 to 60% better results for PDR, 40 to 60% better result for average PLR, 15 to 35% better result for average throughout, 20 to 50% better results for average end to end delay as compared to TDMA, SMAC and 802.15.4 MAC Protocols. This system can be further extended to send the present status of the patient to the hospital once the patient is in the ambulance for the aid. This process would surely need various sensors and wireless networking, sending all the details to the hospital where the patient is to be admitted.
5. "Efficient Dynamic Traffic Control System using Wireless Sensor Networks" 2014, The proposed system solves many problems faced in the real time situations. It reduces the traffic delays and saves a lot of time

during the trip. It gives a special priority to ambulances to reduce the time that gets wasted at the signal and thus it could even save a life in danger. Capacitive proximity sensors and IR based sensor tags Capacitive Proximity sensors can be used to get more accurate normal vehicle count when compared to Inductive Proximity sensors but are comparatively costly.IR sensors could be used to get the count of emergency vehicles instead of RFID tags. The system proposed merely focuses on developing a way to let the ambulances pass traffic signals with minimum delay. As a result, many more areas can be explored to provide patients with high-quality ambulance service.

6. "Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection" 2020, Emergency vehicles need to reach their destinations at the earliest. If they spend a lot of time in traffic jams. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. Currently, it is implemented by considering one road of the traffic junction. the emergency vehicle clearance. Here each vehicle containing a Zigbee transmitter and Zigbee receiver will be implemented at the traffic junction. The buzzer will be switched ON when the vehicle is used for emergency purposes. This system can be further extended to send the present status of the patient to the hospital once the patient is in the ambulance for the aid. This process would surely need various sensors and wireless networking, sending all the details to the hospital where the patient is to be admitted.
7. "Smart Traffic Control Ambulance System" 2020, This work is developed with a main intention of saving the life of a person. Whenever an accident occurs and any serious condition takes place from home that time, the ambulance takes that person to travel to admit in hospital during that the traffic is cleared for the smooth and fast running of the ambulance. This system consists of a health analysis and traffic control system in an ambulance, signal, and a network (Fig.1). We designed the RFID based technology to detect the ambulance before a traffic signal to clear the signal to fast reach at the hospital. This system could be made completely automated as it could find the shortest path to the nearest hospital and if the ambulance halts at the signal, then the signal changes automatically according to the shortest path to the hospital. This saves more time and the patient is taken to the hospital.
8. "Adaptive ambulance monitoring system using IOT '' 2022, Since the last years and until now, technology has made fast progress for many industries, in particular, the garment industry which aims to follow consumer desires and demands. One of these demands is to fit clothes before purchasing them on-line. Therefore, many research works have been focused on how to develop an intelligent apparel industry to ensure the online shopping experience. Most of these works focus on the virtual try-on task to develop Image-based virtual fitting systems which present various challenging issues since persons can appear in different poses and views. In recent years, many studies have developed by using deep learning methods to face the challenges of pose variation, occlusion and illumination changes. Thus, we reviewed, in this paper, a large range of research works focused on using deep learning methods in image-based virtual fitting solutions by summarizing their challenges, their main frameworks and the popular benchmark datasets used for training. Hence, an overview of different evaluation metrics is presented with some examples of performance comparison, and lastly, some promising future research directions are discussed.
9. "Traffic light control system for emergency vehicles" 2023, The proposed solution as an intellective auto traffic control solution that makes easy for emergency response operations (that is facilitating quicker movement of emergency vehicles through traffic in urban areas). In the proposed solution the vehicles

can resolve the emerging conflicts at road junctions by themselves and implement a priority based solution that can prioritize emergency vehicles at road junctions. Our approach to the solution is based on a RFID tagging of traffic signals to communicate their information to the car. The proposed system showcases promising results as the active RFID technology enables to detect the existence and distinction of the traffic signals reliably and adequately in advance. It helps to facilitate emergency response operations. This is done with the help of RFID tagging. This system could be made completely automated as it could find the shortest path to the nearest hospital and if the ambulance halts at the signal, then the signal changes automatically according to the shortest path to the hospital. This saves more time and the patient is taken to the hospital in the minimum time possible.

10. "Density based Traffic Control System with Ambulance Detection" 2019, This interface is synchronized with the whole process of the traffic system. Automatically, this could be programmed in any way to control the traffic light model and will be useful for planning proper road systems. In this paper we have studied the optimization of traffic light controllers in a city using Arduino and IR sensors. A traffic light system has been designed and developed with proper integration of both the hardware and the software. This system can be further extended to send the present status of the patient to the hospital once the patient is in the ambulance for the aid. This process would surely need various sensors and wireless networking, sending all the details to the hospital where the patient is to be admitted.Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology. [18]

III.LIMITATIONS OF EXISTING WORK

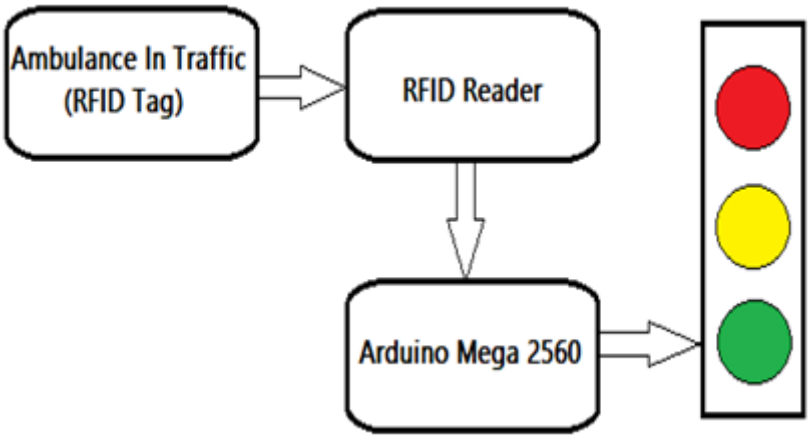
- Setting up the system, including purchasing and installing the necessary hardware and software, can be expensive, especially for municipalities or regions with limited budgets.
- Like any technology, the system requires regular maintenance and updates to ensure it functions correctly. This maintenance can be time-consuming and costly.
- RFID detection can sometimes yield false positives (detecting non-emergency vehicles as ambulances) or false negatives (failing to detect ambulances). These errors can disrupt traffic flow or compromise safety.
- The system is primarily designed for ambulances with RFID tags. Other emergency vehicles like fire trucks and police cars may not be accommodated unless they also have RFID tags.Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.

IV.PROBLEM STATEMENT

Develop a system that detects ambulances in real-time, prioritizes their route through traffic, and optimizes traffic flow to expedite emergency response. This system aims to minimize response times, ensure safety, and comply with privacy regulations while enhancing urban traffic management.

V. PROPOSED SYSTEM

1. ARCHITECTURE



VI. RESULT DISCUSSION

We designed a "Ambulance Detection and Traffic Flow Control System" using IOT devices which works in Real-Time. Such IOT devices are Arduino Mega 2560 for Control Traffic Lights, RFID Sensor for Detecting Ambulance in traffic jams. We are connecting traffic lights and RFID readers to an Arduino Mega 2560.This system developed for work in real-time.

When the system is ready then we take some tests. In that test, we observed that the traffic lights were functioning properly, and we also noticed the effective range of the RFID reader. This system works in real time using an RFID reader to actively function, identifying ambulances in traffic. When an ambulance is detected, the traffic light immediately changes into yellow for a few seconds, and then switches to green. After the ambulance passes, the traffic light changes to yellow for a few seconds and turns into red. Then traffic lights work normally. In this way this Ambulance Detection and Traffic Flow Control System successfully works in Real-Time.

VII. RESULTS / OUTPUTS

Fig. Traffic Light Normal Flow

Fig. Ambulance Stuck in Traffic

Fig. Ambulance Detect in Traffic

Fig. Ambulance Goes Successfully

Fig. Again Traffic Light Normal Flow

VIII. CONCLUSION

Implemented system works in real-time with successfully Ambulance detection and traffic flow control without disturbing another traffic flow. The main attempt of this our proposed system is to minimize the deaths of critical patients by making sure that the ambulance reaches the emergency location and the hospital in time for treatment. RFID Sensors, IoT technologies are used so that the traffic controller system can take immediate action ensuring the reduction in time delay between the traffic jams.

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Keen City Vehicle Positioning Inhabitance Tracking and Managing System

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ABSTRACT

Finding an available parking spot in a congested parking lot can be a daunting and time-consuming task, leading to frustration, traffic congestion, and increased environmental pollution. This problem is exacerbated in urban areas, where parking spaces are in high demand, and traditional methods of parking spot detection fall short in providing efficient solutions. To address this issue, we propose the development of a web application that leverages Machine Learning (ML) and Image Processing technologies to assist users in locating vacant parking slots within a specific area.

Our Keen City Vehicle Positioning Inhabitance Tracking and Managing System aims to revolutionize the parking experience by providing real-time information about available parking spaces. Through the use of cameras and image processing algorithms, the system continuously monitors the parking lot, identifying occupied and vacant spots. The mobile app, linked to this system, allows users to access up-to-date parking availability information, saving time and reducing the stress associated with parking.

Keywords: Machine learning, Deep learning, edge detection, coordinate bound pixels, image processing.

I. INTRODUCTION

Urbanization and the increasing number of vehicles on the road have led to a pressing problem in metropolitan areas worldwide parking congestion. The struggle to find available parking spaces contributes significantly to traffic congestion, air pollution, and the overall stress experienced by urban commuters. In response to this challenge, modern technology, particularly computer vision and machine learning, offers a promising solution. Traditionally, parking management relied on manual checks or simple sensors, which often provided limited and inaccurate information regarding parking availability. In contrast, our proposed Keen City Vehicle Positioning Inhabitance Tracking and managing System leverages real-time data collected from strategically positioned cameras within parking lots and structures. These cameras capture images of parking spaces and feed them into a sophisticated image processing pipeline. The core of our system lies in machine learning and deep learning algorithms, which are employed to analyze these images. These algorithms can accurately detect the presence or absence of vehicles in each parking space, classify the types of vehicles, and even predict parking durations. By continuously processing this information, the system generates up-to-the-minute parking

occupancy data.One of the notable advantages of our approach is its adaptability and scalability. The system can be easily customized to suit different types of parking facilities, from open lots to multi-story parking garages. Additionally, it can seamlessly integrate with mobile applications, websites, and electronic displays, allowing drivers to access real-time parking availability information on their smartphones or other devices. Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEGVigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[15]

The benefits of the Keen City Vehicle Positioning Inhabitance Tracking and Managing System are manifold. By reducing the time and effort required to find parking, it helps alleviate traffic congestion, thereby decreasing fuel consumption and greenhouse gas emissions. Furthermore, it improves the overall driving experience by reducing the frustration associated with circling for parking spots.

In this paper, we present a comprehensive overview of the Keen City Vehicle Positioning Inhabitance Tracking and Managing System, detailing its architecture, image processing techniques, and the machine learning models employed. We also report the results of extensive testing and evaluation, demonstrating the system's accuracy, efficiency, and real-world applicability. The proposed system innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology.[16]

II. LITERATURE SURVEY

Proper management of outdoor parking issue with an inefficient parking slot availability and occupancy. System uses a combination of Laplacian operator to edge and HAAR Cascade classifier for object identification and motion tracking. The system proposes an effective methodology to check availability using a camera placed for a lamppost view.

The primary focus of the work lies in reducing the model training time and outlining the classification model that is used to detect the vehicles**,** for this, we have designed a new FMRCNN model that detects multiple cars in an image. A mobile application on Android and iOS platforms could be developed displaying the real time parking information.

During busy hours in the city finding a parking spot, becomes a tedious process. Convolutional Neural Network; Artificial Neural Network; Image Processing. The Neural Network; Artificial Neural Network; Image Processing. The overall aim was to develop an automatic system that counts the empty spaces in a parking lot, by giving the image of the parking lot as the input. The output will be obtained as a display on the output console.

Detect vehicles that are on the side of the parking lot so that it can be used as a smart parking system for parking management and find out information on the availability of parking spaces**,** Haar Cascade Classifier, and YOLOv3 then compared them to get the best accuracy in detecting parked cars**,** Therefore, in order not to cause congestion and spend time searching for parking slots, management, and information about the availability of parking spaces on the roadside is very important for drivers and parking attendants to find out how long a parking vehicle is.

Finding a free on-street parking spot is an everyday chore for drivers in populated cities. The traditional method of circling around the parking lots or streets to find a spot (blind search) is inefficient, time consuming, and frustrating, it proposed system by describing the design and implementation of CNN, mobile, and server applications., Deep learning can be efficiently applied to the on-street parking management problem The server

will be placed in the Cloud to make it accessible from anywhere. In addition, the mobile application will have an improved user interface such that user can choose the location or system selects the closest location.

Traffic congestion has become one of the main problems in many big cities. Traffic jam contributes to many economic, environmental and social problems such as noise and air pollution., Deep Neural Network, CNN, Smart Parking, Smart Camera, Machine Learning, used to mitigate the traffic congestion problems by reducing time for drivers to look for vacancy positions in car parking lots and providing efficient parking space utilization.

For multistore parking garages. Car drivers spend a considerably long amount of time finding an available parking space where slots are spread throughout multiple stories which causes longer queues and traffic congestion, Python IDLE and the OpenCV library, Edge detection, coordinate bound pixels, image processing, multistore parking, The system can be used to efficiently determine open parking spaces spread across multiple floors in indoor building garages without much added cost by utilizing surveillance camera feeds from each floor.

An increasing number of cities struggle with traffic congestion and inadequate parking availability. For urban dwellers, few things are more irritating than anxiously searching for a parking space, Deep learning, edge devices, smart cities, smart parking. System can automatically detect when a car enters the parking space, the location of the parking spot, and precisely charge the parking fee and associate this with the license plate number.

In highly populated cities, finding available car parking slots is time consuming and may cause severe traffic congestions at the parking entrance, Car detection, Haar Cascade, image processing, internet of things, smart parking, a smart parking system with automated car detection is required so that the car drivers would have minimum effort and time to access the available parking location.

Searching a suitable parking space in populated metropolitan city is extremely difficult for drivers. Serious traffic congestion may occur due to unavailable parking space., automatic parking; slot recognition; parking space detection; machine learning, Optimize the identification of available parking slots to possibly reduce the congestion in parking arena. Due to advancement in machine learning and vision base technology cost effective automatic parking systems facilitate the drivers to locate available spaces at parking arena.

III.PROPOSED SYSTEM

Urban environments worldwide face a complex set of challenges that include traffic congestion, resource allocation inefficiencies, and environmental sustainability concerns. These challenges demand innovative solutions that harness cutting-edge technologies to transform urban management. The Keen City Vehicle Positioning, Inhabitant Tracking, and Managing System, which utilizes deep learning and image processing, addresses the following key problems:

Traffic Congestion and Inefficiency, many cities suffer from chronic traffic congestion, resulting in increased travel times, air pollution, and decreased quality of life for inhabitants. The system aims to alleviate traffic congestion by optimizing vehicle routing, traffic signal control, and public transportation services through real-time data analysis. Resource Allocation and Waste Management: Inefficient resource allocation, such as energy consumption and waste management, can lead to unnecessary costs and environmental degradation. The system employs data-driven insights to optimize resource allocation, reduce energy consumption, and streamline waste management processes.

Block Diagram:

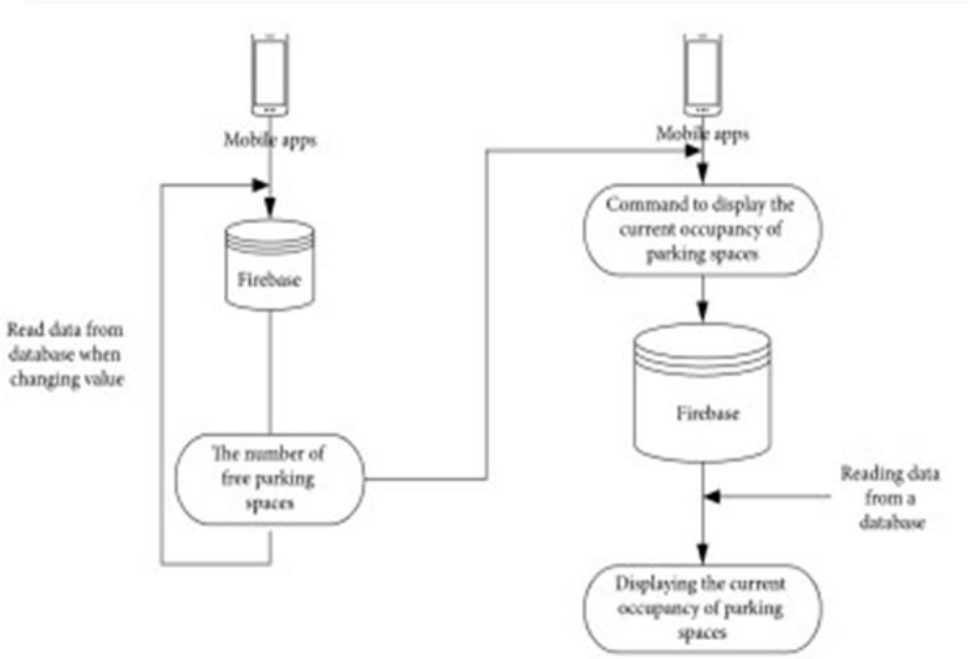

Figure1.1:System Architecture

IV. RESULT

Login Page:

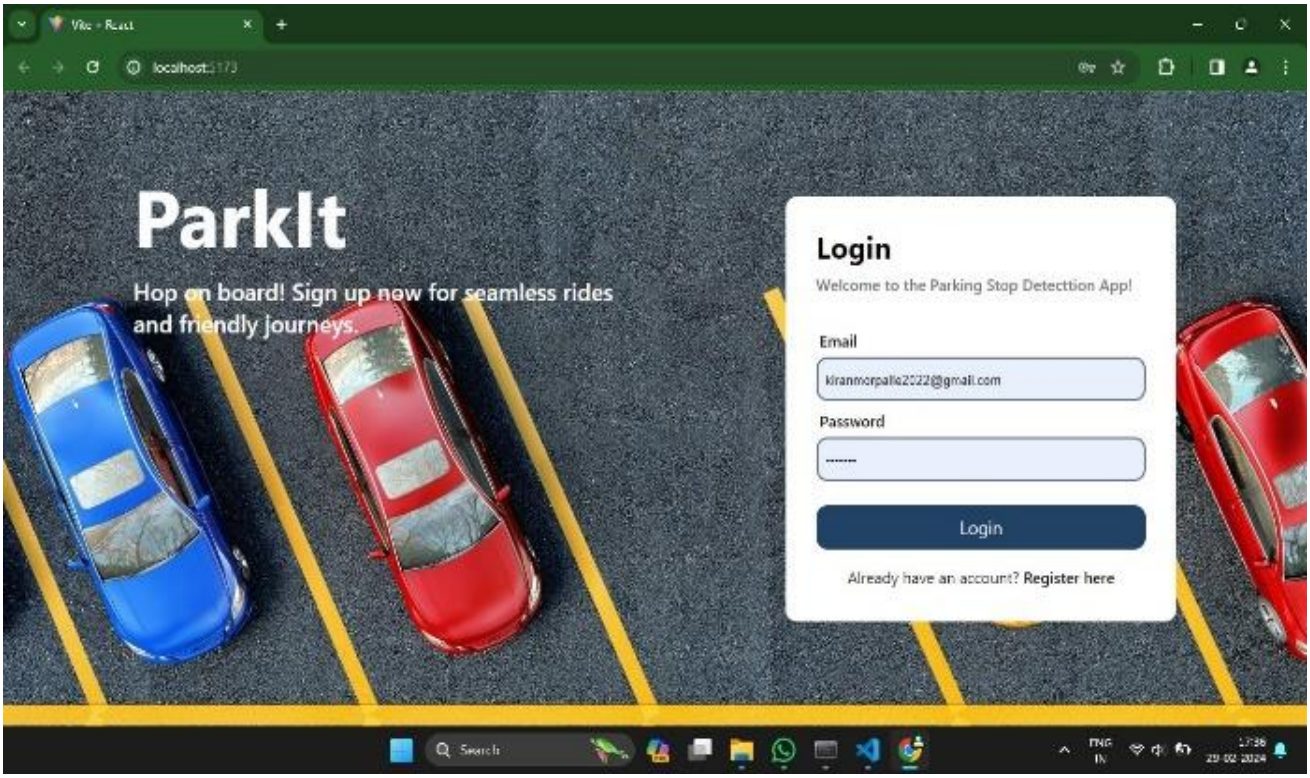

Fig 1.2 Login page

Only authorized users can access specific features, ensuring the protection of sensitive user data and maintaining system integrity. Firebase Authentication is used to enhance the security of the web application.

Video Uploading Page:

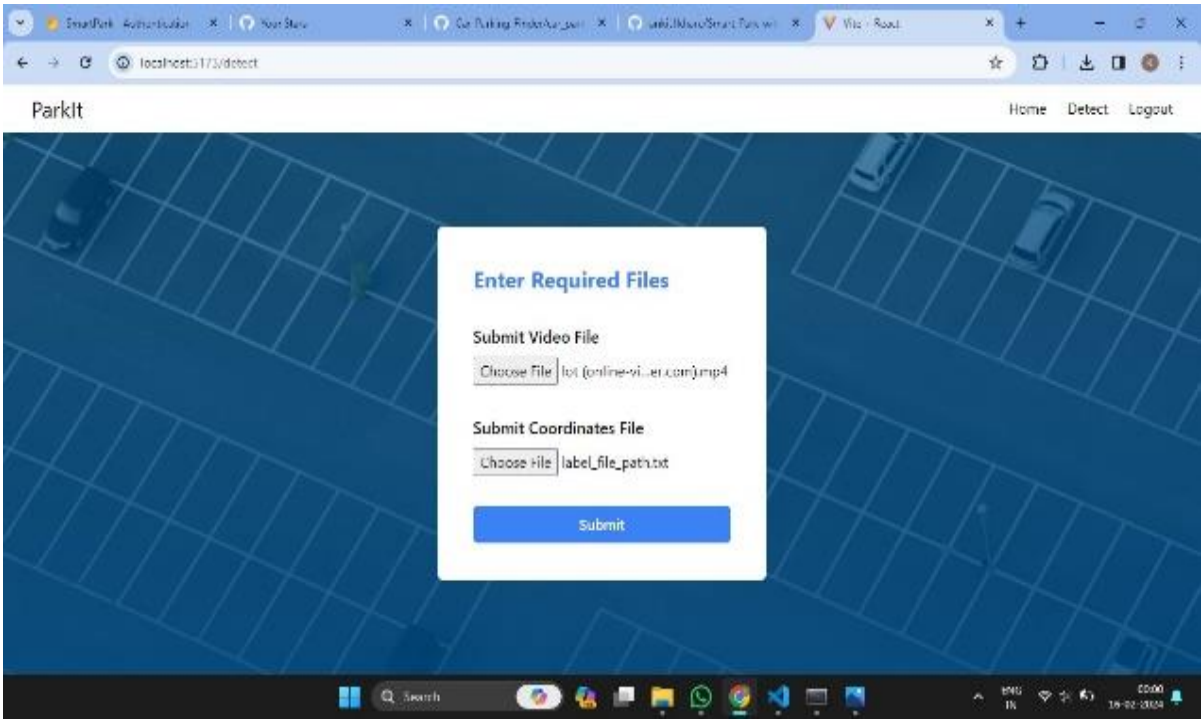

Fig 1.3 Video Uploading Page

System takes input as camera video footage and coordinates of footageimage to make system more flexible so as system can work for many different types of parking system instead of for one specific.

Output Page:

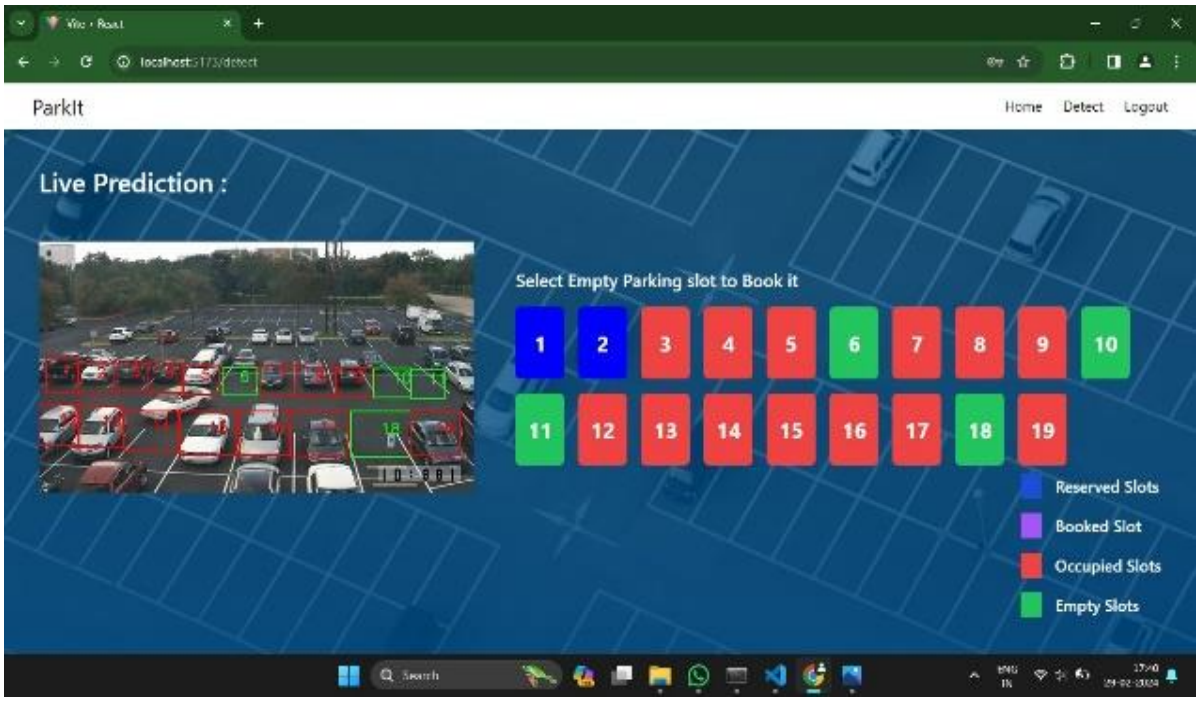

Fig 3. Output Page

System Provides to user a visually appealing and intuitive experience. Users can easily navigate the system, check parking availability, and make reservations without encountering usability issues.

V. RESULT DISCUSSION

User Friendly Interface -The user interface is designed using HTML, CSS, and JavaScript to create a visually appealing and intuitive experience. Users can easily navigate the system, check parking availability, and make reservations without encountering usability issues.

Real-Time Updates - Firebase's realtime Database ensures that users receive instant updates on parking space availability. Real-time updates are crucial for users looking for immediate parking solutions, enhancing the efficiency of the system.

Responsive and Dynamic Feature –
JavaScript is employed to add dynamism and responsiveness to the web application. Users can interact with the system in real-time, receiving dynamic feedback as they perform actions, contributing to an engaging and responsive user experience.

Efficient Backend Processing –
Python serves as the backend scripting language, efficiently managing data processing and logic implementation.Python's versatility contributes to a robust backend, ensuring the seamless processing of user requests and interactions.

Firebase Authentication for Security –
Only authorized users can access specific features, ensuring the protection of sensitive user data and maintaining system integrity. Firebase Authentication is used to enhance the security of the web application.

VI. CONCLUSION

The software stack for the Keen City Vehicle Positioning Inhabitance Tracking and Managing System should be carefully chosen to ensure efficient development, scalability, and real-time performance. By leveraging these technologies, we can create a robust solution that enhances urban parking experiences. The keen city vehicle positioning inhabitance tracking and managing system leverages cutting-edge technologies to transform urban parking. By providing accurate information and reducing search time, it contributes to smoother traffic flow and a more sustainable environment.

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Smart Irrigation System Using IoT and Cloud

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ABSTRACT
In order to monitor and regulate an irrigation system, this article uses a cloud-based platform and sensors to address issues with irrigation mechanisms. Moisture sensors are positioned across the field to track the soil's moisture content in real time. The NodeMCU receives data wirelessly from these sensors, processes it, and then transmits it. The sensor data is collected and processed by the NodeMCU, which takes crop-specific characteristics and standard deviations into account. The irrigation system activates by using this data to turn on the water pump and open the solenoid valves. These valve-opening devices are coordinated by the NodeMCU through wireless communication. Furthermore, the technology optimizes the watering plan with greater precision by utilizing live weather prediction data. In order to conserve water during periods of rain or high humidity, the system dynamically adjusts the irrigation schedule based on analysis of weather patterns, evapotranspiration rates, and crop water needs. Cloud-based platforms are used by the solution to increase accessibility and scalability. The command instructions and collected sensor data are securely sent to the cloud server. This enables farmers to use smartphone apps or the internet to remotely monitor and modify the irrigation system. Furthermore, data analytics techniques can be applied to deduce details and offer recommendations for better crop care and water management practices. In conclusion, an automated and clever method of managing water in agriculture is offered by the Internet of Things (IoT) NodeMCU smart irrigation system. The ability to accurately irrigate based on real-time soil moisture data, weather forecasts, and crop needs saves water, increases crop yields, and improves sustainability.

Keywords: Smart irrigation, Internet of Things (IoT), Sensors, Cloud computing, Water conservation, User interface.

I. INTRODUCTION

Innovative technology that enables efficient water management in both urban and rural environments is an Internet of things-based smart irrigation system. The system has several sensors to keep an eye on the local weather and air quality. Following collection, this data is routed to a cloud service for potential usage with machine learning algorithms. In order to optimize efficiency and reduce waste, the research influences the system's choice to either increase or decrease the watering schedule or the water flow rate. Smart irrigation systems that integrate Internet of Things (IoT) technology have the potential to increase agricultural productivity, reduce water use, and optimize water use [4].

An Internet of Things-based smart irrigation system is an automated way to water crops or plants. It combines sensing, regulating, and networking technologies to provide real-time monitoring of variables like soil moisture, temperature, and plant requirements [5]. This data might then be used by the system to make deliberate decisions about when and how much water to release, which would lead to a more efficient use of the water resources that are available and less waste.

Recent technological advancements have made it possible to take innovative approaches in a number of fields. IoT development has surged, opening up new possibilities for automating hitherto unreachable aspects of daily life. One illustration is the smart irrigation system, which precisely manages and controls the watering of crops and plants through the use of Internet of Things (IoT) sensors [6]. It is commonly known that traditional irrigation methods are wasteful and inefficient. However, in reaction to real-time data gathered via sensors and the Internet of Things, a smart irrigation system can monitor and modify the distribution of water. This maximizes efficiency by supplying water exactly when it is needed, which enhances crop yields and plant health by reducing unnecessary water consumption [7].

Smart irrigation systems with Internet of Things capabilities offer a state-of-the-art solution to the long-standing issues farmers have had with managing water resources. These systems combine sensor data, meteorological information, and advanced control algorithms to maximize agricultural output, conserve resources, and optimize water use [8,9]. As research and engineering advance, intelligent irrigation systems will play a bigger role in encouraging environmentally friendly farming practices.

1.1 Objective

A smart irrigation system aims to improve the effectiveness and efficiency of the irrigation process through the use of Internet of Things (IoT) technologies and data-driven decision-making. The following are the main objectives of an intelligent irrigation system:

A smart irrigation system's main objective is water conservation through effective utilization. By monitoring the weather, soil moisture content, and plant water requirements and only supplying water when and where it is needed, technology can avoid overwatering and reduce water waste. Irrigation systems with intelligence aim to automate the whole watering process, eliminating the need for human intervention at all. The system can employ sensors, actuators, and an Internet of things connection to collect data, do analysis, and start irrigation actions based on user-defined thresholds and algorithms. Controlling irrigation is made simpler for gardens and farmers by this technique [10].

Providing optimal plant development and health is the aim of an intelligent irrigation system. With the use of technology, plant stress, disease, and lower yield from either over- or underwatering can be avoided. The right amount of water is delivered at the right time. Sufficient yet stable soil moisture is good for crops and plants. As intelligent irrigation systems do, they precisely target the root zone, which may lead to "precision watering." Based on information it gets from sensors on soil moisture and plant water requirements, the system may modify the frequency and length of watering. With this type of targeted irrigation, less water is wasted as runoff and more water is absorbed by the plants [11]. Another desired feature of a "smart" irrigation system is the capacity to monitor and control the system remotely. By connecting with cloud platforms and mobile apps, users may collect real-time data, receive alerts and cautions, and remotely change irrigation settings [12]. There is greater convenience and mobility when the irrigation system may be managed remotely.

1.2 Motivation

The increased demand for food production to meet the needs of a growing global population is severely straining water supplies. The agriculture sector is facing a major lack of water, so more durable and efficient irrigation techniques are needed.

Smart irrigation systems with Internet of Things (IoT) capabilities may be the solution to this issue[13]. By using sensors, communication networks, and algorithms to monitor and optimize crop water usage, these systems improve agricultural output and water efficiency. Farmers may be able to save water, increase productivity, and reduce costs by implementing a smart irrigation system built with the Internet of Things [14]. Therefore, to ensure the long-term viability of agriculture and food production, research and development on these systems must continue. Adoption of Internet of Things (IoT) based smart irrigation systems is primarily driven by the desire to improve water management in agriculture and landscaping [15]. Conventional irrigation methods have the following drawbacks: wasted water, increased utility costs, and environmental issues. There are a number of benefits to integrating IoT into irrigation systems.

First, water conservation by determining the specific water requirements of individual plants through the use of sensors, weather data, and soil moisture sensors. The automation of irrigation systems makes use of this data to make sure that the right amount of water is applied at the right times.

Second, by optimizing water usage

Thirdly, one of the main ways that smart irrigation systems contribute to environmental sustainability is through water conservation [16]. Water scarcity is a major concern in many places, and effective irrigation techniques help to mitigate it. Conserving water also reduces the demand on local ecologies and lowers the energy required for pumping and treating water.

Fourth, real-time information on temperature, humidity, and other environmental factors is made possible by sensors made possible by the Internet of Things, which improves plant health and productivity. Farmers can adjust their watering schedules and provide their plants with the necessary nutrients to thrive by using this knowledge. Avoid overwatering and underwatering your plants if you want healthier plants and larger crop harvests. Fifth, remotely monitoring and controlling smart irrigation systems via internet or mobile app interfaces is possible with IoT-based technologies. This gives gardeners and farmers the ease and independence to remotely monitor and manage their irrigation systems [17]. They may adjust the system, receive alerts for issues, and make decisions based on precise, current information.

Conclusions drawn from the data: Irrigation systems with intelligence store data regarding soil composition, water consumption, and other environmental factors. Numerous applications of this data exist, such as water demand predictions, irrigation method optimization, and pattern detection [18]. With the use of this data, farmers and landscapers may boost productivity, make wiser decisions, and manage resources more wisely. A device that is Internet of Things (IoT) enabled aims to smart irrigation system is to increase plant health and production while simultaneously decreasing water use and operating expenses.

1.3 Literature Survey

[1] The process of developing a smart irrigation system employing IoT technology was investigated in Kavitha and Kumar's (2020) research. The system made use of soil moisture sensors, which transmitted soil moisture readings to a cloud server. Following the information's compilation, the system provided users with recommendations regarding when, how much, and how long to water. According to an early assessment of the system's effectiveness, it may be possible to conserve up to 40% of water while still producing crops at the same

rate.

[2] According to Li et al. (2021) in their paper titled "Smart irrigation system using IoT and Machine Learning Algorithms," a smart irrigation system can be used to anticipate soil moisture levels and irrigation schedules. The framework

II. IMPLEMENTATION

Hardware components for monitoring, controlling, and optimizing watering are essential in an Internet of Things (IoT)-based smart irrigation system. A Node MCU, a DHT11 sensor, and soil moisture sensors are the brains of a smart irrigation system. The monitoring of environmental conditions, analysis of data, intelligent judgements, and automation of the watering process are all possible thanks to the hardware components that make up a smart irrigation system. Effective water management made possible by the Internet of Things (IoT) enables optimal plant development, less water waste, and increased sustainability in agricultural practices.

2.1 Block Diagram

Figure 1 depicts the Internet of Things (IoT) as a block schematic of an intelligent irrigation system. Some of the components of the system are as follows.

Sensors: In the field, sensors are employed to collect data. This category may include soil moisture sensors, temperature and humidity sensors, and others. With the availability of real-time soil and meteorological data, irrigation schedule may be more precisely planned.

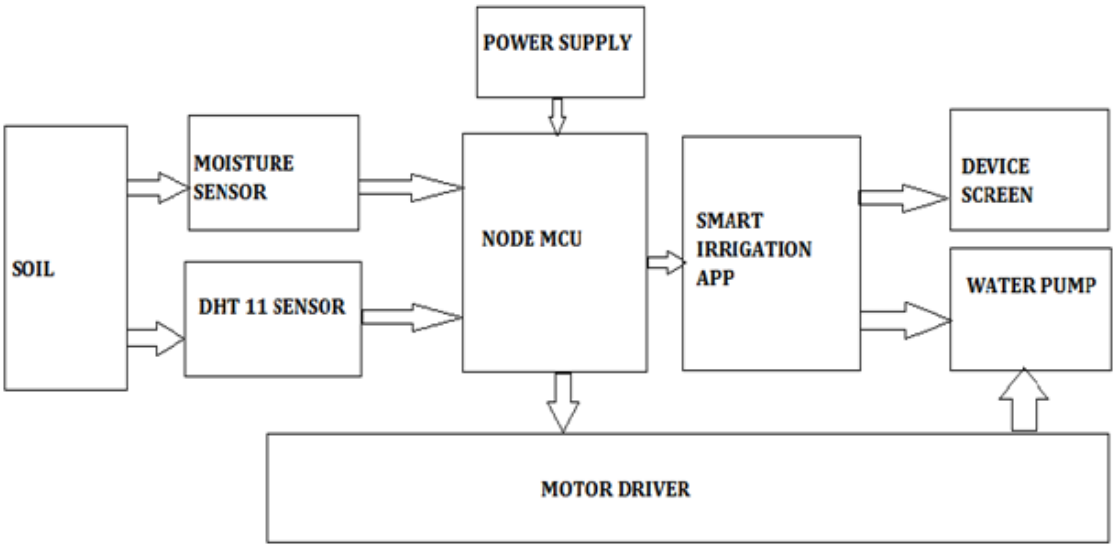

Figure no. 1 B.D. of smart Irrigation system

IoT Gateway: the Internet of Things gateway connects the sensors in the field to the cloud or command hub. It takes readings from the sensors and sends them over to a remote server or control hub for examination.

Cloud or Central Control System: the cloud or centralized control system, receives data from the IoT gateway and processes, analyses, and makes decisions based on that data. The data it collects may be stored and processed using cloud-based platforms or dedicated servers [20]. The cloud or control system must use smart algorithms to fine-tune watering times and distribution rates.

Communication Network: Information from sensors to the IoT gateway to the cloud or control system is transferred via the communication network. It may use a variety of technologies to ensure a continuous

connection, including cellular networks, Wi-Fi, and other wireless communication protocols. User Interface (Blynk Application): This interface enables communication between the human and the smart irrigation system. An irrigation system can be managed and observed in real time via a web interface, smartphone app, or dashboard. Users have the ability to view sensor data, customize adjustments, and establish irrigation plans.

Actuators (Motor Drivers): The part that controls how the irrigation system operates in response to commands from the cloud or control system is the actuator (motor driver) [21].

Power Supply: Without a dependable power source, a smart irrigation system's sensors, IoT gateway, communication devices, and actuators cannot operate. Combining mains power, batteries, solar panels, or other renewable energy sources can accomplish this.

The flow of data and control between the field sensors, the IoT gateway, the cloud or control system, the communication network, the user interface, and the actuators is depicted overall in the block diagram of an IoT-powered smart irrigation system. Real-time monitoring, data analysis, and intelligent irrigation management are made possible by this networked system, allowing for sustainable agriculture practices and effective water use.

2.2 Schematic Diagram

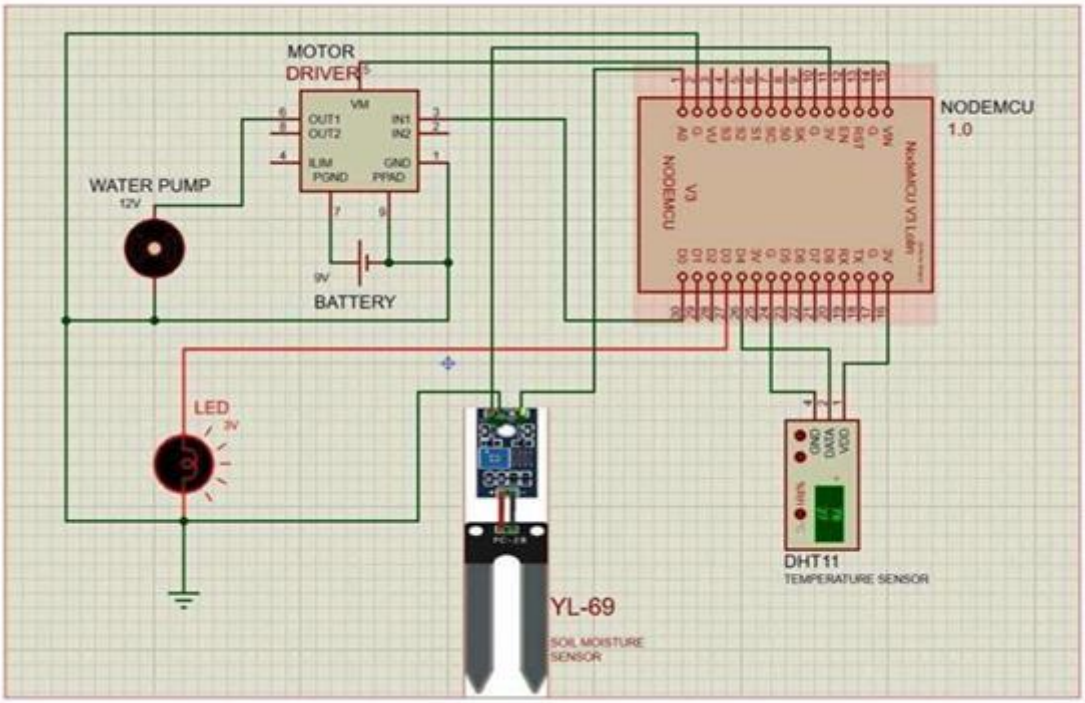

Figure No.2. Schematic diagram

Figure 2 displays the system's schematic diagram. Typically, a smart irrigation system that leverages the Internet of Things (IoT) is made up of multiple sensors and components that collaborate to effectively automate and manage the process of watering crops or plants. An example of a typical schematic diagram for this kind of system is as follows:

Source of Water: A water source, such as a well, municipal water supply, or rainwater collection system, is where the system starts. Water from this spring is sufficient for irrigation.

Water Pump: To extract water from the source and supply the required pressure for system distribution, an irrigation pump is utilized. Usually, a solenoid valve or motor is used to operate it.
Soil Moisture Sensor: This sensor detects the amount of moisture in the soil by being embedded in it. It aids in determining if irrigation is necessary or not.
DHT11 Sensor: Recording environmental variables, the DHT11 sensor is a data logger.
Using this information, the watering schedule is adjusted in accordance with the climate.
Control Unit/Microcontroller: An Arduino, NodeMCU, or Raspberry Pi is an example of a microcontroller that serves as the system's central processing unit (CPU). It receives input from sensors, processes it, and then uses the results to give commands to the various components of the system. Generally speaking, the microcontroller will must be connected to the internet in order to exchange data withother devices.
IoT Gateway: The microcontroller and cloud server can communicate thanks to the IoT gateway. It may connect to the internet via cellular networks, Ethernet, or Wi-Fi protocols.
Cloud Server: The data obtained from the microcontroller is stored and processed by the cloud server. Based on the data gathered, it maintains the irrigation schedule, conducts data analytics, and forecasts the weather. It also makes it possible to access and operate the irrigation system remotely.
User Interface: The user interface enables remote monitoring and control of the irrigation system through a web or mobile application. It offers historical analysis, real-time data, and the flexibility to change irrigation schedules and settings.
Solenoid Valves: These valves regulate the water flow to various areas for irrigation. The The microcontroller determines the required irrigation schedule and uses it to activate or deactivate the valves. and inputs from sensors.
Drip/Sprinkler System: Sprinklers or drip lines may be used in an irrigation system. positioned in the garden or field in a way that will uniformly distribute water to the plants.
All things considered, this schematic design shows how sensors, microcontrollers,
To develop a smart irrigation system, IoT connection, cloud servers, and user interfaces are combined. The system seeks to guarantee effective water use, minimize human intervention, and irrigation determined by environmental variables and real-time data

2.3 Working

Inserted into the soil, the Soil Moisture sensor (YL-69) detects the soil's moisture content. The temperature and humidity of the environment are sensed using the DHT11 sensor. The water pump is managed by the Motor Driver (L298N). The NodeMCU, a microcontroller unit, is coupled to the components listed above. To save the data, this NodeMCU is linked to the cloud environment. A mobile application has been created to assist in managing and tracking the individual moisture, temperature, and humidity parameter readings. The pump automatically turns on or off based on the amount of moisture in the soil. Finally, a dashboard displaying these parameters appears on the device's screen.

2.4 Flow Chart

The system flowchart is displayed in Figure 3. The module is powered on, and the app opens the Smart Irrigation dashboard. The DHT11 and Soil Moisture sensors measure the soil's moisture content and the surrounding air's temperature and humidity, respectively.

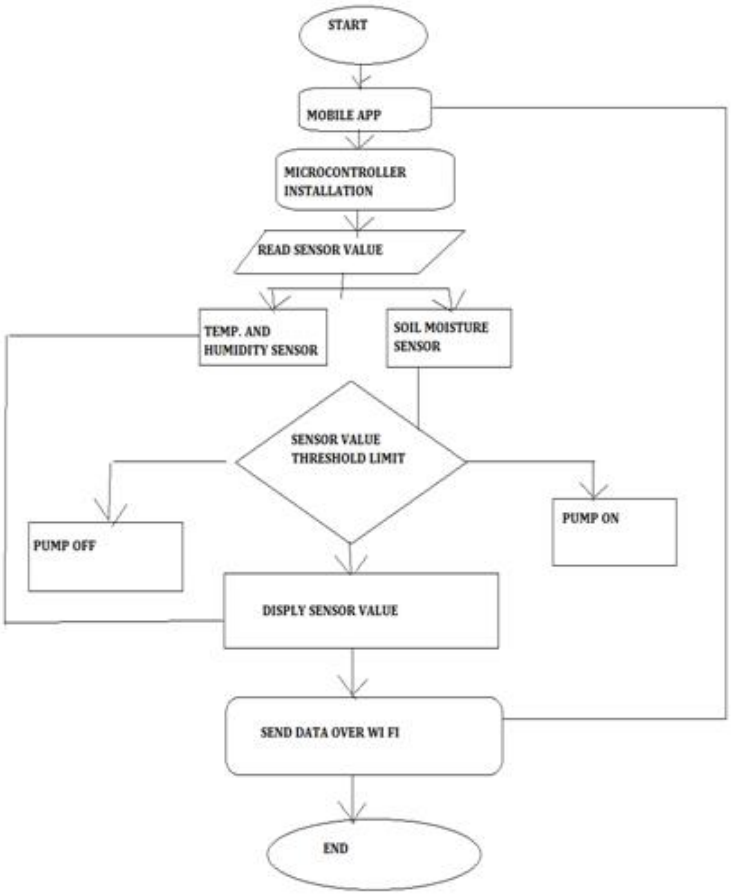

Figure No. 3 Flowchart

The pump activates when the soil moisture content falls below the 50% threshold. The pump will automatically shut off if the level of soil moisture hits the threshold. The mobile dashboard shows the corresponding parameter values. Wi-Fi is used to transmit this data.

III.RESULTS

There are a number of advantages to deploying an effective smart irrigation system with IoT technology. Here are a few possible outcomes:

Conserving water: The smart irrigation system delivers precise amounts of water when and where it's needed, optimizing water usage. By preventing overwatering and cutting down on water waste, this results in significant water conservation. Water supplies are protected as a result, and the negative effects of excessive irrigation on the environment are reduced.

Savings on costs: The smart irrigation technology lowers water usage and does away with labor-intensive manual irrigation procedures, saving consumers money on water bills. Over time, cost savings from optimized water usage make the system economically advantageous for farmers, companies, and households. optimal crop yields and healthier plant growth by applying the appropriate amount of water at the appropriate time. The technique reduces plant stress, disease susceptibility, and stunted growth by avoiding under- or overwatering. This leads to higher-quality product and more frequent harvests.

Time efficiency: The smart irrigation system's automation capabilities do away with the requirement for manual irrigation process intervention. Users can program when to water plants based on their needs and the conditions in their area, and the system will take care of the irrigation work on their behalf automatically. Users are able to focus on other crucial tasks because this saves them time and effort.

Environmental sustainability: The smart irrigation system helps to maintain the environment by maximizing water use and reducing water waste. It helps address the problem of water scarcity and lessens the demand on water resources.

Precision agriculture and data-driven insights: By gathering and analyzing data on a range of environmental variables, the smart irrigation system helps users obtain important knowledge about plant water requirements, soil types, and weather patterns. Making more accurate and well-informed decisions about crop selection, irrigation techniques, and resource management is made possible by this data-driven approach. It encourages the use of precision agriculture techniques, which result in more effective and sustainable farming methods. All things considered, an effective smart irrigation system with IoT technology can lead to data-driven precision agriculture, cost savings, enhanced plant health and yield, time efficiency, and environmental sustainability. These results show how IoT-enabled irrigation systems have the power to transform water management techniques and advance environmentally friendly gardening and farming. Figures 4 and 5 presents the cloud platform and the entire hardware configuration.

Figure 4. system setup

Figure No. 5 Cloud Setup

IV. CONCLUSION

concerns the management of water in commercial, residential, and agricultural contexts. Utilizing automation, real-time data, and remote control capabilities, these systems maximize plant health and productivity while conserving resources and water.

Precise monitoring of soil moisture levels, weather, and plant water requirements is made possible by the combination of IoT sensors and meteorological data. By using this information, the appropriate amount of water may be applied at the appropriate time to avoid overwatering, stress on plants, and diseases brought on by underwatering.

An intelligent irrigation system has advantages that go beyond saving water. The system can be conveniently and flexiblely controlled and monitored remotely by users using web interfaces or mobile apps. Because the automated capabilities do not require human irrigation activities, they save time and effort.

Economically speaking, the system is appealing to businesses, farmers, and households because it saves money on water usage. Furthermore, the system's data-driven insights facilitate improved decision-making with respect to crop selection, irrigation tactics, and resource management.

In the end, an Internet of Things-enabled smart irrigation system encourages environmentally friendly water management techniques, boosts agricultural output, and conserves the environment. It is a viable way to deal with issues related to water shortages, cut down on water waste, and encourage resource efficiency in a range of contexts.

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Student High Definition Monitoring Face Recognition Smart Attendance System

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ABSTRACT

Today's educational institutions are worried about students' consistent performance. The insufficient attendance is one factor contributing to the decline in student performance. The most popular techniques to record your attendance are to sign or call the pupils. It was problematic and took longer. A computer-based student attendance monitoring system that enables the teacher to maintain attendance records is now essential. In this paper, we used an intelligent attendance system based on face recognition.

In this paper it involves student's facial recognition smart attendance system .it is different from traditional old way of marking attendance instead of giving decay time for attendance we can use this method to saving paper work and time of teacher and students not worry about to missing their Attendance rather a calling their roll no one by one just time taking process. In this paper attendance automatically taken and automatically mark on Excel sheet. And also student database and teacher database also include to help teachers to categorize the attendance subject wiseand teacher database help teacher to login and logout with their respective subject and teacher have proper access this platform.

Keywords: Face Recognition, LBPH(Local Binary Pattern Histogram) Algorithm, Haar Cascade Algorithm.

I. INTRODUCTION

Every organization requires a robust and stable system to record the attendance of their students. and every organization have their own method to do so, some are taking attendance manually with a sheet of paper by calling their names during lecture hours and some have adopted biometrics system such as fingerprint, RFID card reader, Iris system to mark the attendance. The conventional method of calling the names of students manually is time consuming event. The RFID card system, each student assigns a card with their corresponding identity but there is chance of card loss or unauthorized person may misuse the card for fake attendance. While in other biometrics such as finger print, iris or voice recognition, they all have their own flaws and also they are not 100% accurate. Use of face recognition for the purpose of attendance marking is the smart way of attendance management system. Face recognition is more accurate and faster technique among other techniques and reduces chance of proxy attendance. Face recognition provide passive identification that is a person which is to be identified does not to need to take any action for its identity. Face recognition

involves two steps, first step involves the detection of faces and second step consist of identification of those detected face images with the existing database. There are number of face detection and recognition methods introduced. Face recognition works either in form of appearance based which covers the features of whole face or feature based which covers the geometricfeature like eyes, nose, eye brows, and cheeks to recognize the face.

II. LITERATURE SURVEY

According to Harsh Kumar, NishantBhati, PiyushBharadwaj,PratyushChoudhary, Ms.Akansha Sharma "Real Time Face Attendance System Using Face Recognition"2023 The technique used to solve the problem of inefficient and inaccurate attendance systems is the implementation of a real timeface recognition attendance system using deep learning algorithms. This system utilizes deep learning models, such as MobileFaceNet,for face detection and recognition. The face detection is performed using the ultra-light face detector model, while the face recognition is achieved using the MobileFaceNet.[1]

According to RohiniVhatkar, AnasShaikh, QadriHasan, Prof. Dinesh Deore. "Attendance Management System Using Face Recognition."2023 The technique used to solve the existing problem of attendance management is the development of an Attendance Management System using Machine Learning specifically face recognition technology.This system automates the attendance process by using biometric techniques to detect and recognize faces.[2]

According PayalPatil, Prof. Dr. S. Shinde, "Comparative analysis of facial recognition models using video for real time attendance monitoring system"2020Attendance reporting is one of the standard processes across the world in academic institutions. The key purpose is to encourage consistency in attending school which in turn improves the learning process for a student. The manual attendance system is widely used in the educational system which is time-consuming as well as laborious. The main concept behind the automatic attendance system is to apply facial recognition effortlessly compared to other biometric systems.[3]

According to Maria Ali, Hafiz UsmanZahoor, Ans Ali. "Smart Multiple Attendance System through Single Image", 2020In this system, a group image is captured from a high-resolution camera mounted at a fixed location to capture the group image for all the students sitting in a classroom. Next, the face images are extracted from the group image using a popular Viola-Jones algorithm followed by recognition using a convolutional neural network trained on the face database of students. We tested our system for different types of group images and types of databases.[4]

According to DrArunaBhat, ShivamRustagi, Shivi R Purwaha, ShubhangSinghal, "Deep-learning based group photo Attendance System using One Shot Learning",2020face recognition-based attendance system which can work with group photo of a class providing us a list of present students. It uses one shot learning based face recognition technique for our system which can work for new users by providing only a single image of them thus making the system very robust and efficient. The proposed work presents a fully functional android app and backend system architecture which can easily be utilized by any university or school without requiring any expensive infrastructure setup.[5]

According Naman Gupta, Purushottam Sharma, Vikas Deep, Vinod Kumar Shukla,"Automated Attendance System Using OpenCV"The technique used to solve the problemof inefficient and inaccurate manual attendance systems is image processing, specifically face recognition. This technique involves capturing and analysing images of students' faces to accurately detect and mark their attendance.[6]

According to SoumitraChowdhury, SudiptaNath,AshimDey and Annesha Das.“Development of an Automatic Class Attendance System using CNN-based Face Recognition”,2020 This paper represents the development of a face recognition based automatic student attendance system using Convolutional Neural Networks which includes data entry, dataset training, face recognition and attendance entry. The system can detect and recognize multiple person’s face from video stream and automatically record daily attendance.[7]

According to SamridhiDev, TusharPatnaik, “Student Attendance System using Face Recognition”, 2020 The technique used to solve the existing problem of efficient and accurate attendance management in educational institutions is the implementation of a realtime attendance system. This system utilizes algorithms such as K-nearest neighbor (KNN), convolutional neural networks (CNN), and support vec- tor machine (SVM) for face recognition and attendance marking.[8]

According to ArjunRaj.A, Arvind K, Chethan KS, Mohammed Soheb, “Face recognition based smart attendance system”2020 The image is enhanced using histogram equalization and inputted into face detection algorithms like Deep Neural Network (DNN). The LBPH Algorithm is used to recognize students' faces, cropping them for features like eye distance and nose distance. Students are marked present or absent based on these features, and their identification is recorded in a database.[9]

According to Radhika C. Damale, Prof.Bageshree. V.Pathak “Face Recognition Based Attendance System Using Machine Learning Algorithms, 2018 paper proposes a face recognition system using machine learning algorithms such as SVM, MLP and CNN. The system achieves good accuracy on a self-generated database but suggests improvements like using a better-quality webcam and expanding the dataset for better real-time performance.[10]

III.PROBLEM STATEMENT

To design and develop a student high definition monitoring face recognition smart attendance system.

IV. PROPOSED SYSTEM

Here in this section we have cover the detailed information of proposed system. Here we will see objectives of proposed system along with architecture, hardware and software requirements, algorithm, applications.

V. ARCHITECTURE

Following Figure represents Architecture of our proposed system

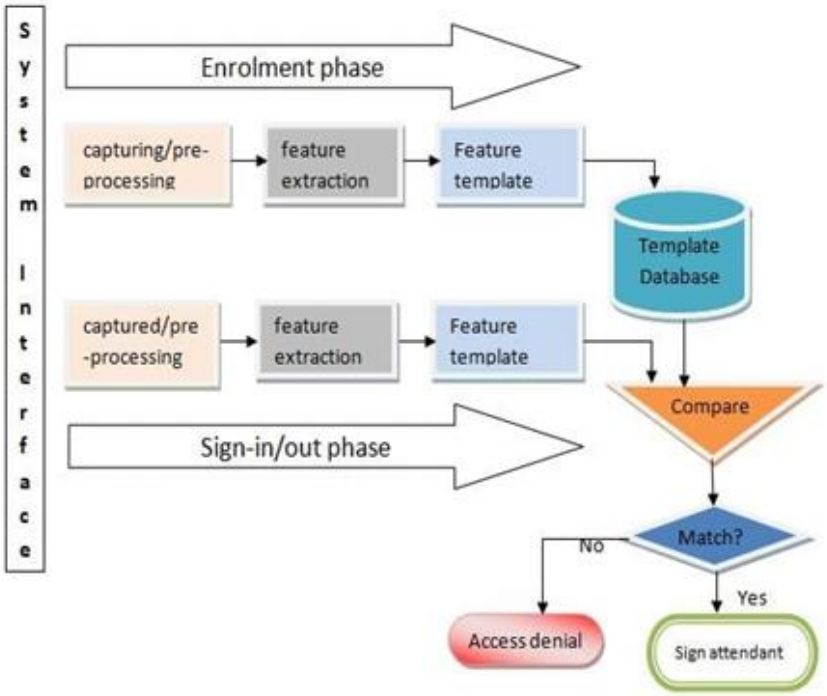

Fig.1. Architecture of face detection attendance system

The image you've shared is a flowchart representing the architecture of a biometric security system interface. It's divided into two main phases: the "Enrolment phase" and the "Sign-in/out phase". Here's a breakdown of the flowchart:

Enrolment Phase:

1. **Capturing/Pre-processing**: The system captures and preprocesses the biometric data (in this case, likely a facial image or fingerprint).
2. **Feature Extraction**: The system extracts unique features from the pre-processed data.
3. **Feature Template**: The system creates a feature template from the extracted features and stores it in the Template Database.

Sign-in/out Phase:

1. **Capturing/Pre-processing**: The system captures and pre-processes the biometric data of the person trying to sign in or out.
2. **Feature Extraction**: The system extracts feature from the pre-processed data.
3. **Feature Template**: The system creates a feature template from the extracted features.
4. **Compare**: The system compares the newly created feature template with the templates in the database.
5. **Match?** If there's a match, the system signs the attendant in or out. If there's no match, access is denied.

This architecture is commonly used in biometric security systems for access control or attendance tracking. It ensures that only enrolled individuals can sign in or out, enhancing the security of the system. Please note that the actual implementation may vary based on specific requirements and technologies used.

VI. OBJECTIVE

The objective of implementing a face recognition smart attendance system is to improve efficiency and accuracy in attendance tracking by leveraging advanced technology.

This system aims to automate the process, reduce manual errors, enhance security, and provide valuable data for better management and analysis of attendance records.

VII. ALGORITHM

- The use of facial data raises privacy issues and may infringe on individuals' rights, leading to concerns about data security and misuse.
- Face recognition systems can struggle with variations in lighting conditions and facial poses, reducing their accuracy in real-world environments.
- Implementing these systems on a large scale can be complex and costly, requiring significant hardware and infrastructure.
- Face recognition systems are susceptible to spoofing attacks, where a photo or video of an authorized person can be used to gain access.
- High computational and memory requirements can limit the practicality of deploying face recognition systems on resource-constrained devices.

VIII. RESULT &DISCUSSION

The student high definition monitoring face recognition smart attendance system discussed in the paper successfully addresses the issue of inefficient attendance monitoring in educational institutions by using face recognition technology to automatically mark attendance. The system is designed with specific hardware and software requirements, including a processor, RAM, operating system, and database.

The system functions well in various positions and variants, effectively marking each student's attendance using facial recognition technology. However, the paper also highlights limitations that need to be addressed for future improvements. These limitations include occasional struggles in identifying pupils at a distance and certain processing limitations. To enhance the system's performance, it may be beneficial to utilize a system with more processing power[1].

Overall, while the student high-definition monitoring face recognition smart attendance system shows promise in improving attendance monitoring processes in educational institutions, there is room for enhancement in terms of performance and functionality. Future improvements could focus on addressing the identified limitations to further optimize the system's efficiency and accuracy in marking attendance [1].

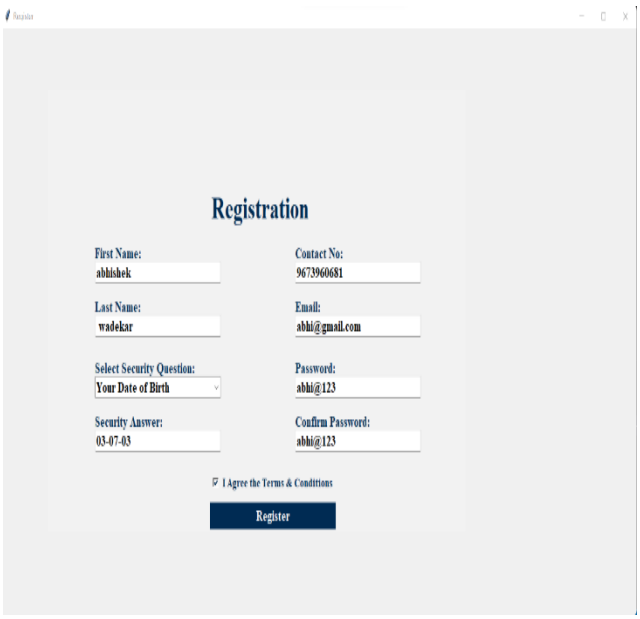

Fig: - registration page

This is registrantion page there is not login any one thye are registrantion first

fig: -login page

In this page the parson is login form

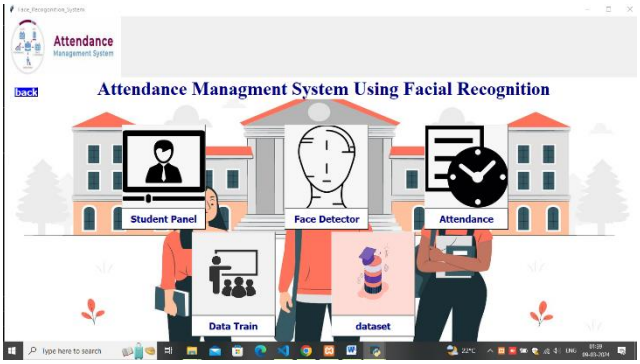

fig: feature

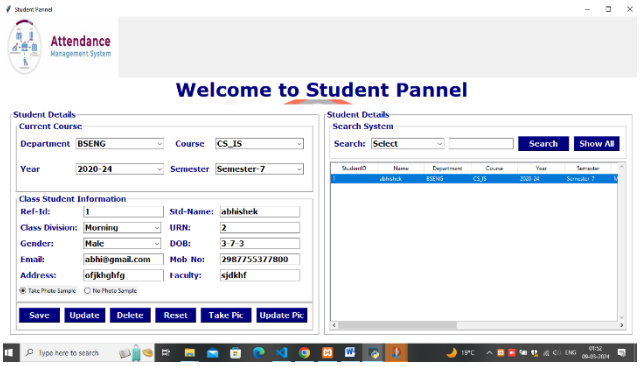

Fig: - information of Students

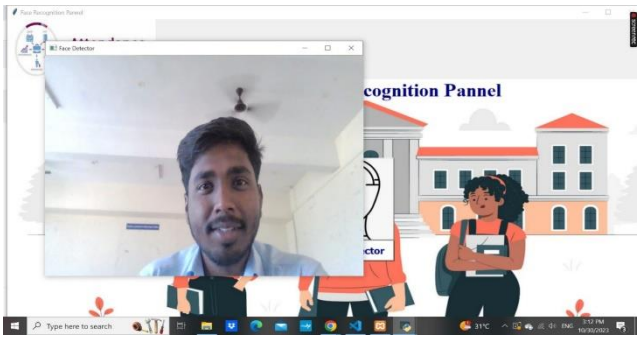

Fig: - train data base

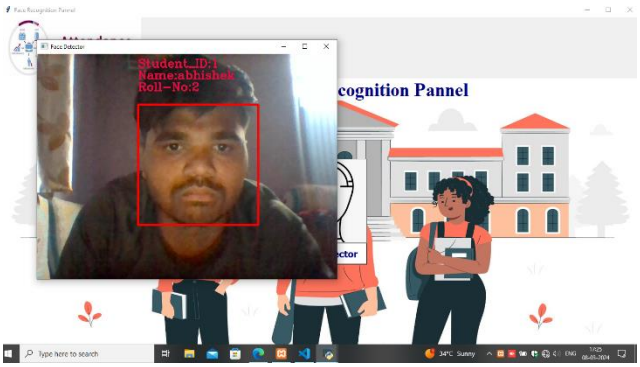

Fig: -detection of face with name and roll no

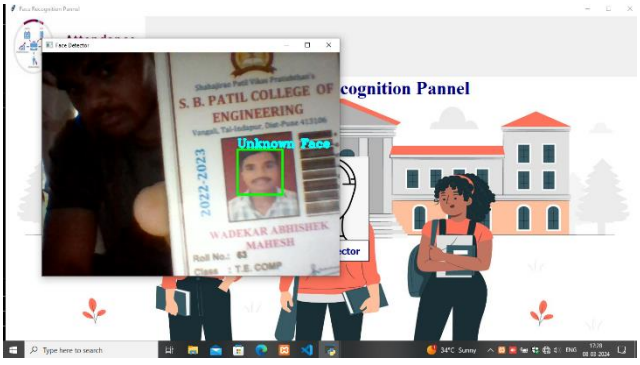

Fig :- 2d image not respond

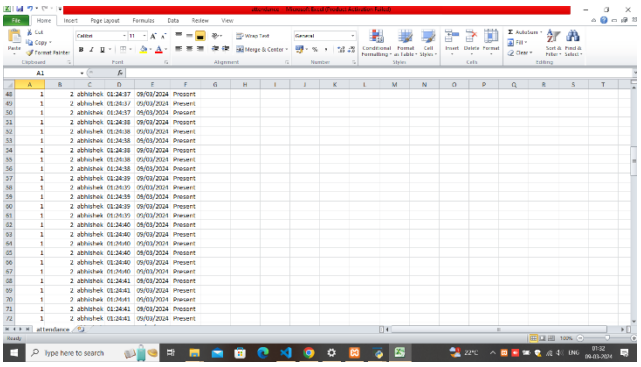

Fig: - Mark Attendance in excel sheet

IX. CONCLUSION

The problems with the current manual systems are addressed by the smart attendance management system. To improve the system and mark each student's attendance, we applied the facial recognition approach. The device functions admirably in various positions and variants. Future improvements to this system are required because it occasionally struggles to identify pupils at a distance. Additionally, there are certain processing limitations, so using a system with more processing power may help this system perform even better

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3-D Hand Geometry Based Recognition System for User Authentication Using Image Processing

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ABSTRACT

Biometrics which can be used for identification of individuals based on their physical or behavioral characteristics has gained importance in today's society where information security is essential. Hand geometry based biometrics systems are gaining acceptance in low to medium security applications. Hand geometry based identification systems utilize the geometric features of the hand like length and width of the fingers, diameter of the palm and the perimeter. The proposed system is a verification system which utilizes these hand geometry features for user authentication. This project introduces an inexpensive, powerful and easy to use hand geometry based biometric person authentication system. One of the novelties of this work comprises on the introduction of hand geometry's related, position independent, feature extraction and identification which can be useful in problems related to image processing and pattern recognition .Today students (class) attendance became more important part for any organizations/institutions.

Keywords: Hand geometry, hand features, radius distance methods, computational intelligence, hand biometric, palm geometry analysis, palm equations.

I. INTRODUCTION

Biometric characteristics such as palmprint [1], hand and finger geometry [2], fingerprint [3], Iris [4], etc. are mostly popular used in security systems over the traditional secure measures, password or ID cards. The biometric systems are more reliable because they cannot easily be lost, stolen, shared and duplicated. Palmprint features have advantages compared with other features. For example, palmprint has more information than fingerprint and it can be captured by low resolution devices such as digital camera, video camera. Furthermore, iris capture devices are more expensive than palmprint capture devices. The Principal lines and wrinkles are normally features extracted from palmprint image. The most researchers usually used them for identification process. The palmprint alignment which is the crucial preprocessing steps prior to the identification steps in the palmprint recognition system [5]. The previous works almost usedthree approaches for palmprint alignment. At the first approach, tangent-based approach [6] is a tangent calculation between two boundaries to find the key points for further used in palmprint alignment. A bisector-based approach [7, 8] is constructed the lines from the center of gravity of a finger boundary to find the key points. The last

approach is a finger-based approach [9]. Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology.[21] This method used a wavelet to detect the fingertips to assign the key points. Most of the previous approaches usually used hand acquisition devices with guidance pegs [2, 6, 8, 9] to fix the hand position to avoid the scaling, translation and rotation problems for correctly palmprint image alignment. But this mechanism makes some user feel uncomfortable and the palm must be contacted to image capture device during acquisition process so it is not hygiene for the user. In this paper, we proposed a new contactless palmprint image alignment method and further used in the person identification We find the robust reference point in the middle of palm using distance map applied on the binarized hand image. We use radius distance methods to find the position of the fingertip and the concave of the finger from the hand contour which are served as fiducial points used to estimate the affine transformation matrix. The reference palmprint image can then be aligned against the query palmprint image. The distance map error can be computed and used for person identification.A pixel form can be used for user cryptographic security in pixel form [10].

II. LITERATURE SURVEY

1. **Yutthana Pititeeraphab, Chuchart Pintavirooj "Identity Verification Using Geometry of Human hands":**A Palmprint, biometric characteristics, was mostly found in civil and commercial applications for security system because it has more reliable and easy to capture by low resolution devices. This research focuses on the development of hand identification and hand geometry using hand fea-tures, including the length of the hand, length and width of each finger, size of palm. We use radius distance methods to find the position of the fingertip and the concave of the finger from the hand contour. The radius distance method is highly flexible, accurately detecting the curves of fingertip and concave of finger.
2. **Zhizhong Han , Baorui Ma, Yu-Shen Liu , Member, IEEE, and Matthias Zwicker "Reconstructing 3D Shapes From Multiple Sketches Using Direct Shape Optimization**":3D shape reconstruction from multiple hand-drawn sketches is an intriguing way to 3D shape modeling. Currently, state-of-the-art methods employ neural networks to learn a mapping from multiple sketches from arbitrary view angles to a 3D voxel grid. Because of the cubic complexity of 3D voxel grids, however, neural networks are hard to train and limited to low resolution reconstructions, which leads to a lack of geometric detail and low accuracy. To resolve this issue, we propose to reconstruct 3D shapes from multiple sketches using direct shape optimization (DSO), which does not involve deep learning models for direct voxel-based 3D shape generation. Specifically, we first leverage a conditional generative adversarial network (CGAN) to translate each sketch into an attenuance image that captures the predicted geometry from a given viewpoint.
3. **Jiayun Wang, Jierui Lin, Qian Yu, Runtao Liu, Yubei Chen, and Stella X. Yu "3D Shape Reconstruction from Free-Hand Sketches":**Sketches are the most abstract 2D representations of real-world objects. Although a sketch usually has geometrical distortion and lacks visual cues, humans can effortlessly envision a 3D object from it. This suggests that sketches encode the information necessary for

reconstructing 3D shapes. Despite great progress achieved in 3D reconstruction from distortion-free line drawings, such as CAD and edge maps, little effort has been made to reconstruct 3D shapes from free-hand sketches. We study this task and aim to enhance the power of sketches in 3D-related applications such as interactive design and VR/AR games.

4. **Johnson I Agbinya Human Palm Geometry Modelling for Biometric Security Systems:**Palm print modelling and recognition systems have been extensively studied. Palm shape or palm geometry has had lesser attention paid to its study because of the difficulties associated with shape definitions and modelling. This paper reports on experimental determination of human palm geometryequations.Experimentaldetermination of human palm geometry was undertaken using measurements of hands of 14 subjects drawn from a mixture of racial and gender backgrounds. By also analysing scanned images of their hands, characteristic measurements of their palms were determined. Characteristic expressions describing the geometry of human hands are proposed. model can use the dataset needed for bot detection on its own.
5. **Hesham Hashim Mohammed *, Shatha A. Baker*, Dr. Ahmed S. Nori** "Biometric identity Authentication System Using Hand Geometry Measurements:**In recent years hand geometric dependent biometric system has shown to be the quite acceptable biometric trait and suitable for security applications. It has been recognized as an effective means of authenticating identity in a variety of commercial applications as a result of better hardware and improved algorithms.
6. **MarcosFaundezZanu,"BIOMETRIC VERIFICATI ON OF HUMANS BY MEANS OF HAND GEOMETRY1":** This Paper describes a hand geometry biometric identification system. We have acquired a database of 22 people, 10 acquisitions per person, using a conventional document scanner. We propose a feature extraction and classifier. The experimental results reveal a maximum identification rate equal to 93.64%, and a minimum value of the Detection Cost Function equal to 2.92% using a Multi Layer Perceptron Classifier.
7. **Min-Yu Wu a , Pai-Wen Ting a , Ya-Hui Tang a , En-Te Chou a , Li-Chen Fu a,b,"Hand pose estimation in object-interaction based on deep learning for virtual reality applications q,q" :** Hand Pose Estimation aims to predict the position of joints on a hand from an image, and it has become popular because of the emergence of VR/AR/MR technology. This paper develops a system that accurately estimates a hand pose in 3D space using depth images for VR applications. We propose a data-driven approach of training a deep learning model for hand pose estimation with object interaction. In the convolutional neural network (CNN) training procedure, we design a skeleton-difference loss function, which effectively can learn the physical constraints of a hand. Also, we propose an object-manipulating loss function, which considers knowledge of the hand-object interaction, to enhance performance.
8. **Johnson I Agbiny," Human Palm Geometry Modelling for Biometric Security Systems":**Palm print modelling and recognition systems have been extensively studied. Palm shape or palm geometry has had lesser attention paid to its study because of the difficulties associated with shape definitions and modelling. This paper reports on experimental determination of human palm geometry equations. Experimental determination of human palm geometry was undertaken using measurements of hands of 14 subjects drawn from a mixture of racial and gender backgrounds. By also analysing scanned images

of their hands, characteristic measurements of their palms were determined.A pixel form can be used for user cryptographic security in pixel form[10].Author presented an algorithm for detecting and preventing Node isolation attack where attacker become the sole MPR of victim and isolated the victim from the rest of the network.[12].

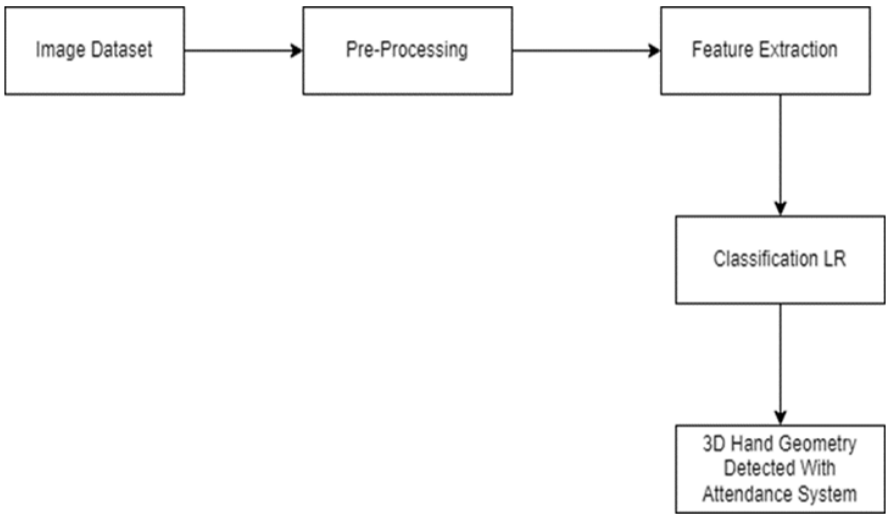
The detailed survey given in this paper [15].

Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[20]

III.PROPOSED SYSTEM

A) **ProblemStatement:**The Userauthentication is a critical component of ensuring the security and privacy of various systems and applications. Traditional methods like passwords and PINs have proven to be vulnerable to attacks, and more robust and secure authentication methods are needed. One such method is hand geometry-based recognition, which utilizes the unique geometric features of an individual's hand for authentication purposes. Identify relevant features from the 3D hand geometry data that may contribute to attendance prediction.

B) **Block Diagram:**



C) **REQUIREMENTS**

I. Hardware Requirements:

- Processor - Intel i5
- Speed - 3.1 GHz
- RAM - 4Gb(Min)
- Hard Disk - 256GB

II. Software Requirements:

- Operating System- Windows

- Database - SQLite
- Language -Python
- IDE -Spyder

D) RESULT SCREENSHOTS AND DISCUSSION:

Here this section covers the result of implemented project.

Fig. Login Page

The login page added the biometric authentication details of the users, enhancing touch less authentication and System Security.

Fig. Registration Page

The registration page ensecure the the user's data stored in the database and the information of the user's for the attendance.

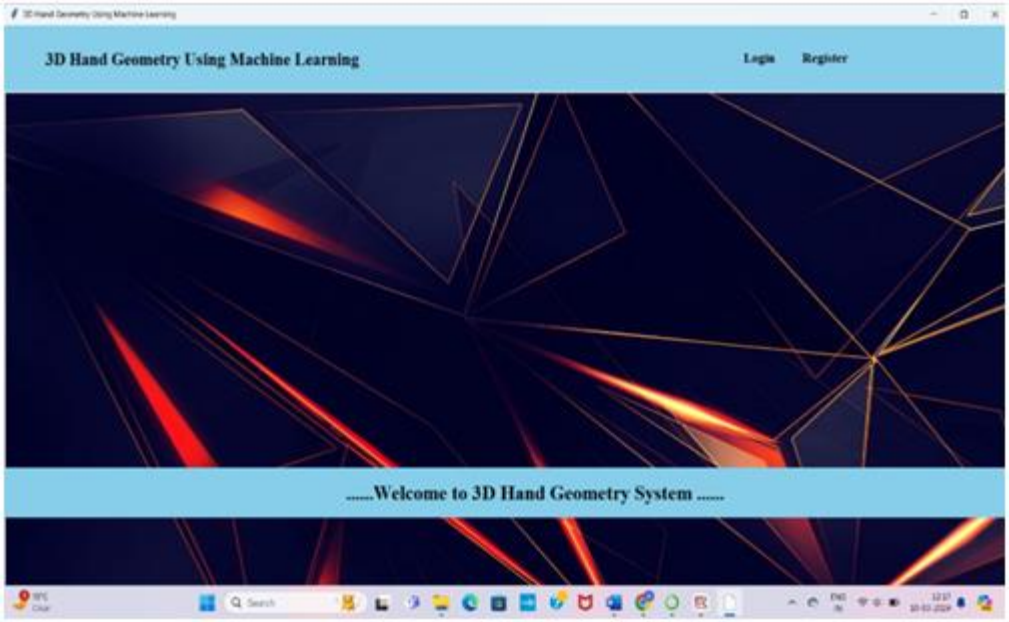


Fig. GUI Page

The GUI(Graphical user interface) page has for the our starting page and it's included the login and registration button, enhancing the user's point of view

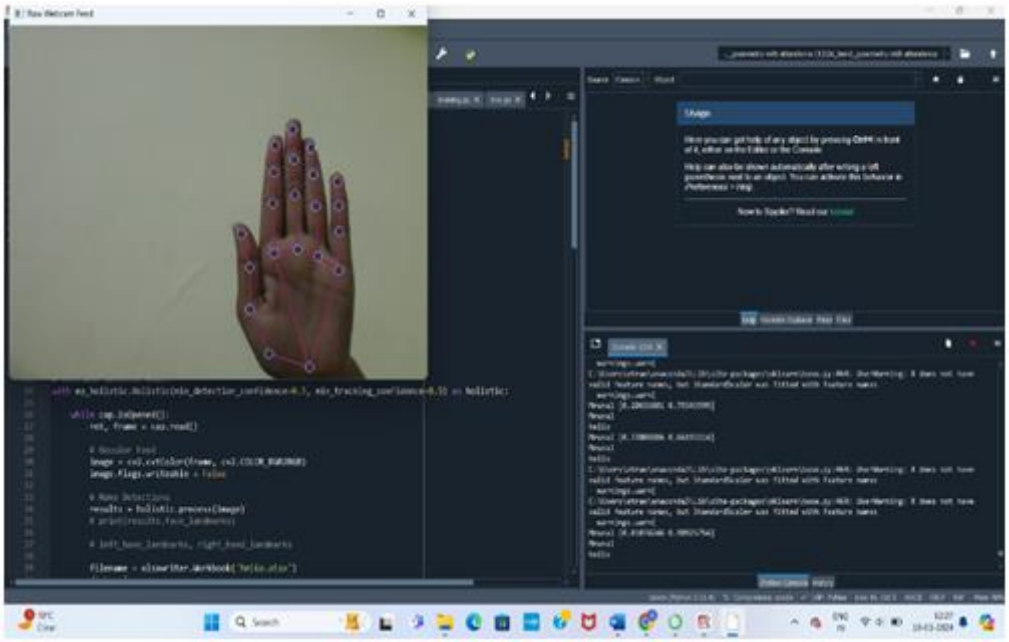


Fig. Hand Geometry For Detection

The hand geometry page for authentication of the user's name and roll number for ensuring the attendance and stored the data provides the secure touchless attendance system.

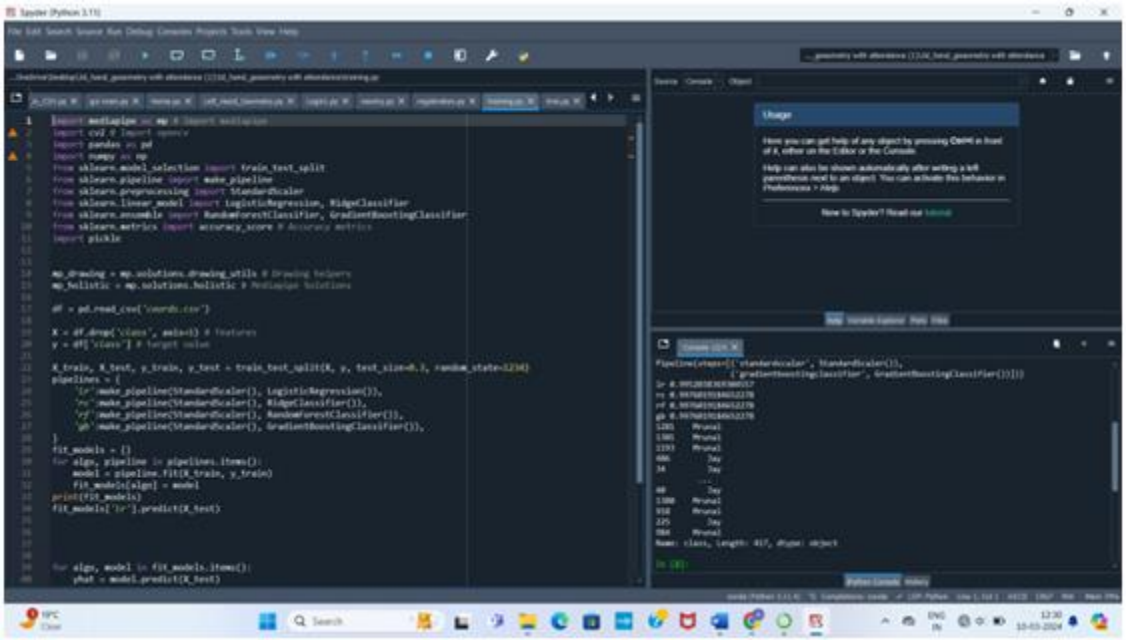


Fig. Final Page

The page of Training is used to take the student 3D hand geometry and scanning the whole hand of the student. Train the dataset by using the hand cords and this makes more secure system.

IV. RESULT DISCUSSION

3D hand geometry analysis involves the examination of various hand dimensions and shapes in three-dimensional space. This technology is often employed for biometric purposes, security systems, or virtual reality applications. The discussion can encompass accuracy, applications in authentication, potential privacy concerns, and advancements in capturing and processing 3D hand data.Display Screenshots showcasing the results obtained by the Machine Learning models like Logistic Regression.

V. CONCLUSION

The development and implementation of 3-D Hand Geometry Based Recognition System For User Authentication represent a significantstepforwardinthesafely using of the touchless attendance system,offeringpromisingsolutionstoaddressthe challenges posed by the infectious diseases.The conclusion is that we proposed the new contactless palm print alignment method with the general web camera and the screen. This method used the corresponding key points from the fingertips and the concave of the fingers to find the affine transformation matrix which was used to align set of inquiry palm-print image against set of reference palm print image. To improve the specificity for person identification, another features vector which contains the physical parameter extracted from the finger and palm including the length and width of

the finger was used. The proposed technique was tested successfully for person identification. The result is very promising with 90% accuracy.

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Synthetic Fuels – A Review

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ABSTRACT

For almost ten years, researchers have been studying artificial fuels in an effort to identify alternative energy sources. There has been a focus on intensifying the transition recently because the world's climate circumstances are quickly drawing to an end. A wide range of substances known as synthetic fuels can be used in place of more conventional fuels like petrol and diesel. This paper offers a thorough analysis of synthetic fuels, emphasizing their categorization and methods of manufacture. After providing a thorough introduction, the article essentially categorizes the main synthetic fuels that are now produced on an industrial basis. In order to assist readers grasp the fundamental science underlying synthetic fuels, this article goes on to describe their feedstock's and manufacturing methods in further detail and includes comprehensive equations and graphs. The effects of these fuels are also examined, as are the major figures in each industry. This study intends to promote a knowledgeable conversation about the future of energy and the potential contribution of synthetic fuels to lessening our dependency on fossil fuels by highlighting the advantages and disadvantages of these fuels.

I. INTRODUCTION

People and ecosystems are impacted by climate change in a variety of ways, making it a complicated and multifaceted problem [1-3]. The necessity to promote the idea of climate change is no longer present. Even if it's a tired subject these days, it's still urgently needed. The overwhelming opinion among scientists is that human activity is the primary driver of climate change, which is occurring today and is genuine [4-6]. Global warming's effects are already being felt, and if we don't do something to solve the issue, they will probably get worse and spread faster [7-9]. Frequent heat waves [10,11], extreme weather events [12,13], rising sea levels [14], altered precipitation patterns [15], loss of biodiversity due to animals urging to withstand the rising temperatures [15], effects on human health, the economy, and so forth are some of its obvious main effects. Many people continue to see climate change as a distant or abstract threat, even in light of how urgent the issue is, and they might not even be aware of how it is already impacting their lives [16].This is partially because of the manner that political and media circles frequently address climate change. It is portrayed as a remote, technical problem that has nothing to do with people's daily lives [17, 18].In actuality, climate change poses a

serious and immediate threat. The repercussions on people and ecosystems worldwide are likely to be more severe and the problem will be more difficult and expensive to solve the longer we ignore it.

Thankfully, there are a lot of climate change solutions that can be implemented right now give the resources, knowledge, and technology at our disposal. Many international climate change movements have emerged in recent decades, uniting people, groups, and governments in an effort to increase public awareness and create a roadmap for the shift to a more sustainable future. A broad spectrum of actors are also involved in the movement, from community organizers and grassroots groups to decision-makers in industry, science, and politics. There are numerous approaches to combating climate change, and the most successful one will probably include several distinct tactics. Among the most important countermeasures against climate change are:

Renewable energy: Switching to renewable energy sources like wind, solar, and hydropower is one of the most significant ways to combat climate change. Clean, plentiful, and sustainable, renewable energy can lessen greenhouse gas emissions and lessen the effects of climate change. Solar photovoltaic, wind turbine, hydroelectric power plants, geothermal energy, and tidal energy technologies are a few examples of renewable energy technology.

Energy efficiency: Reducing energy use to maintain the same level of service is a key component of energy efficiency, which is another significant response to climate change. Numerous strategies, including improved insulation, more energy-efficient appliances, and intelligent transportation networks, can help achieve this.

Carbon capture and storage (CCS): This technology stores carbon dioxide emissions underground, keeping them out of the environment by capturing emissions from power- plants and other sources. Climate change effects can be lessened and greenhouse gas emissions can be decreased with the use of CCS [19].

Synthetic fuels: Also referred to as e-fuels or artificial fuels, synthetic fuels are made from renewable or non-renewable resources and have properties similar to those of fuels obtained from fossil fuels. They can be utilized in place of conventional fossil fuels for a number of purposes, including power generation, heating, and transportation.

Carbon pricing: A strategy that uses taxes or cap-and-trade programs to set a price on carbon dioxide emissions is known as carbon pricing. As a result, companies and individuals have financial motivation to cut emissions and switch to greener technology [20].

This paper is devoted solely to the topic of synthetic fuels; it provides a quick overview of their necessity as well as an explanation of the categories and procedures involved in the creation of each main kind of synthetic fuel. The fact that synthetic fuels can replace current fuels and contribute to the reduction of greenhouse gas emissions is one of the main reasons they are being considered here and why they will be necessary in the future [21]. Fossil fuels are extensively relied upon for many critical modern activities, including transportation and electricity generation, which release copious amounts of greenhouse gases, including carbon dioxide, into the environment. This fuels climate change and other environmental issues.In contrast to fossil fuels, synthetic fuels may be created with renewable electricity, which lowers greenhouse gas emissions [22]. Porsche, a German car manufacturer, successfully tested the concept of using 100% synthetic fuel instead of fossil fuel in 2022 [23]. This fuel is made from water and carbon dioxide that is taken from the air. Further sections cover a detailed discussion of the methods required in bringing this notion to reality.Synthetic fuels are also more portable and easily stored than some other renewable energy sources, like solar and wind power [24]. This makes them a more flexible and dependable energy source. The fact that synthetic fuels can contribute to

increased energy security is another reason why they will be necessary in the future [25]. Due to their heavy reliance on imported fossil fuels, many nations are susceptible to changes in price and disruptions in supply [26].

II. SYNTHETIC FUELS AND THEIR CLASSIFICATIONS

Fuels that have been chemically synthesized to imitate the physical and chemical characteristics of fossil fuels are known as synthetic fuels [27–29]. They are usually produced by chemical processes that transform non-fossil or renewable feedstock's into fuel, such as carbon dioxide, water, and biomass. They can be utilized in place of fossil fuels for a number of purposes, such as heating, power generating, and transportation [30, 31]. Given that they can be produced from carbon-neutral feedstock's like biomass or carbon dioxide that has been collected, they may be able to lower greenhouse gas emissions. Because of this, greenhouse gas can be used as a raw material to create renewable energy-based substitutes for natural gas, diesel, and petrol [32]. This indicates that the carbon dioxide extracted from the atmosphere during their creation balances the carbon dioxide emissions linked to their use and manufacturing. On the other hand, burning fossil fuels releases a significant amount of carbon dioxide, which contributes to climate change. In addition, they may be able to supply a more consistent and dependable energy source for transportation than electric batteries [31]. Electric batteries are an effective and clean energy source, but they are dependent on the grid for electricity, which can be interrupted by power outages or natural disasters. Contrarily, synthetic fuels are more resilient to disturbances because they can be transported and stored like conventional fossil fuels [33].

The development and application of new technology, as well as the enactment of laws that encourage their usage, will determine the synthetic fuel industry's future, which makes predictions difficult. However, in order to lower greenhouse gas emissions and increase energy security, synthetic fuels will probably become more prevalent in the energy mix in the future.

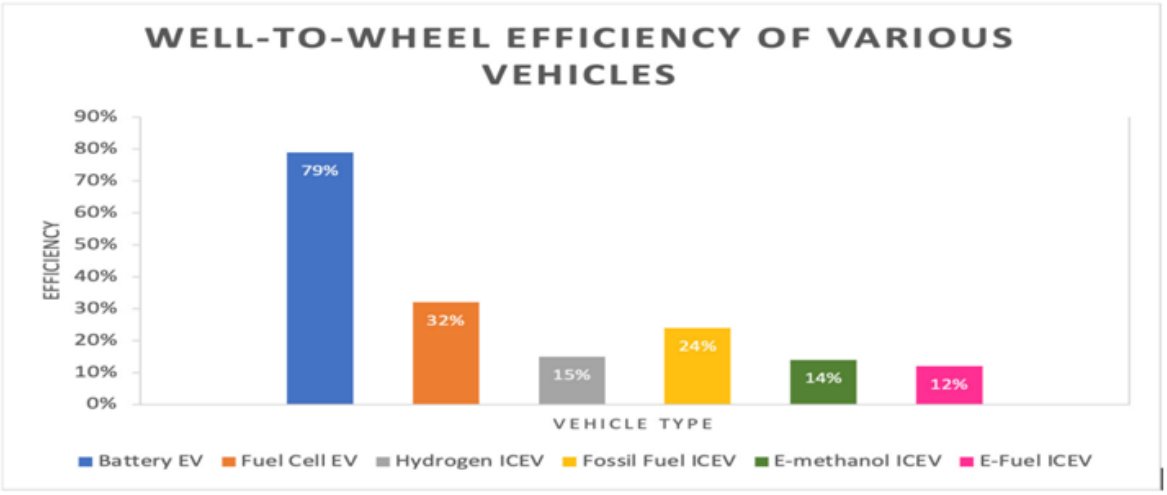

Fig 1. Chart comparison of well wheel efficiency between various fueled vehicles.

It is difficult and contextual to classify synthetic fuels into wide, mutually exclusive groupings since it depends on many of the discussed characteristics, including chemical composition, application, sustainability, feedstock, and production process. Because it makes it possible to create thicker groupings of related fuels, this study has chosen to categories synthetic fuels according to their feedstock in order to keep things simple. A deeper comprehension of the many important synthetic fuels covered in the paper can be achieved with the help of this classification scheme. The classifications depending on feedstock are-

1. Biofuels: These are artificial fuels made from biological materials, like waste materials, animal fats, or vegetable oils. Biodiesel, bioethanol, and biogas are a few types of biofuels.
2. Hydrogen fuels: These artificial fuels are created when hydrogen reacts with other molecules, most frequently carbon dioxide. Methanol, DME, and synthetic natural gas are a few fuels that fall within this category.
3. Power-to-liquid (PtL) fuels: These are synthetic fuels made by converting carbon dioxide and water into liquid fuel using electricity derived from renewable sources. Synthetic diesel, synthetic petrol and synthetic aviation fuel are a few types of PtL fuels.

III.BIOFUELS

Synthetic fuels made from animal fats, vegetable oils, and other biomass are known as biofuels [44, 45]. Feedstock, which is defined as the raw material used as input for fuel production, includes recently decomposed or live plant material as well as animal wastes used in the manufacturing of biofuels. Non-edible seeds are the source of the vegetable oil that is extracted and utilized as feedstock. For example, in India, the oil required to produce biodiesel is extracted from non-edible seeds like Neem, Mahua, Jatropha, and Karanja [46]. Other biomass feedstock's include sugarcane bagasse, rapeseed harvest, olive, agricultural residue, and waste cooking oil [47]. The feedstock for animal fat is obtained from slaughterhouses, while the feedstock for fish oil is obtained from fish processing companies.

Fuels classified as "gas-to-liquids" (GtL) are synthetic fuels made from natural gas or other gases used as feedstock's. Synthetic diesel, synthetic petrol and synthetic aviation fuel are a few types of GtL fuels. In contrast, fossil fuels are non-renewable and are derived from the remains of long-dead vegetation and fauna. In contrast, biofuels are thought to be a renewable energy source because their feedstock can be grown again endlessly. The concept of carbon neutrality states that when they are used, or burned, carbon dioxide (CO_2) levels do not increase because the majority of their ingredients are obtained from plants [48]. However, because of their similarities to fossil fuels, they are a desirable alternative fuel that can be employed in locations where fossil fuels are currently used, such as internal combustion engines.

Four "generations" of biofuels have been identified based on the kind of feedstock that is utilized [49]. The feedstock for first-generation biofuels comes exclusively from sources that are related to food. When we talk about food-based, we're talking about plants and animals that humans eat. These consist of sugarcane, vegetable oils, carbohydrates, cereal crops, and animal fats from meat. Microorganisms that ferment the feedstock and then process it to produce the necessary biofuel are primarily responsible for this generation's production [50]. After harvesting crops and removing all of their edible portions, non-food sources including wood, straw, and other leftover materials are used to produce the second generation [50]. They are also known as cellulosic biofuels because of their high cellulose component. Animal fats and oils that are not edible are also a part of the second generation. Because they are also known as algal biofuels, certain species of oil-producing algae create the third generation. Since there is a limited supply of this type of biofuel for production, large-scale production using these methods is currently being developed [51]. The fourth generation, the last and most recent sector, is created in state-of-the-art labs using cutting-edge biochemistry procedures. But before this generation is commercially used, it must first undergo experimentation [52].

Figure 2 depicts the generational groupings. Among the notable biofuels are biodiesel, bio-ethanol, bio-methanol, biogas, bio hydrogen, bio ethyl tertiary-butyl ether (ETBE), and bio MTBE.

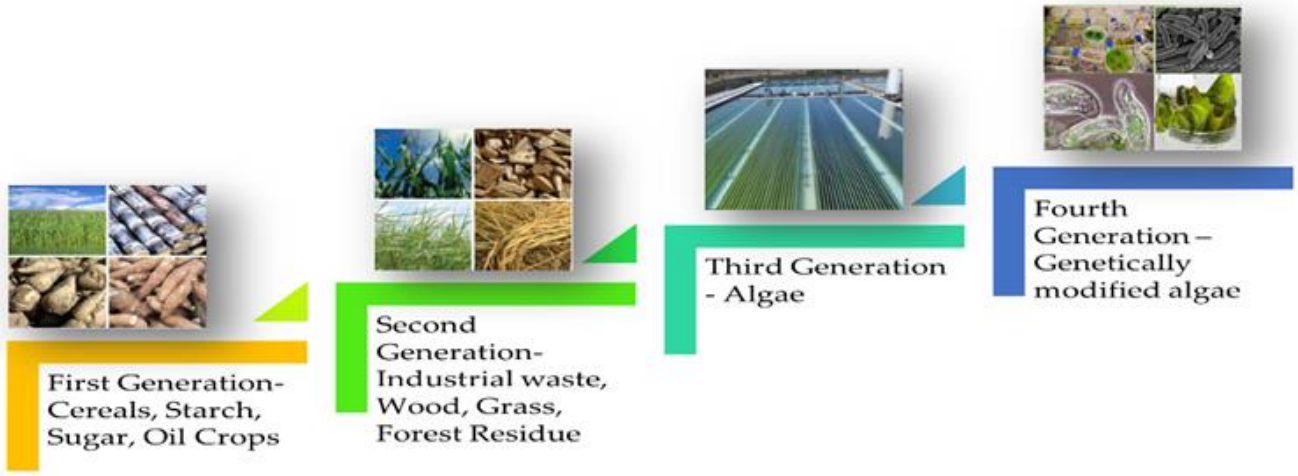

Fig 2 – Generations of Bio-Fuels

Biodegradability, non-flammability, low toxicity, safety, high combustion efficiency, abundance, lubricating nature, high cetane number, reduced emission, and renewability are some of the benefits of biofuels. Low calorific value, nitrous oxide emissions, short shelf life, and a propensity to induce engine wear are some of its drawbacks [53, 54]. Because of their miscibility, they can be combined with fossil fuels or used in their pure form [55]. Blends of biodiesel are referred to by the notation Bxx, where xx denotes the percentage of biofuel in the mix. B40, for instance, denotes a blend of 40% biofuel and 60% fossil gasoline. Existing internal combustion engines can use a blend up to B20 without requiring modifications to their structural design [56].In the subsections that follow, the commonly manufactured and consumed biofuels are covered in more detail, along with details about their production methods and pertinent graphics. The European Union is the biggest producer of biofuels as of 2022. Its most recent, ambitious policies are to blame for this [57].

3.1 Bio Diesel

Fatty acid alkyl esters, or FAAEs, are the building blocks of biodiesel, which is regarded as a competitive low-carbon diesel substitute, especially for the transportation industry [58,59]. Four basic processes can be used to make biodiesel: pyrolysis, trans esterification, micro-emulsion, and oil blends. Because of the high quality of gasoline generated, the trans esterification route is the most chosen one [60]. The fatty acids in vegetable oil or animal fat are transformed into esters by the environmentally benign chemical process of trans esterification [55]. Usually, an alcohol, like methanol or ethanol, and a catalyst, such potassium hydroxide or sodium hydroxide, are used in this reaction [61,62]. Temperature is the characteristic that affects yield the most, followed by reaction time and pressure. The trans esterification reaction's overall response is-

Triglyceride + ROH + NaOH Biodiesel + Glycerol (1)

Glycerol is a byproduct of this process that is usually extracted and used in other applications, including soap or animal feed. The fatty acids in the vegetable oil or animal fat combine with the alcohol in this reaction to form biodiesel and glycerol [63, 64]. The process of producing biodiesel is comparatively easy to understand and may be done on a small or large scale with a range of different feedstock's. In comparison to diesel derived from petroleum, biodiesel is a flexible fuel with many uses that provides a number of benefits, such as better air quality, lower greenhouse gas emissions, and increased energy security [65–67]. It is noteworthy that while FT-diesel (examined in subsequent parts) is often frequently referred to as biodiesel, it is distinct from the FAME biodiesel that is the subject of this section [68]. The high cost and low efficiency of biodiesel are major barriers

to its widespread commercialization [69]. The availability of this fuel is further limited by the high cost of feedstock and the absence of infrastructure necessary to transport substantial volumes of biodiesel from refineries to densely populated areas. Several businesses and groups are actively engaged in the creation, testing, and production of biodiesel as of 2022. Neste, a Finnish enterprise, is a prominent manufacturer of sustainable diesel fuel. The company makes sustainable diesel and other synthetic fuels from a variety of feedstock's using a patented process called "NexBTL" that was first introduced in 1997 [70]. As of 2022, World Energy, a US-based business with a network of production sites throughout the country, is a top producer of renewable diesel and biodiesel.

3.2 Hydrogenated Vegetable Oil (HVO)

Triglycerides and fatty acids are found in a range of vegetable oils and fats that are used to make HVO, an alternative fuel. Hydro-processed esters and fatty acids, or HEFA, are sometimes known as HVO [71]. Green diesel or renewable diesel are some names for it. It is produced by hydrocracking and hydrogenating paraffinic hydrocarbon lipid forms, with vegetable oil, tallow, and animal fat serving as its feedstock [72]. Out of all the feedstock's, rapeseed has the greatest product yield of HVO [73]. While biodiesel is manufactured through trans esterification, HVO is made through a hydro treated technique, despite both products being derived from similar feedstock's [74]. This distinction aids in enhancing HVO's oxidative stability. This makes it more resistant to bacterial development than biodiesel, which makes it a superior option for intermittent and long-term uses [75]. Although it has a lower density and energy content than fossil diesel, its chemical properties are similar to those of diesel [76]. In addition, it lacks oxygen, sulphur, aromatic hydrocarbons and has a high cetane number [77]. Currently ranked as the second most popular renewable diesel substitute, it is combined with fossil diesel blends that are sold at gas stations [78–80]. Figure 3 displays the HVO manufacturing flow diagram. Equation (2) shows the general reaction for the formation of HVO.

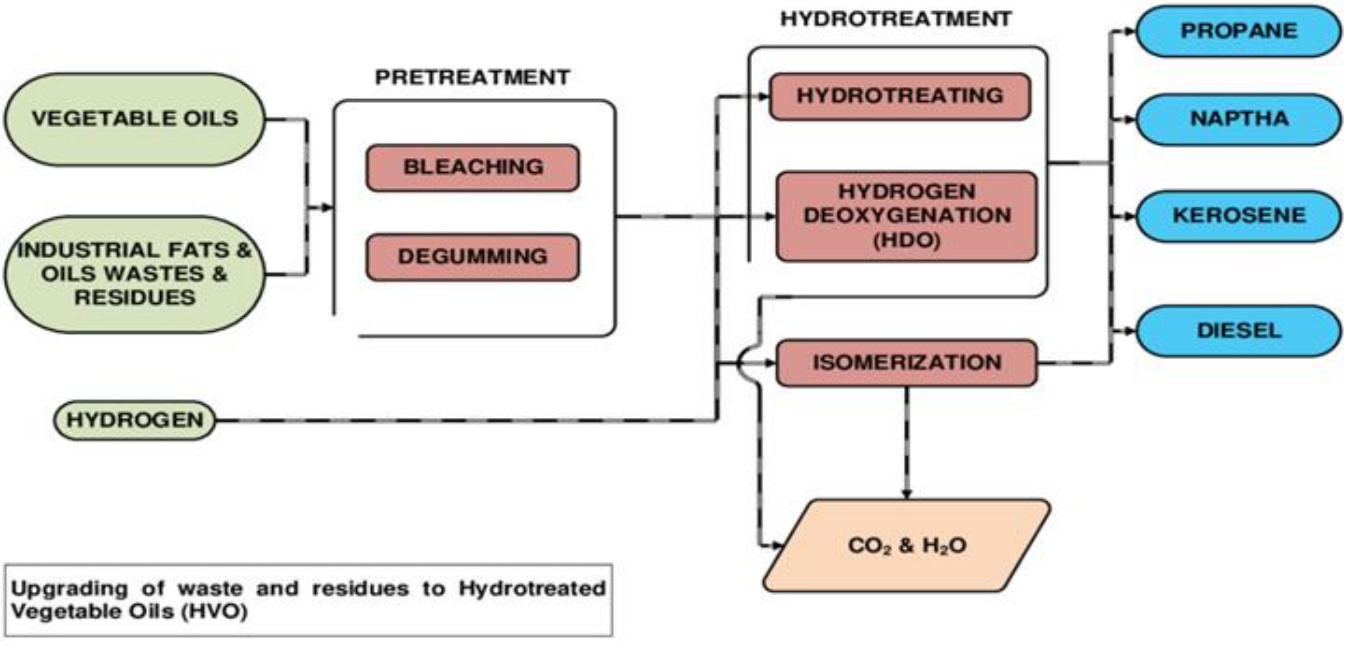

Fig 3 HVO Production Process

HVO manufacture is a multi-step, intricate process that calls for specific tools and knowledge [81]. The fatty acids in the vegetable oil or animal fat are first transformed into paraffin, olefins, and naphthene by a sequence of chemical processes, as illustrated in the equation. These chemicals are then combined to generate the HVO

fuel [82, 83]. Compared to biodiesel, the resultant fuel has several benefits, such as increased stability, increased energy density, and enhanced handling qualities. Because of this, HVO is being utilized more frequently in place of diesel derived from petroleum in a number of applications.HVO has higher capital requirements for manufacturing than synthetic and biodiesel, even if it is comparable to them in terms of cetane number and other fluid qualities [84]. As of 2022, major participants in the large-scale production of HVO include Total, Emerald Biofuels, World Energy, Neste, Preem, Petrobras, Nippon Oil, and ENI. Major producers of gensets, marine engines, and aircraft engines, including Rolls-Royce, started making investments in its increased use in 2022 [85].

3.3 Bio-Methanol and Bioethanol

One kind of biofuel is bioethanol, which is made when yeast is used to ferment biomass, like corn or sugarcane [86]. The resultant liquid can be utilized in traditional petrol engines and combined with petrol to make fuel [87,88]. E10, which is frequently available at gas stations, is a mixture of 10% bioethanol and 90% unleaded petrol. There is also another blend called E85, which has 85% ethanol by volume. On traditional engines, this mixture cannot be used consistently because it will eventually wear down the engine [89, 90]. However, a specifically engineered E85 engine shows promise and allows for engine operation at lower temperatures [91,92]. Compared to petrol, bioethanol offers a number of benefits, such as lower greenhouse gas emissions and better air quality [93]. It is important to remember that ethanol and bioethanol are identical chemically. The nomenclature distinction suggests that bioethanol is ethanol made by fermentation, a biochemical process that primarily uses organic matter as feedstock. Harvesting the biomass, processing it into a fine powder, and combining it with yeast and water to make a mash are the stages involved in producing bioethanol. Next, the mash is fermented, usually with Saccharomyces cerevisiae [94], a species of yeast that produces alcohol from the sugars in the biomass.

To create bioethanol, the alcohol is then extracted from the mash and refined. The aforementioned procedures have been given different names, including scarification, fermentation, distillation, and ethanol dehydration. The overall biofuel feedstock categorization depicted in Figure 2 is the same as the feedstock classification of bio-methanol. The majority of biomass generated today is first generation, with sugarcane extract and starch being the most often used first-generation feedstock's for the production of methanol and ethanol [95,96]. Equation (3) shows the overall response of bioethanol production, while Figure 4 shows the process of producing bioethanol.

$$C_6H_{12}O_6(\text{biomass containing glucose}) + \text{yeast} \rightarrow C_2H_5OH(\text{ethanol}) + CO_2 \quad (3)$$

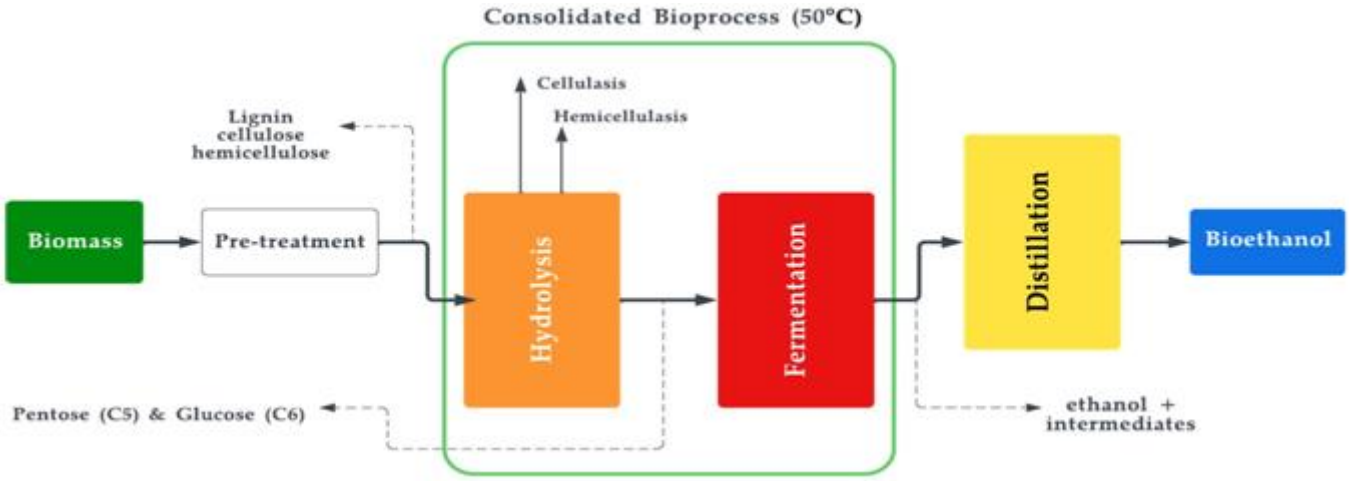

Fig 4. Bioethanol production process.

The processes used to produce bioethanol and bio-methanol are identical. It is created by employing microorganisms that can make methanol to ferment biomass, such as wood or agricultural waste [97]. The type of microbe used differs slightly from the procedure used in the manufacturing of bioethanol. The yield of ethanol/methanol varies depending on a number of factors. Temperature, pH, fermentation duration, and carbon source concentration are a few of the variables [95]. Equation (4) describes the general reaction for the generation of bio-methanol using this approach. It is noteworthy that syngas, a mixture of carbon monoxide and hydrogen produced from the gasification of biomass, is also frequently converted into methanol by catalysis around the world [98]. Methanol and ethanol production is sustainable because the majority of the processes involve the use of carbon capture technologies, biomass, and solid waste. Equation (5) shows the reverse water-gas shift reaction, which is the first step in the reaction that produces bio-methanol from syngas. Equation (6) shows the reaction that occurs when CO reacts with H2.

$$\text{Biomass} + \text{Microorganism} \rightarrow CH_3OH(\text{methanol}) \quad (4)$$

$$CO_2 + H_2 \rightarrow CO + H_2O \quad (5)$$

$$CO + 2H_2 \rightarrow CH_3OH\ (\text{methanol}) \quad (6)$$

Each has advantages and disadvantages of its own; a comparison of some of these are because there is just one carbon atom in methanol, it can react with steam at lower temperatures and has the benefit of a simpler reforming process [99]. Unlike methanol, which is harmful in nature, ethanol is non-toxic [99]. When combined with petrol, ethanol performs better during combustion and exhibits less corrosion than methanol [100]. Compared to methanol, ethanol has a higher specific energy. Producing methanol is less expensive than ethanol [101]. Because of its higher equilibrium conversion and reactivity, methanol is the preferred fuel for transesterification, which produces other synthetic fuels like biodiesel [102]. While the lack of infrastructure, feedstock availability, and R&D investment risk have hindered the global development of these fuels' use, nations with cheap energy costs, like Iceland, have produced methanol at a level that is competitive with petrol [104]. Large-scale bio-methanol production has been accomplished by a number of industries, with Methanox standing as the global leader as of 2022 [105]. Other global producers of bioethanol and bio-methanol include Green Biologics Inc., LanzaTech, DuPont Industrial Biosciences, POET LLC, and GranBio. Around 2010, the Swedish Energy Board approved Chemrec, a Swedish company, to produce bio-methanol on a large scale using a unique process. Since then, other inventions have been made in this area [106].

3.4 Hydrogen Fuels

The creation of energy in the future could be significantly influenced by hydrogen energy, which is a clean, sustainable energy source. The most common element in the universe is hydrogen, which when burned merely yields heat and water as byproducts. As a result, it burns cleanly and doesn't release any damaging greenhouse gases or other pollutants. The three main methods for creating hydrogen are electrolysis, biological processes, and steam reforming. Whereas electrolysis uses electricity to divide water into hydrogen and oxygen, steam reforming uses methane and steam to make hydrogen gas. In contrast, biological processes entail the utilization of microorganisms to synthesize hydrogen from organic stuff.

At the moment, fossil fuels are the main source of hydrogen production, making it carbon-intensive. However, it is expected that hydrogen generation will become more economical and sustainable as renewable energy sources become more widely available and cost-effective. The absence of infrastructure for hydrogen transport and storage represents a significant additional obstacle [108]. The majority of hydrogen is currently transported and kept in a gaseous state, which is dangerous and necessitates costly specialized equipment. To overcome these obstacles and increase the practicality and accessibility of hydrogen energy, new technologies are being developed. Making synthetic hydrogen fuels is one of the main applications for hydrogen. Hydrogen is combined with other elements, such as carbon, oxygen, or nitrogen, to create these fuels [109]. This process yields hydrogen, which is known as "Blue Hydrogen" [121–124]. The full industrial cycle of absorbing CO2, generating H2, and creating synthetic fuels is depicted in Figure.

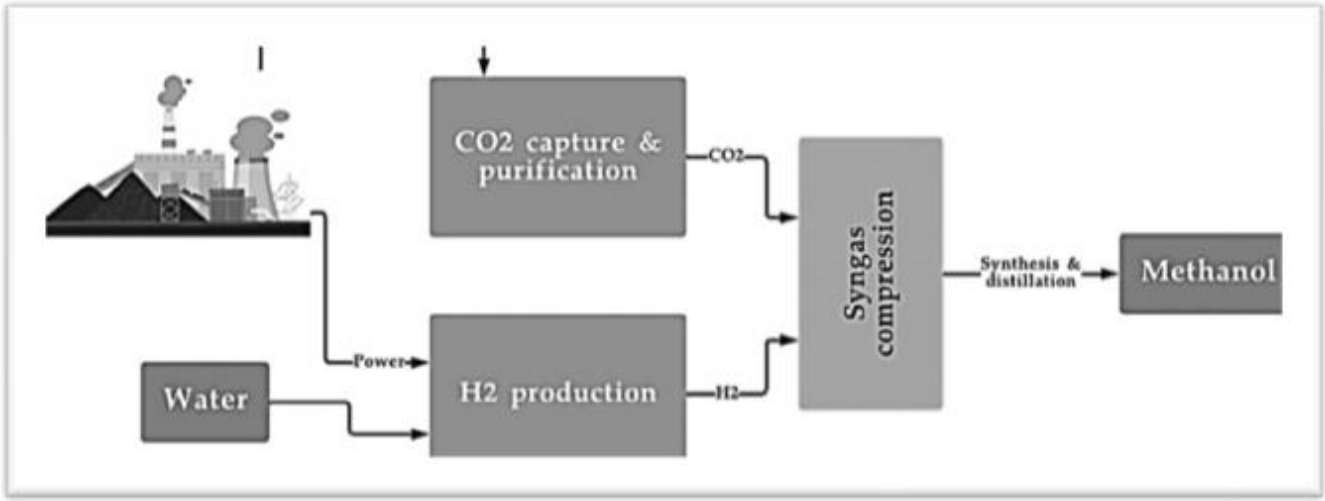

Fig 5. Synthetic fuels Production process from CO2 capture and H2 production.

Synthetic fuels based on hydrogen have their own advantages and disadvantages. Among the benefits are the fact that its feedstock (H2 and CO2) is plentiful and renewable, and that it may be generated locally, reducing the need for long-distance transportation and enhancing energy security [125–127]. The primary drawback of this product is its expensive production costs, since it necessitates sophisticated and specialised infrastructure [128,129].

3.5 Hydrogen

One clean, sustainable energy source that is useful for many different things is hydrogen. It is created by the electrolysis process, which divides water into hydrogen and oxygen with the assistance of electricity. Grey, blue, and green hydrogen are the three primary forms of hydrogen energy. Grey hydrogen is the most prevalent

form of hydrogen energy and is generated from fossil fuels like natural gas. Although it has a high energy density, the process of producing it contributes to climate change by releasing carbon dioxide into the atmosphere [130]. On the other hand, green hydrogen is created using sustainable energy sources like wind and solar energy, and it is currently being pushed for widespread use in a range of applications. In Figure, all three of the major hydrogen colour codes are displayed.

Hydrogen energy is generally useful in a variety of applications. Among them are:

1. As a vehicle fuel: Cars, buses, and other vehicles can run on it. It could replace petrol and other fossil fuels because of its high energy density and capacity for energy storage and transportation.
2. In order to generate electricity, hydrogen can be consumed in a fuel cell, producing only water as a byproduct. Homes, companies, and other buildings can be powered by fuel cells because of their great efficiency [131].
3. For industrial processes: Chemical feedstock for the synthesis of chemicals, fertilizers, steel, and other synthetic fuels is what it can be used for [132,133].
4. Hydrogen can be utilized as a fuel for heating and cooling systems, offering a substitute for fossil fuels like natural gas. Because hydrogen is very reactive, electrolysis is the process that yields the cleanest form of hydrogen.
5. In order to split water into hydrogen and oxygen, energy is needed. It is one of the most popular techniques for creating hydrogen energy, and depending on the electrical source utilized, it can create both grey and green hydrogen. Alkaline, solid oxide, and proton exchange membrane (PEM) electrolysers are among the various types of electrolysers that are available [107].

An alkaline solution, like potassium hydroxide, is used as the electrolyte in alkaline electrolyzes [134]. They are not as efficient as other kinds of electrolysers, but they are comparatively easy and affordable to run [135]. Proton exchange membranes are used as the electrolyte in PEM electrolysers. They are appropriate for use in many different applications because of their great efficiency and ability to function at a wide range of temperatures. A solid oxide substance serves as the electrolyte in solid oxide electrolyzes.

Although they are extremely efficient and capable of operating at high temperatures, their production and upkeep are more costly than those of other kinds of electrolysers [136]. Uses for this kind of power are extensive. Temperature, electrolyte concentration, and electrolyte flow rate are three factors that significantly affect hydrogen yield [137].

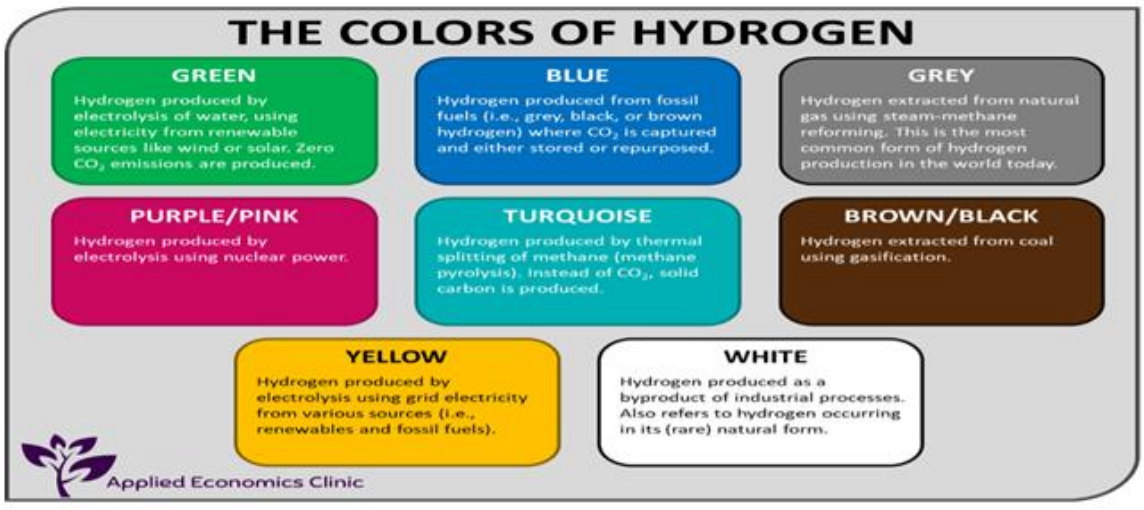

Fig 6. Popular hydrogen color codes.

Metal hydride, cryogenic, or high-pressure tanks are commonly used to store hydrogen generated through electrolysis. These days, the third kind is most commonly utilized [138]. Figure 7 shows the electrolysis procedure, and Equation (7) shows the general formula for the electrolysis of water.

$$2H2O \rightarrow 2H2 + O2 \quad (7)$$

On a worldwide basis, hydrogen energy is thought to have the potential to be very important in the shift to a cleaner and more sustainable energy system. Green hydrogen production will rise in tandem with the increased usage of renewable energy sources, thereby mitigating our dependency on fossil fuels and lowering greenhouse gas emissions. Global energy groups are currently concentrating on lowering the price of manufacturing hydrogen and increasing the effectiveness of current systems [139]. IRENA [140] is an instance of one such organization. Conversely, a number of academics and lecturers began to point out in 2021 that the hydrogen economy is a hoax orchestrated by the fossil fuel industry in an attempt to stall the present green energy transition [141–144]. Based on empirical data regarding the costs and practical efficiency of integrating hydrogen systems into the energy transition, this theory is put forth.

3.6 Syngas

Syngas, commonly referred to as synthesis gas, is a blend of gases that includes carbon monoxide (CO), hydrogen (H2), and carbon dioxide (CO2). It can be used as a fuel or as a feedstock to make chemicals and other synthetic fuels. Carbon-containing resources, including coal or biomass, are used as the feedstock for a multi-step process that produces syngas [145]. It is made by partially oxidising or steam reforming light hydrocarbons and gasifying heavy hydrocarbons. A carbon-containing feedstock is first gasified by heating it in the presence of partial oxygen but without air, causing the feedstock to split into its component gases. Nitrogen (N2), which is passive and does not take part in any reactions, is typically present in the mixture together with H2, CO2, CO, CH4, and CH4 [146]. The water-gas shift reaction (WGSR) is used when the ratio needs to be lowered in order to raise the H2 concentration and lower the CO content. This is accomplished by reforming the mixture with steam, improving its suitability for use as fuel or in the synthesis of other fuels [148]. The value of the ratio reflects the amount of air required to burn the fuel. The syngas equivalency ratio is a measure of the ratio of the actual fuel-air ratio to the stoichiometric fuel-air ratio required for full syngas combustion [153,154]. High-quality syngas can be produced at any combination of temperature and pressure by modifying the ideal ER ratio. The syngas production process is shown in Figure 8. The process and feedstock utilized in syngas generation determine its sustainability. The production of syngas from fossil fuels may have negative environmental effects. Furthermore, even with the use of renewable feedstock's, there are sustainability issues because the production process needs a large quantity of energy, which is frequently derived from fossil fuels.

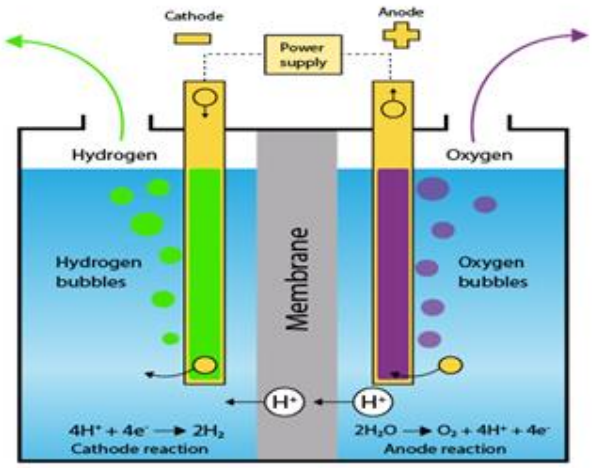

Fig 7. Electrolysis reaction

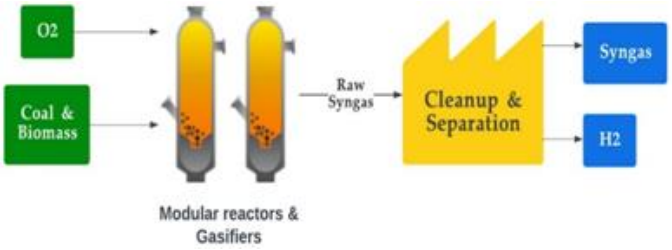

Fig 8. Production of syngas.

Syngas is widely utilised in the manufacturing of transportation fuels like jet fuel and diesel, as well as chemicals like methanol and synthetic natural gas (SNG) [155,156]. Commercial-scale production of syngas from the gasification of biomass is hampered by the lack of technology necessary for stable syngas production [157]. The different applications of syngas are shown in Figure 9 [158]. In the syngas production market, Royal Dutch Shell, Air Liquid, Linde Plc, Maire Tecnimont SpA, and Technip Energies NV are a few of the industrial businesses with a strong competitive landscape.

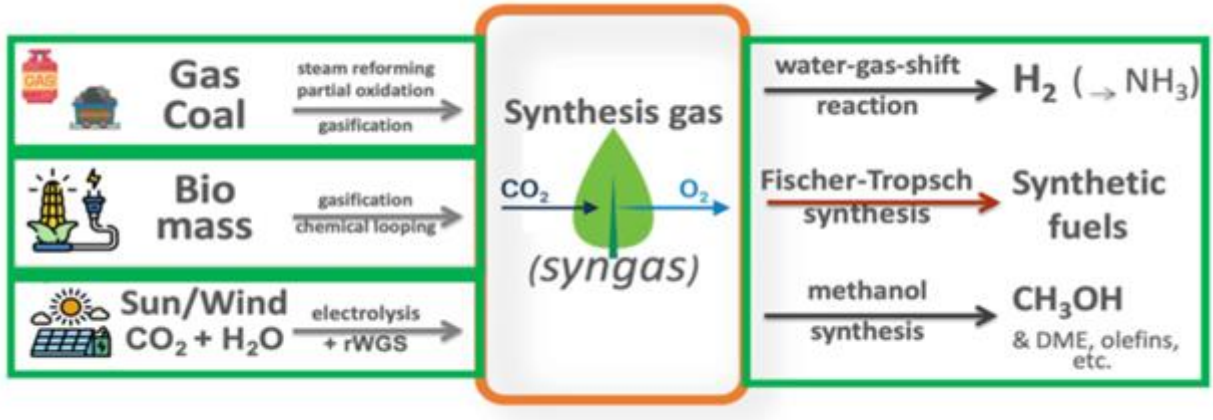

Figure 9. Production of various synthetic fuels from synthesis gas.

3.7 Methanol

Methanol is a flammable liquid that is commonly used as a solvent, a fuel, or a chemical intermediate [159–161]. It can be used in a variety of applications, including as a fuel for vehicles and as a feedstock for the production of other chemicals and materials. When used as a fuel, it produces relatively low levels of carbon monoxide and particulate matter and does not produce sulphur dioxide, which makes it a cleaner burning fuel [162,163]. One of the main advantages of methanol is that it can be produced from a variety of renewable and waste materials, such as biomass, waste gases, and waste plastics. Some of the sources of waste gases include coal oven gas, landfill gas, gas from palm kernel shell (PKS) solid waste and gas from empty fruit bunch (EFB) solid waste [164–166]. The source of plastic is majorly from the product and plastic packaging composition of municipal solid waste. This makes it a potential alternative to fossil fuels and a way to reduce greenhouse gas emissions and air pollution. There are several methods for producing methanol, the existing methods are:

Carbon monoxide hydrogenation: This process creates hydrogen and methanol by reacting carbon monoxide with water [167]. The CO needed for this process is produced industrially by reforming natural gas [98]. This section will go over this approach in more depth.

1. Biomass fermentation: This method produces methanol by fermenting biomass, such as wood or agricultural waste. In essence, it turns methane from biomaterials into methanol. This kind, which was covered in-depth in the preceding sections, is also referred to as bio-methanol. Usually applied on a small scale, this process is utilized to turn waste products or other low-value feedstock's into methanol. The feedstock's for all varieties of methanol are shown in Figure 10.
2. Direct conversion of methane to methanol: The conventional (indirect) method is used in the industrial process of transforming methane to methanol, but it is expensive due to its high energy needs. To achieve cost-effectiveness and feasibility, direct conversion routes for methane to methanol, including plasma, photocatalytic, supercritical water, and biological routes, have been established [98]. These technologies are still in the early phases of development, and it will take five to twenty years for them to become industrially viable.

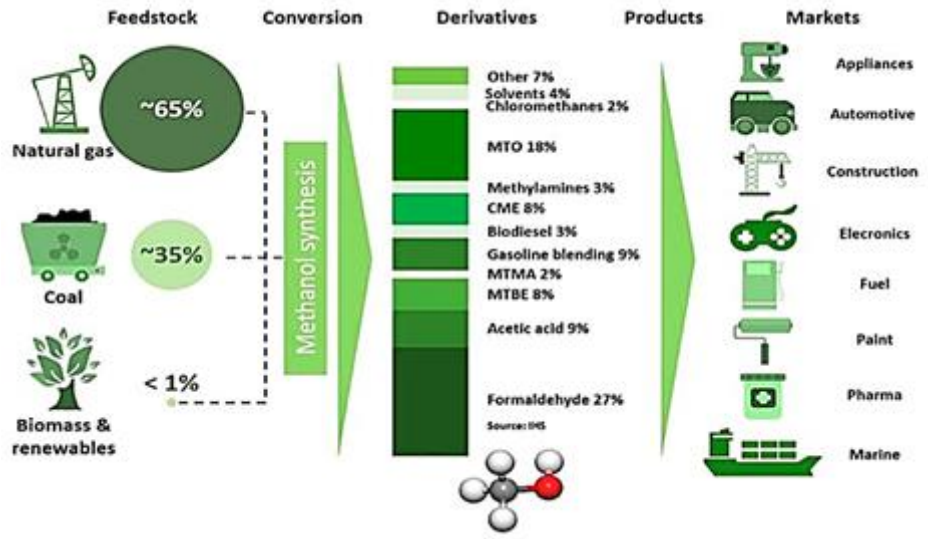

Fig 10. Various Feedstock's of methanol

Traditionally, natural gas is used to generate methanol on a big scale. Since the natural gas (methane) is first reformed to make CO and then hydrogenated in the presence of a catalyst (such as ZnO2 or copper chromite) to produce methanol, this process is regarded as indirect. High temperatures and pressures are usually used during the process, which aids in accelerating the reaction and increasing the methanol output. Since the reaction is exothermic—that is, it emits heat—cooling devices are usually used to remove the heat before the reaction gets out of hand. This technology has the benefit of being able to be produced on a small scale, and it can be used to manufacture methanol from feedstock's high in carbon or waste gases. This makes it a potentially cost-effective and environmentally friendly process for making methanol, as well as a means of lowering air pollution and greenhouse gas emissions. The process of hydration of carbon monoxide to produce methanol does have several drawbacks, though. High-quality catalyst and specialist equipment are needed for the process, both of which might raise costs. Figure 11 provides a visual representation of the method described above.

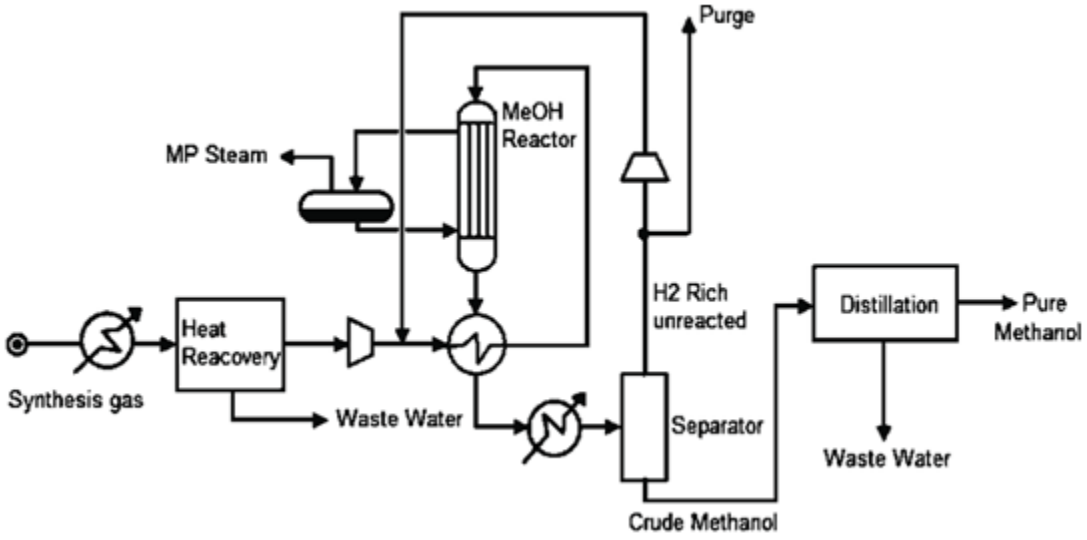

Fig 11. Methanol synthesis

3.8 Synthetic Diesel

Production of synthetic diesel can be divided into PtL and GtL categories. The PtL diesel synthetic fuel, which is created by transforming H2 and CO2 into liquid hydrocarbons, is the subject of discussion in this section. It's also critical to remember that biodiesel is an ester, whereas this is a hydrocarbon. This suggests that it is basically the same as HVO, with the exception that synthetic diesel is produced by a distinct chemical process. It is made using a procedure called the Fischer-Tropsch process, which, as Figure 9 [191] illustrates, combines hydrogen and carbon monoxide to create a range of liquid hydrocarbons, including jet fuel, diesel, and petrol.Typically, PtL diesel is made by electrolyzing water to produce hydrogen, which is then mixed with carbon dioxide to create syngas and ultimately this synthetic fuel. There are other ways to obtain carbon dioxide, such as through industrial emissions and biogas. PtL diesel can be used in many different applications because of its high energy density and ease of storage and transportation [192]. It may be used as jet fuel for airplanes and is currently used to replace conventional diesel fuel in cars, trucks, and other vehicles. Chemicals and other industrial items are also produced using it.

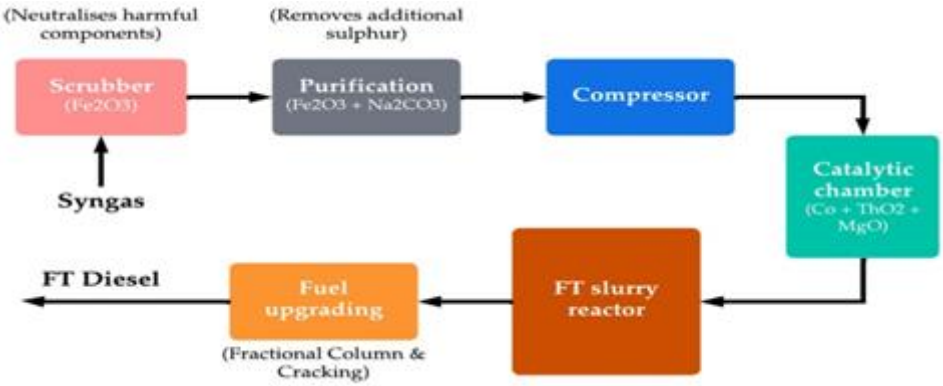

Fig 12. FT diesel production from syngas - Typical Fischer–Tropsch process

The aforementioned method finds use in many other applications, such as the manufacturing of chemicals and other industrial products, as well as the creation of synthetic fuels like naphtha, synthetic diesel, and jet fuel for aviation [196–198]. When compared to the manufacturing of synthetic fuels using other technologies, the technology can be used to produce synthetic fuels at a reasonable cost. But depending on where the feedstocks come from, the energy-intensive process can be expensive in some situations and have a major negative

influence on the environment [198, 199]. Following Fischer–Tropsch fuel extraction, the leftover byproducts are treated using the water–gas shift (WGS) reaction [200]. This chemical process converts CO and water into H2 and CO2, which can then be utilised as feedstock to produce more synthetic fuels [201]. If the energy needed to synthesise the fuel comes from renewable sources, then synthetic diesel is regarded as sustainable. The expansion of FT diesel is restricted by the technological limitations of biomass gasification on a commercial scale, as previously described in the sections. In 2022, Neste, a Finnish firm, LanzaTech, an Indian company called Carbon Clean Solutions, and Audi will be some of the major manufacturers of synthetic diesel with significant investments made in its continued advancement.

3.9 Ammonia

Chemically, ammonia is utilised extensively in many different applications, including the production of fertilizer, refrigerants, and various other compounds [209]. Ammonia can be produced by a variety of methods, such as electrochemical, thermochemical, and electrolytic processes. The Haber-Bosch process, which entails the reaction of nitrogen and hydrogen at high temperatures and pressures, is the conventional method used to create it [210]. Although the electrochemical method is much less developed than the Haber-Bosch process, it may use less energy to create ammonia [210].Because it may be made by combining nitrogen (taken from the air) with H2 (generated through electrolysis), ammonia is referred to as a "electro-fuel." The electricity required for electrolysis is generated utilising renewable energy sources, just like with any other PtL fuel. Because of its high energy density, ammonia is becoming more and more popular as a synthetic fuel. Research is being done on it as a synthetic fuel, mainly for use in boats but also in automobiles and buses [211,212]. It can also be burned in a fuel cell to generate energy, or it can be used as a chemical feedstock in a variety of industrial processes, including the manufacture of chemicals, fertilizers, and steel. Its low-cetane value, low flame speed, and poor calorific value, among other drawbacks, make it difficult to utilize in combustion engines [213]. It is necessary to use them carefully because they are also poisonous and can quickly contaminate their surroundings [214].

Ammonia also has the benefit of cracking. By applying pressure and heat, ammonia is broken down into smaller molecules like nitrogen and hydrogen. This is a particular kind of pyrolysis. Ammonia cracking is normally done in a reactor or furnace, where it is heated to high pressures (usually between 30 and 100 atm) and temperatures (usually between 400 and 600 C) [215]. Under these circumstances, the ammonia molecule's atomic bonds weaken and are susceptible to breaking, which causes smaller molecules to form. Hydrogen, a crucial fuel for fuel cells and a lucrative chemical feedstock, is frequently produced via this procedure. In Figure 16, the uses of ammonia are depicted visually. Ammonia's primary drawback is that it is poisonous and can have negative environmental effects [216]. As of 2022, CF Industries Holdings Inc., Yara, Nutrien Ltd., OCI Nitrogen, and OSTCHEM are the leading producers of ammonia worldwide.

Fig 13. Uses of ammonia.

3.10 Naphtha

In the petrochemical industry, naphtha is a kind of liquid hydrocarbon that is created as a byproduct of refining crude oil [223]. It is a complex combination of hydrocarbons that can be utilized as a feedstock for the synthesis of different chemicals and fuels. It is a colorless or light yellow liquid with an aroma similar to petrol. Since naphtha may be manufactured using the FT process covered in previous sections, it is regarded as a GtL fuel [224]. Distillation is a common refinement method used to make it on an industrial basis [225]. In order to separate crude oil or coal tar into different components depending on their respective boiling points, it must first be heated and distilled [226]. After that, the mixture is put through a succession of distillation columns to remove the naphtha and other ingredients like kerosene and petrol. Usually, it is made from crude oil's middle distillates, which are the parts with a boiling point of between 200 and 300 °C. After that, hydrogen is added to the naphtha, and it is run over a catalyst—a metal or metal oxide, for example—to get rid of impurities and enhance its quality. Following purification, the naphtha is chilled and kept for later use or transfer to other facilities for additional processing. Hydrocarbons with carbon numbers between five and twelve usually make up naphtha [227]. It is composed of both olefins and n-paraffin; the olefin composition varies on the reaction pathway, where a stronger olefin composition indicates a higher octane number and, consequently, better fuel quality [228,229]. The paraffin yield quality favors high temperature and low pressure. The fractional distillation of crude oil for the manufacture of naphtha is shown in Figure 17. Crude oil is heated and distilled to separate it into different hydrocarbon components according to their boiling points during the petroleum refining process. Furthermore, a form of naphtha known as bio-naphtha is made from biomass feedstock's as opposed to fossil fuels like coal or petroleum. Bio-naphtha can be made using a biomass-to-liquid Fischer–Tropsch (BTL FT) process, which is comparable to the standard FT process [230]. The cycle of naphtha's usage is shown in Figure.

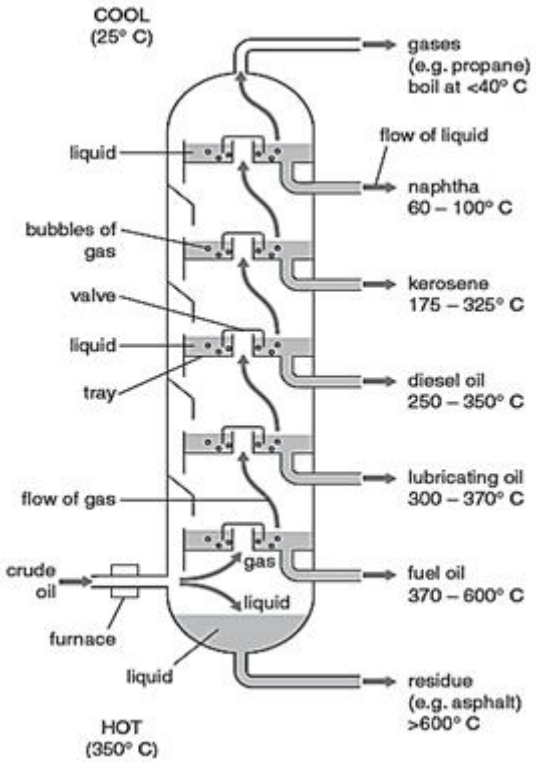

Fig 14- The fractional distillation of crude oil for the manufacture of naphtha

Uses of Naphtha:

- Feedstock for producing high octane gasoline.
- Industrial solvents and cleaning fluids
- In the home cleaning fluid
- An oil painting medium
- An ingredient in shoe polish
- An ingredient in some lighter fluids
- A fuel for portable stoves and lanterns
- As a coating for elemental lithium metal, to prevent oxidation
- As a fuel in gas turbine unit
- As the working fluid in the naphtha engine.

Fig 15 - Uses of Naphtha

Naphtha finds extensive application in the fuel and chemical sectors. It is frequently utilized as a feedstock for the synthesis of many compounds, including petrochemicals, solvents, polymers, and resins, in addition to petrol [231]. In addition, naphtha is utilized as fuel for various heating and culinary appliances, such as portable stoves. Naphtha's high energy density is one of its main characteristics, which draws interest in it as a fuel for transportation purposes [232, 233].

3.11 Liquefied Petroleum Gas (LPG)

Natural gas is extracted or petroleum is refined to create LPG, which is a mixture of propane and butane [234]. It is a GtL fuel that is made by converting natural gas or other gases into liquid form over a number of stages. In order to eliminate contaminants like water and sulphur, natural gas or other gases must first be cleaned and purified. The method of steam methane reforming is subsequently used to transform the purified gases into synthesis gas, or syngas. In this process, hydrogen and carbon monoxide are produced when the gas reacts with

steam and a catalyst. Following that, the syngas is passed over a catalyst—a metal or metal oxide, for example—to transform it into a variety of hydrocarbons, including LPG [235]. As previously mentioned, LPG is also created by fractional distillation, and Figure illustrates this process' upper layer. Lower temperature, the ideal steam to feed ratio, and more trays in the furnace are the factors that encourage a high LPG yield [236].

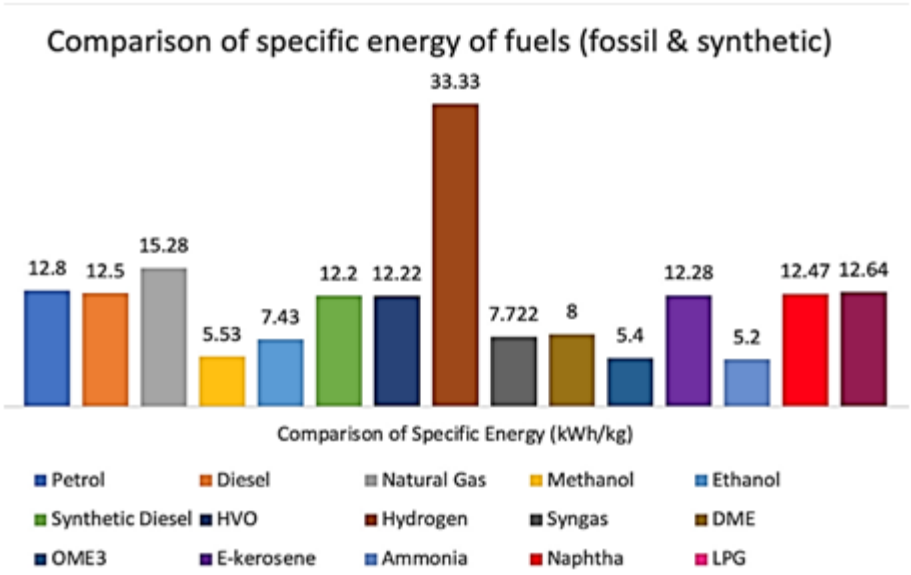

Fig 16. Comparison of specific energy of fuels

Due to its clean burning characteristics, which produce fewer pollutants than other fossil fuels, LPG is a popular choice for cooking and heating in both home and commercial settings, among its many other uses [237]. Additionally, it serves as fuel for trucks, buses, and automobiles. In addition, it serves as a solvent for a range of goods and as feedstock for the synthesis of chemicals and polymers. Propylene, which is used to make polymers, resins, and other items, is frequently produced using it [238]. Using LPG as fuel for recreational vehicles, such as boats and RVs, is a rare application of the fuel.

Many customers find it to be an appealing alternative because it is also a reasonably priced fuel [239]. Although it is widely available throughout the world, its gaseous state makes transportation challenging [240]. Its main disadvantages are its non-sustainable nature, greater engine burning temperatures, higher consumption, NOx emissions, difficulty in transportation, and high equipment costs [241]. Compared to other fossil fuels, LPG has a far smaller environmental impact even though it is not sustainable. China and India are the two countries that consume LPG at the moment (2022); the main producers of LPG in India are Indian Oil Corporation Ltd., Bharat Petroleum Corporation Limited, Hindustan Petroleum Corporation Limited, and Reliance Petroleum Ltd.

IV. CONCLUSION

To address the effects of climate change and lessen the likelihood of its unfavorable effects, governments everywhere have set goals and roadmaps for reaching net zero carbon emissions. Organizations like the Intergovernmental Panel on Climate Change (IPCC), the International Energy Agency (IEA), and the United Nations Framework Convention on Climate Change (UNFCCC) are keeping an eye on these activities. Annual conferences such as the United Nations Climate Change Conference (COP), the Global Summit on Climate Action (GSCA), and the Carbon Pricing Leadership Coalition (CPLC) Annual Conference are held to discuss

progress towards these aims and to exchange ideas and best practices. While growing nations like China and India have set their targets at 2060 and 2070, respectively, developed nations like the US, the EU, the UK, Japan, Australia, and so forth have set their net zero targets at 2050. These initiatives show a dedication to making the shift to a low-carbon, more sustainable future.

The following are the main obstacles that prevent nations from achieving their net-zero emissions targets:

Cost: Making the switch to emissions-free or low-carbon technologies can be costly. Fossil fuels are a major source of energy for many nations, and moving away from them would necessitate large expenditures in new infrastructure.

Technical difficulties: Making the switch to low-carbon or zero-emission technologies may present certain technical difficulties, such as the requirement to create new technologies or alter current ones.

Political obstacles: Since the shift to net zero emissions may call for major policy adjustments and the enactment of new rules, political obstacles could arise. This can be challenging to do, especially if some societal groups or sectors are resistant to change. Changes in behavior are also necessary to reach net zero emissions; for example, people and companies must use energy-efficient practices and low-carbon modes of transportation. It can be challenging to get someone to change their behavior, especially if they are resistant to it.

International cooperation: Since global emissions must be decreased to achieve net zero emissions, cooperation between nations will be necessary. This can be difficult since different nations may not agree on the best course of action and have different objectives.

In relation to this paper's specialty, the obstacles to the widespread adoption of synthetic fuels in underdeveloped nations are their high production costs, inadequate infrastructure, low consumer awareness, and funding requirements. Because they are currently far more expensive to create than fossil fuels, both producers and consumers find synthetic fuels to be less appealing. They need specific distribution and storage infrastructure, which may not exist in many places. Adoption is challenging due to a lack of consumer knowledge and comprehension. However, as part of the energy transition and decarburization initiatives, plans to offer subsidies for synthetic fuels have been planned. These subsidies include grants for pilot projects, tax breaks, and financing for research and development in order to encourage the creation and use of synthetic fuels. Generally speaking, their goals are to lower the price of creating synthetic fuels, particularly hydrogen, and to promote the advancement and application of these technologies. The most heavily supported synthetic fuel is hydrogen in particular, as it has the potential to be a major player in the shift to a low-carbon energy system. Numerous feedstock's can be used to make hydrogen, which is also used as a feedstock for other synthetic fuels. Because of its high specific energy, hydrogen has much more potential than any other fuel now in use, both synthetic and fossil.

Figure 19 shows a comparison of particular energies in Lower Heating Value (LHV) [76,178,242–245]. Synthetic fuels can be made in a variety of ways, and the methods used to generate them can also range greatly. However, a lot of the procedures involved in producing synthetic fuels are related to one another because they frequently use comparable catalysts or other chemical processes, share similar raw materials, and go through similar beginning phases of synthesis. Furthermore, certain fuels are made using feedstock that is another fuel. The majority of the processes that are discussed in the study are related to one another, and Figure 20 provides an overview of all the manufacturing processes that are presented.

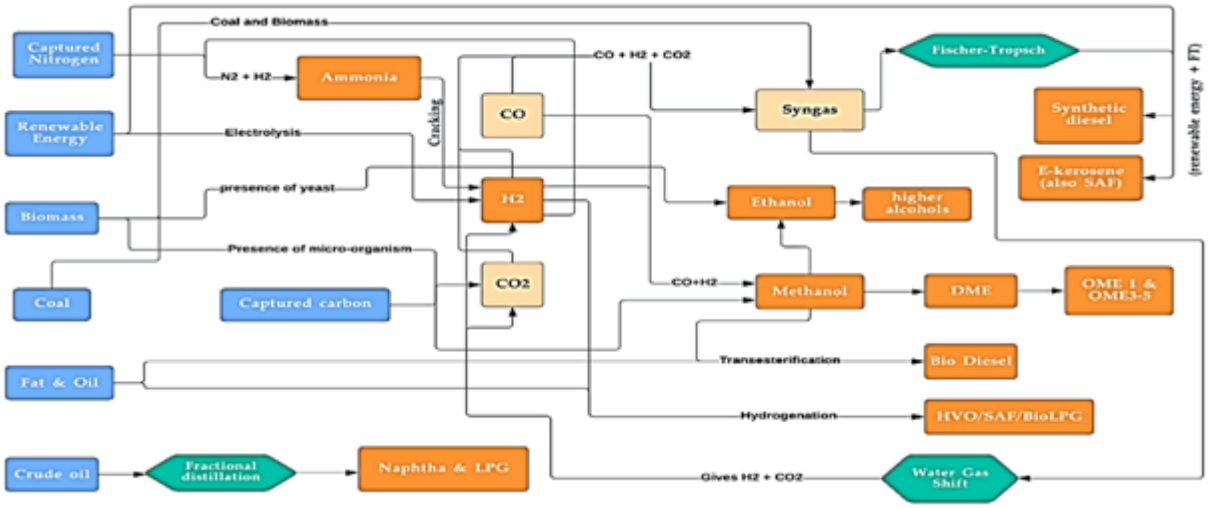

Fig 17 overview of all the manufacturing processes

It is challenging to forecast with precision how much energy hydrogen and e-fuels will provide to a net zero global economy, though, as this will rely on a number of variables, such as policy choices, raw material availability, economic conditions, and technology advancements. One of the main forces behind this expansion is the rising need for decarbonized and sustainable energy sources, and it is crucial to take into account every possible route towards sustainability. The main reason for the need is because synthetic fuels can be produced from waste, which means that in the future, they may be a more cost-effective option than traditional fossil fuels.

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Medical Insurance Premium Prediction with Machine Learning

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ABSTRACT

This study presents a machine learning approach for predicting medical insurance premiums. With the increasing complexity of healthcare costs, accurate prediction of insurance premiums is crucial for both insurances and policyholders. Leveraging a dataset containing demographic information, medical history, and other relevant factors, various machine learning algorithms including regression and ensemble methods were employed to build predictive models. The performance of these models was evaluated using metrics such as mean absolute error and R-Squared. Results indicate that the developed models can effectively predict insurancepremiums,providingvaluableinsights forbothinsurancecounteragentsapproachoffersthepotential to optimizing pricing strategies, improve risk assessment, and enhanced decision-making processes in the healthcare insurance domain. Medical Insurance Premium Prediction using Machine Learning Predict health insurance cists based on individual characteristics. Collected and Preprocessed dataset of policyholders' attribute(age,gender,BMI,Number of children, smoking habits, location).Split data into training and testingsets. Build and trained artificial neural network model using Karas and TensorFlow. Evaluated model performance using mean R- squared error and R-Squared metrics. Developed an accurate predictive modelwith high R-Squared value. Identified keyfactors influencing insurance premiums. Demonstrated potential for machine learning in healthcare cost estimation. This project showcases the effectiveness of machine learningin predicting medical insurance premiums. By developing these predictive models, insurance companies can streamline their underwriting process, offers more personalized insurance plans, and assists policyholders in making informed decision about their healthcare coverage. The developed model can aid insurances in setting accurate premiums and policyholders in making informed decisions. This research contributes to the advancement of data driven approaches in the insurance industry, ultimately benefiting both insurers and ultimately benefitting both insurances and insured individuals a like.

Keywords-Medical insurance, Premium prediction, Machine Learning, predictive modeling, Underwriting, Feature importance, Data-driven decision-making.

I. INTRODUCTION

Predicting medical insurance premiums using machine learning involves using historical data on individuals' demographics, health facts, and insurance convergence to build models that can estimate future premiums for

new customers. By leveraging algorithms like regression,decision tress, or neural networks, insurances Insurers can improve accuracyin pricing policies and better manage risk. This introduction sets thestage for exploring how machine learning can revolutionize insurance pricing, ensuring fairness and accuracy in premium assessments.

Background: Discuss the importance of accurately predicting medical insurance premiums in the healthcare industry. Highlight the challenges faced by insurance providers in determining premiums and the potential impact on policyholders.

Motivation: Explainthemotivationbehindusingmachinelearningtechniquesforpremiumprediction .Discussthelimitationsoftraditionalactuarialmethodsandthepotential benefitsofdata-drivenapproaches.

Research Objective: Clearly state the aim of the study, which is to develop and evaluate machine learning models for predicting medical insurance premiums based on various factors.

Significance: Highlight the significance of the research in advancingthe field of healthcareanalytics and its potential impact on insurance underwriting practices, policyholder satisfaction, and overall healthcare affordability.

Structure of the Paper: Provide an overview of the organization of the paper, outingthe sections that will be covered in detail, such as data collection, Methodology, experimental results and discussion.

II. LITERATURE SURVEY

2.1 “Predicting Health Insurance Costs Using Machine Learning Techniques” by Pratibha G.Joshi and Sunanda Dixit: This paper explores the application of machine learning algorithms such as Linear Regression, Decision Trees and Random Fore sets to predict health insurance costs. It compares the performance of these algorithms influencing premium prediction accuracy.

2.2 “Machine Learning Techniques For Predicting Insurance Premiums” by A. Khalfan , Hassan ,and M.S Ansari: This study investigates various machine learning models for predicting insurance premiums, Gradient Boosting and Neural Networks. It discusses feature selection methods and model evaluation techniques to optimize prediction accuracy.

2.3 ”Predicting Health Insurance Premiums : A Comparatives Study of Machine Learning Techniques” by S. Gupta andS. Sharma: This research compares the effectiveness of machine learning algorithms such KNN, NaïveBayes ,and Ensemble methods in predicting health insurance premiums. It analyzes the impact of different features sets and preprocessing techniques on prediction performance.

2.4 “Deep LearningApproaches for Health Insurance Premium Prediction” by R. S. Raj and S. Kumar : This paper explores the application of deep learning techniques, including Convolution Neural Network and Recurrent Neural Networks, for health insurance premium prediction. It discusses of using deep learning models in this context.

2.5 “Feature Selection Techniques for Medical Insurance Premium Prediction” by M. A. Rahman and S.Begum:thisstudyinvestigatesvariousfeatureSelectionmethods,suchasWrapper,Filter,andEmbedded approaches , to identifythe most relevant predictors fir medical insurance premium prediction. It compares the performance of different feature selection techniques and their impact on prediction accuracy.

2.6 “FairnessinMedicalInsurancePremiumPrediction:AMachineLearningPerspective”byL.Zhangand.H. Wang : This research examines the issue of fairness in medical insurance premium prediction and discusses

techniques for mitigating bias and discrimination in machine learning models. It explores methods for promoting fairness and equality in premium assessments across different demographic groups

2.7 "Temporal Analysis of Medical Insurance Premiums Using Machine Learning" by J. Chen and X . Li : Thispaperinvestigatesthetemporalpatternsinmedicalinsurancepremiumsandexploreshowmachine learningmodelscancaptureandpredictfluctuationsovertime.Itdiscussestheimplicationsoftemporal analysis for premium pricing and risk management strategies.

This studies collectively prove insights into the information / application of machine learning techniques for medical insurance premium prediction, converting various algorithms feature selection methods , fairness considerations , and temporal analysis approaches

III.EXISTING WORK AND PROPOSED WORK

3.1 Existing Work:

3.1.1 Data Collection : The existing system collects historical data on insured individuals , including demographics(age , gender , location) , health factors (BMI,pre-existing conditions) , and insurance Converge details.

3.1.2 Data Preprocessing :Thecollecteddataundergoespreprocessingstepssuchascleaning,normalizationandfeatureengineeringtoprep areitforanalysis.

3.1.3 Feature Selection :Relevant features affecting insurance premiums are identified using techniques like correlation analysis , feature importance ranking , or domain knowledge.

3.1.4 Model Selection : Various machine learning algorithms such as Linear Regression , Decision Trees , Random Forest , Gradient Boosting , and Neural Networks are evaluated for their suitable in predicting insurance premiums.

3.1.5 Model Training : The selected machine learning models are trained using the preprocessed data ,with aim of learning patterns and relationships between input features and insurance premiums.

3.1.6 Model Evaluation :The trained models are evaluated using metrics such as Mean SquaredError (MSE) , Mean Absolute Error(MAE) or Root Mean Squared Error (RMSE) to assess their predictive performance.

3.1.7 Hyperparameter Tuning : Hyperparameters of the machine learning models are fine – tuned using techniques like grid search or Random Search to optimize model performance.

3.1.8 Validation : The performance of the trained models is validated using holdout sets, cross - validation , or other validation techniques to ensure generalizability to unseen data.

3.1.9 Deployment : Once validated , the best -performing model is deployed into the existing insurancesystem to predict premiums fornewcustomers based on theirdemographicand health information.

Block Diagram:

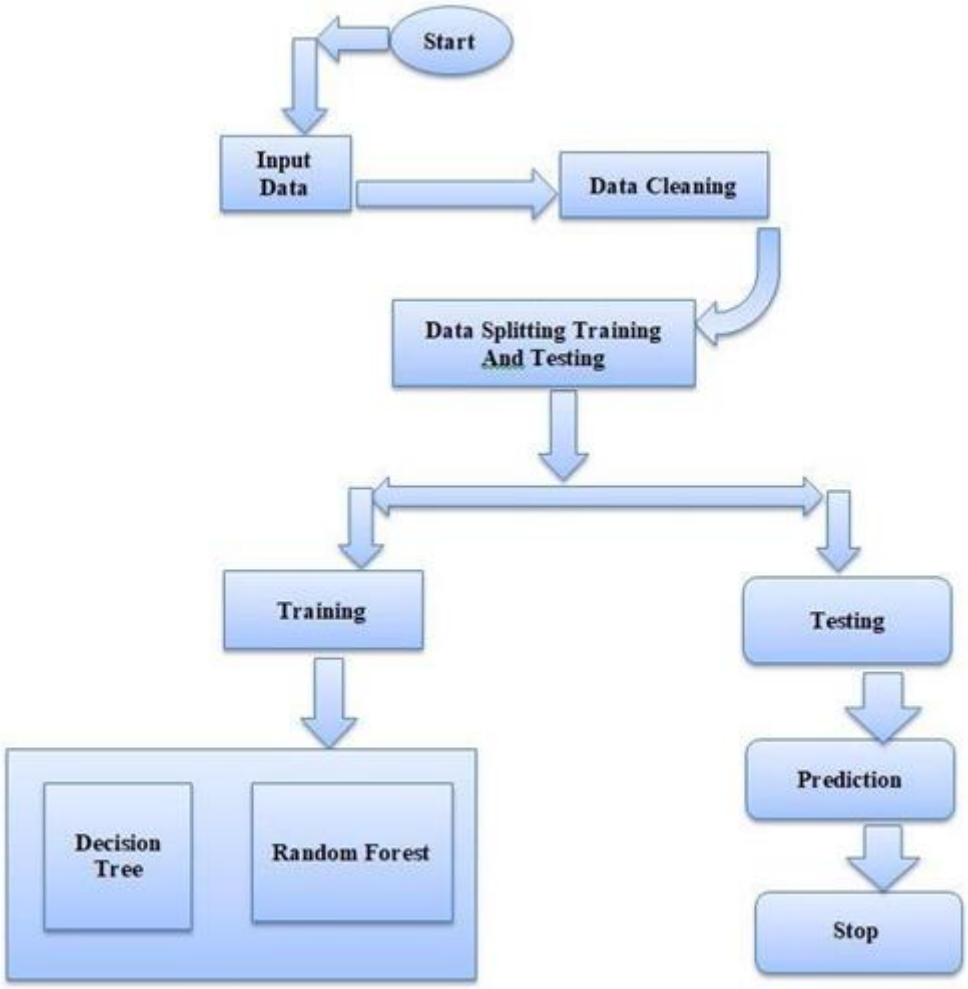

Fig.1.1BlockDiagramhealth Insurance

The Process begins with the initiation of the machine learning pipeline for predicting medical insurance premiums. Relevant data is collected from various sources , including policyholders' demographics , medical history , lifestyle factors and insurance premium amounts. The collected data undergoes preprocessingtohandlemissingvalues,outliers, andinconsistencies.Thisstepensuresthatthedataisina suitableformatfor furtheranalysis.Thepreprocesseddataisdividedintotwosubsets:atrainingsetusedto train the machine learning models and a testing set used to evaluate their performance .Typically , around 70-80% of the data is allocated to training and the remaining 20-30% to test. Two types of Models,decisiontree andRandomForest, areselectedfiguretraining.

3.2 Proposed Work:

3.2.1 Enhanced Feature Engineering : Implementing advanced feature engineering advanced feature engineering techniques to extract more insightful features fro demographic , health , and insurance data.

3.2.2 Advanced Model Selection : Exploring advancedmachine learning Models such as ensemble methods deep learning architectures , and hybrid models for improved prediction accuracy.

3.2.3 Feature Selection :Relevant features affecting insurance premiums are identified using techniques like correlation analysis , feature importance ranking , or domain knowledge.

3.2.4 Fairness and Bais Mitigation : Integrating fairness -aware techniques to address bias and insurance equali table premium predictions across diverse demographics groups.

3.2.5 Temporal Analysis : Incorporating temporal analysis methods to capture dynamic patterns and trends in insurance premiums over time , enhancing predictive capabilities.

3.2.6 Interpretability and Transparency :Incorporating temporal analysis methods to capturedynamic patterns and trends in insurance premiums over time , enhancing predictivecapabilities.

3.2.7 Deployment : Designing a scalable and robust deployment framework to seamlessly integrate the predictive model into existing insurance systems, ensuring efficient real-time premium predictions for new customers.

3.3 Experimental Results:

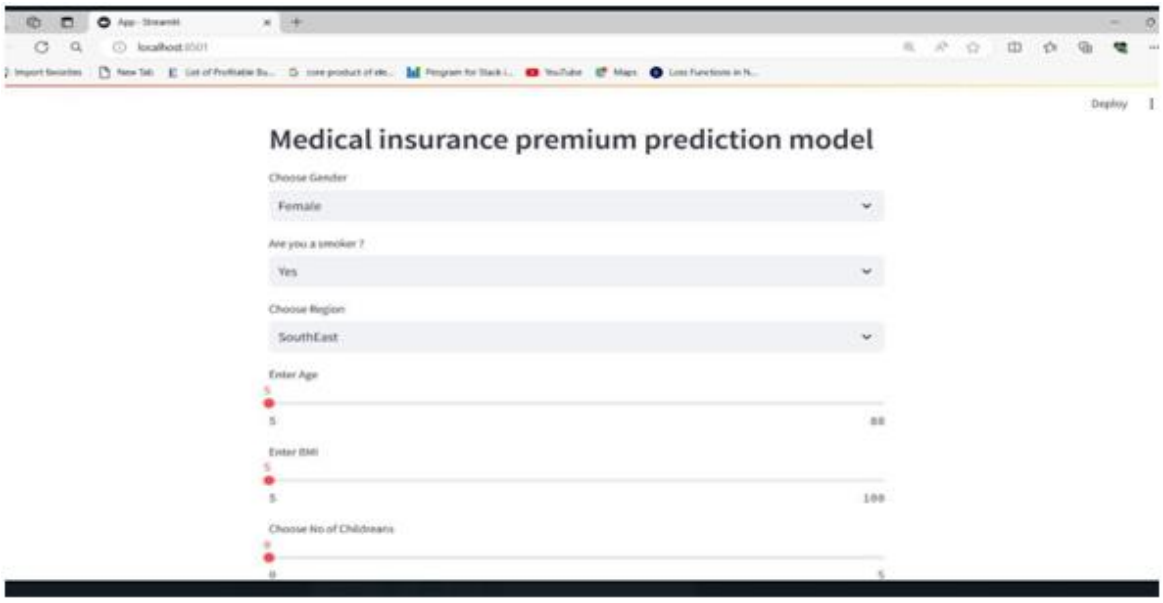

Fig1.2

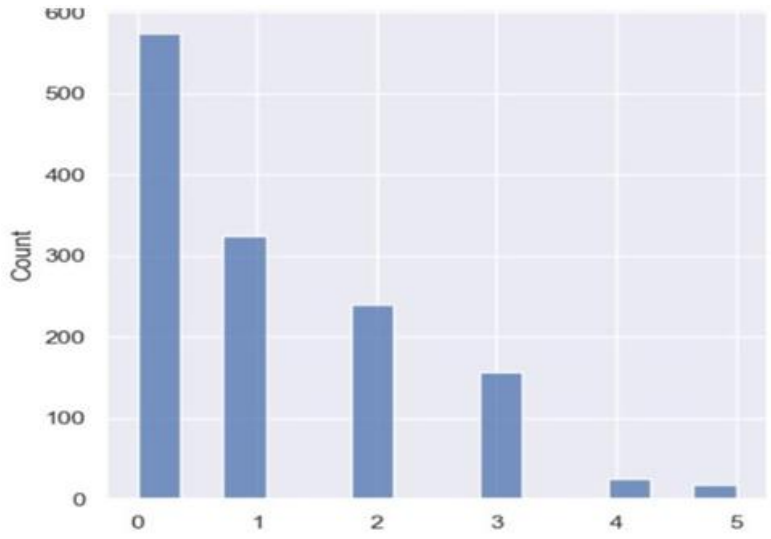

Fig1.3 Prediction

IV. CONCLUSION

In conclusion ,the application of machine learning to predict medical insurance premiums to predict medical insurance premiums holds significant promise for enhancing accuracy, fairness , and efficiencyin insurance pricing. Through the analysis of historical data and the development of predictive models , insurance can better assess risk and tailor premiums you individual characteristics , ultimately benefiting both insurances and policyholders.

However ,while machine learning offers valuable insights and predictive capabilities , several challenges must be addressed to realize its full potential in this domain. These include ensuring fairness and transparency in premium predictions , mitigating bias , and maintaining model interpretability to foster trust among stakeholders.

Despite these challenges , the ongoing advancements in machine learning techniques ,coupled with a deeper understanding of insurance dynamics , are paving the way for more understanding.

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Enhanced Age Progression and Facial Reconstruction for Locating Missing Children using GAN

Vishal Khomane, Shruti Jambhale, Utkarsha Etam, Prasad Kharache ,Pradnya Bormane

ABSTRACT

The development of age can predict a person's face to different levels; This has important implications for the use of computer vision in entertainment, forensics and medicine. This brief explores recent advances in terms of integration of artificially distributed artificial neural networks (GANs), autoencoders, and VGG networks.
GAN is successful in creating age-appropriate, realistic facial images by learning from different data sets. Autoencoders know how to encode and decide on faces, helping by capturing legacy features. VGG networks are effective in image classification, enhancing age models by extracting high-value features.
Integration of GANs, autoencoders and VGG networks leads to the development of advanced technology. This combination can create truly era-changing displays that impact the space, from fun to familiar faces.
KEYWORDS: Age progression,Facial Aging,Facial recognition,Generative Models

I. INTRODUCTION

Age progression is a predictive task of seeing a person's face at different stages of life that has attracted the attention of computer vision researchers due to its many uses in entertainment, forensics, and medicine. treatment. As technology continues to evolve, the techniques used in the technological age continue to evolve and the overall goal is to create a true and accurate representation of the individual.
In recent years, deep learning has made great progress in aging research. This introduction is designed to provide an overview of the integration of three well-known methods (artificial neural networks (GAN), autoencoders, and VGG networks) and introduce their impact on the progress of the advancing era.
Generative Adversarial Networks (GAN) have become the basis of the image field created by the collaboration of two neural networks (generator and discriminator) to create real images. In the context of age evolution, GANs play an important role in comparing facial aging patterns collected from big data, enabling good and accurate rendering of images.
Autoencoders that leverage the power of GANs have attracted much attention due to their ability to perform well and identify complex faces. Autoencoders help eliminate significant aging features by breaking down facial images into compact representations. Autoencoders can provide continuous control of aging objects by leveraging the encoded representation, thus ensuring the integrity of aged images.
The integration of the VGG network, which is also known for its excellent capabilities in image classification, leads to the advancement of the era by providing high-resolution extraction of the facial image. Using a

hierarchical representation compiled from VGG networks, the age-related developmental process provides an in-depth understanding of the patterns and data changes associated with facial aging.

This introduction sets the stage for an in-depth exploration of the integration of GANs, autoencoders, and VGG networks that drive decision-making in advanced technology. By combining these methods, researchers have made significant progress in creating age-related images, opening new horizons for applications in many fields.

Dataset =UTKFace Dataset - Public Dataset

The UTKFace dataset is a collection of facial images with age, gender, and ethnicity labels. It contains over 20,000 images of faces, annotated with these attributes. The dataset is often used for tasks such as age estimation, gender classification, and facial recognition. It's valuable for training and testing algorithms in computer vision and machine learning applications related to face analysis.

II. LITERATURE REVIEW

The challenge of locating missing children persists as a pressing societal concern, prompting innovative approaches that leverage advancements in artificial intelligence (AI). In recent research, [1] introduced "ChildGAN," a model grounded in a variational auto-encoder (VAE) integrated with a generative adversarial network (GAN). This model represents a significant advancement in the field, utilizing diverse datasets such as the Indian Child Dataset (ICD) and the Multi-Racial Child Dataset (MRCD) for comprehensive experimentation.

[1]'s work extends beyond mere model architecture, encompassing a meticulous exploration of quantitative and qualitative evaluation criteria to assess the model's performance. The research presents a promising avenue for simulating age progression and rejuvenation, providing a unique toolset for visualizing potential changes in the appearance of missing children over time.

Building upon this foundation, subsequent research by [2] emphasizes the significance of StyleGAN2 for generating synthetic datasets of child facial biometrics with controlled attributes. This synthetic data proves invaluable for applications such as child gender classification, face localization, and facial expression analysis.

In parallel, other researchers ([3], [4]) have explored the applications of GANs, specifically StyleGAN and StyleGAN2, in generating high-quality synthetic images, including child facial data. These studies delve into the ethical considerations and practical implications of deploying facial progression AI technology, with a focus on its utilization in locating missing children in various regions, such as Kenya.

This paper builds upon the collective insights from these pioneering studies, aiming to explore the feasibility, efficacy, and ethical dimensions of GAN-based age progression and rejuvenation techniques in the context of missing children investigations. By synthesizing and extending the findings of the aforementioned research, our work seeks to contribute to the evolving discourse on leveraging AI to address the challenges surrounding missing children, ultimately advancing the cause of child welfare and family reunification on a global scale.

III.PROPOSED SYSTEM

The proposed methodology will encompass a general approach to age modeling by integrating state-of-the-art algorithms such as artificial neural networks (GANs), autoencoders and VGG networks. During the design

process, each component is carefully combined to support its specific function to create an age-appropriate representation of timeless beauty.

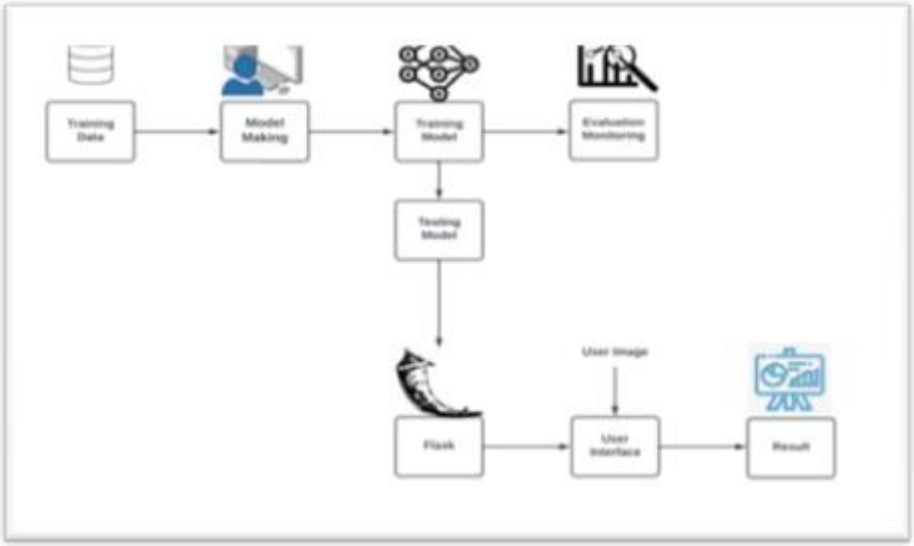

Fig No:Proposed System.

In training mode, the model learns iteratively, extracts the content of the facial image, and improves its performance through optimization. Ongoing monitoring and evaluation to ensure the model is effective, with metrics such as repeatability, accuracy, and connection speed as a measure of learning. Rigorous testing confirmed the model's ability to produce age-appropriate images, lending confidence to its real-world use. User-centered design allows users to enter facial images, specify the desired developmental age, and seamlessly interact with advanced technology through an intuitive user interface. Finally, the presentation of advancing ages can allow users to see themselves in the future, making it easier to detect aging and its effects over time.

IV.ARCHITECTURE

Autoencoder + GAN + VGG19

1. Autoencoder:

An autoencoder is a neural network architecture used for learning efficient representations of data, typically by reducing the dimensionality of the input and then reconstructing it.

In this project, the autoencoder can be trained on a dataset of facial images, learning to encode the key features of a face into a lower-dimensional latent space and then decode it back to reconstruct the original face.

2. Generative Adversarial Network (GAN):

GANs consist of two neural networks, a generator and a discriminator, trained simultaneously in a competitive setting.

The generator generates synthetic data (in this case, synthetic facial images) while the discriminator tries to distinguish between real and synthetic data.

In this project, the GAN can be used to generate facial images that simulate the aging process. The generator learns to generate aged versions of faces, while the discriminator learns to distinguish between real aged faces and the synthesized ones.

3. VGG19:

VGG19 is a convolutional neural network architecture, commonly used for image classification tasks.

In this project, VGG19 can be used as a feature extractor. Specifically, it can be employed to extract high-level features from both real and synthesized facial images.

In the proposed method, the integration of autoencoders and GANs as a rule for advanced processing includes a variety of methods that use the unique strengths of each model. The development of age-based modeling brings many challenges, such as capturing different facial expressions, storing personal information, and simulatingthe ancient process of that time.

Autoencoders are experts at learning a compact representation of input data while preserving important features that need improvement. By leveraging the encoder-decoder architecture of autoencoders, we can extract the latent content represented by input images to encode simple facial features such as shape, texture, and expression. These covert agents could provide a basis for correlating age-related images withimprovedintegrity.

On the other hand, conditional GANs provide a powerful framework for creating realistic images defined by specific attributes or characteristics. GANs can control the output by incorporating formal information such as age labels or age-related features into the production process. This feature is especially useful in older ages, where the goal is to simulate the aging process while preserving identity and facial features.

Incorporating autoencoders and GANs as a rule-based approach to advanced image synthesis. The autoencoder component helps extract latent content representation from the input image by capturing important faces and features. These latent representations are used as official data for the GAN generator, combining age-related images related to the input image while incorporating changes in age of change.

Furthermore, GAN's feedback system supports the generator to produce real-time images that are not only accurate but also indistinguishable from real ones. By optimizing the renderer and separation from feedback, the preparation process has been worked on to create an age image with increased clarity and accuracy.

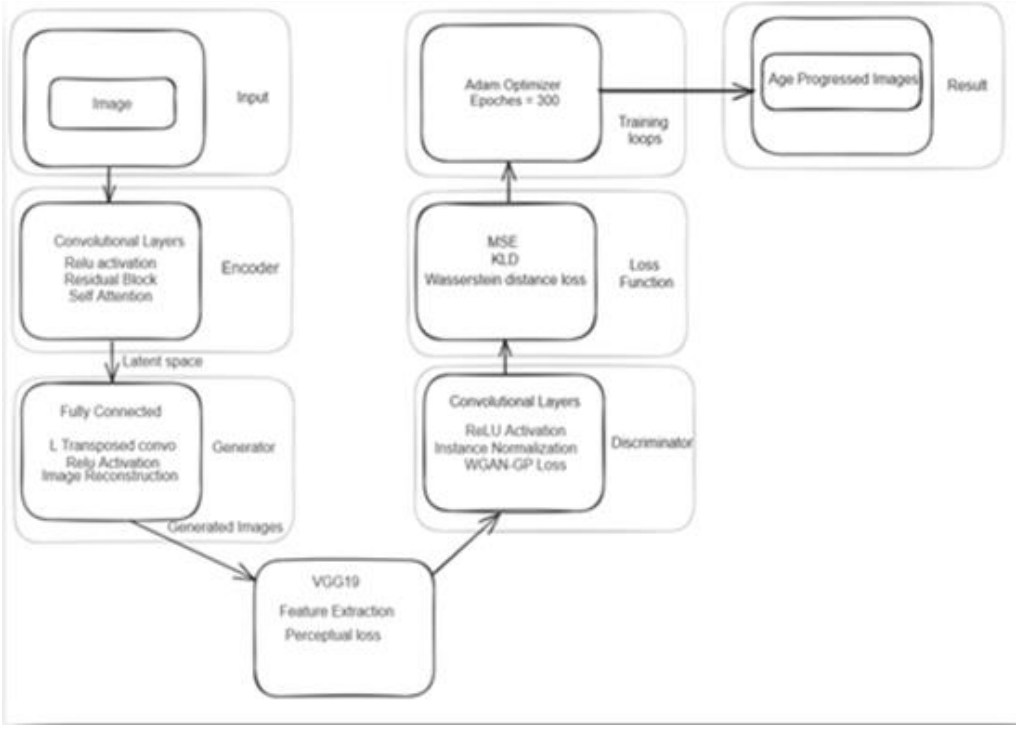

Fig No:2Model Architecture.

The proposed system architecture utilizes advanced deep learning techniques to generate images, with a specific focus on age progression. It is composed of two main components, namely the Generator and the Discriminator, both integral parts of Generative Adversarial Networks (GANs).

The Generator is designed with sophistication, incorporating Convolutional Layers, ReLU Activation functions, Residual Blocks, and Self-Attention mechanisms. These elements work together to extract hierarchical features from input images and produce realistic outputs.

The Convolutional Layers serve as the foundation for feature extraction, while the ReLU Activation Functions introduce non-linearity and enhance feature representation. The Residual Blocks facilitate the flow of information, aiding in feature preservation. The Self-Attention Mechanisms allow the model to focus on important regions, resulting in higher image quality.

Operating on a Latent Space representation, the Generator captures essential features of input images. These features are then transformed by Fully Connected Layers to generate the desired output images. Transposed Convolutions are utilized for accurate reconstruction, effectively upsampling the features.

The Discriminator, responsible for distinguishing between real and generated images, is comprised of Convolutional Layers with ReLU Activation functions and Instance Normalization. It evaluates features from both real and generated images.

The Convolutional Layers extract discriminative features, while the Instance Normalization assistsin stabilizingand accelerating training by normalizing activations. The Wasserstein Distance Loss is used to measure thediscrepancy between the distributions of real and generated images, ensuring high-quality outputs. Additionally, the Gradient Penalty Loss is employed to improve convergence and regularize the training process.

V. RESULT

Training progression of Term 1, Step 1:This means that the following information is about the first step of initial training.

Table No:2 Parameter Table.

FPL loss	2.450389
KLD	3.986218
G_img_loss	-0.969203
G_tv_loss	0.000272
D_img	0.987233
|D_reconst	0.969203

1. Performance evaluation: The training process of our model is shown in Table 2, which shows the preliminary steps of training. 1. Loss estimation (FPL), Kullback-Leibler difference (KLD), image loss generator (G_img_loss), total loss generator (G_tv_loss), image discrimination loss (D_img) and Discriminant reconstruction (D_reconst) are well preserved. These measurements provide insight into the structure, consistency, and optimization of the learning model.

2. Output

Fig No:3 Output Image.

Fig No:4 Images After 100 Epoch

Our model was trained on a large dataset, resulting in extended training times due to limited hardware resources. Despite these challenges, we achieved the above result. To address hardware constraints, we employed a project on Colab. The total training duration was 1 hour for 2 epochs. We acknowledge the impact of resource limitations on scalability.

Given the resource limitations encountered during training, future research could benefit from utilizing more robust hardware configurations to reduce training times. Employing high-performance hardware can expedite model convergence and enhance scalability, paving the way for broader applications of our approach.

VI. FUTURE SCOPE

1. Optimization for Efficiency:

Investigate techniques to optimize the model architecture and training process for faster convergence and reduced computational resources.

Explore hardware acceleration methods such as GPU optimization or distributed computing to speed up training times.

2. Large-Scale Deployment:

Develop strategies for deploying the model at scale, potentially leveraging cloud-based infrastructure to handle large datasets and real-time inference.

Collaborate with law enforcement agencies and organizations involved in locating missing children to integrate the system into existing workflows and databases.

3. Ethical Considerations:

Conduct thorough ethical evaluations of the proposed system, particularly regarding privacy concerns and potential biases in age progression algorithms.

Collaborate with ethicists, legal experts, and stakeholders to develop guidelines and protocols for responsible use of the technology in real-world scenarios.

4. Long-Term Age Progression:

Explore methods for extending age progression beyond childhood to simulate aging into adulthood and old age.
Investigate the impact of factors such as lifestyle, environment, and genetic predispositions on long-term facial changes.

5. Cross-Domain Generalization:

Assess the generalization of the model across different demographic groups, ethnicities, and cultural backgrounds to ensure equitable performance in diverse populations.
Investigate domain adaptation techniques to improve the robustness of the model to variations in facial appearance across different regions and populations.

VII. DISCUSSION

The combination of generative adversarial networks (GANs), autoencoders, and VGG networks is a significant advance in age and face recognition. Using today's technology, researchers have been able to achieve accurate, age-appropriate facial representation in a wide variety of applications.
The biggest benefit of this approach is its ability to replicate the complexity of the aging face. While GANs are good at using information from different data to create realistic facial images, autoencoders are good at understanding and storing faces. In addition, the integration of VGG networks improves the age modeling process by extracting relevant features, thus increasing the accuracy of age estimation.
This combination led to a revolutionary change in design, including an era of innovation and image quality. Through repeated training and careful analysis, the model is able to create an accurate, age-appropriate facial representation. Additionally, its user-friendly interface facilitates interaction, allowing users to enter the facial image and specify the desired age, thus facilitating personal age simulation.
In addition, meticulous analysis and meticulous analysis underline the model's ability to continuously age. A fair representation of the population of all ages. Key metrics such as predictive loss (FPL), Kullback-Leibler difference (KLD), and image discrimination provide insight into model performance and optimization strategies.
In fact, GANs, autoencoders and VGG networks herald the new era in facial recognition technology, promising unique and versatile features in real use.

VIII. CONCLUSION

In summary, the integration of generative adversarial networks (GANs), autoencoders, and VGG networks represents a major breakthrough in the development of age and face recognition. Using the power of deep learning, researchers have made significant progress in creating legal representatives at all levels of life.
The applications obtained with this method provide a suitable basis for the creation of age-appropriate facial images with a wide range of meanings in various fields such as biological field, forensic science and medicine. Throughout the training and evaluation phases, the model continues to improve its performance by improving its ability to accurately capture facial nuances.
In the future, more research is needed to explore other ways to improve and use this method. Additionally, continued efforts to address ethical issues and privacy issues related to facial recognition technology are critical to mission deployment and adopting these advances in real situations.

More importantly, the combination of GANs, autoencoders, and VGG networks holds great promise for improving age-based facial recognition, paving the way for continued research, innovation, and social impact.

IX. DATASET

UTKFaceDataset - Public Dataset
The UTKFace dataset is a collection of facial images with age, gender, and ethnicity labels. It contains over 20,000 images of faces, annotated with these attributes. The dataset is often used for tasks such as age estimation, gender classification, and facial recognition. It's valuable for training and testing algorithms in computer vision and machine learning applications related to face analysis.

X. FUNDING

We would like to clarify that this research project did not receive any external funding. All resources, including equipment and personnel. Therefore, there are no conflicts of interest or biases related to funding sources influencing the outcomes of this study.

XI. AUTHOR'S CONTRIBUTION

Vishal spearheaded the model development aspect of the project. Shruti led the research work and collaborated with Utkarsha on documentation. Prasad was responsible for creating the user interface and managing data preprocessing tasks. Pradnya played a pivotal role in project coordination and requirements management. All authors contributed significantly to the conceptualization, execution, and review of the study, and approved the final manuscript.

XII. DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Design and Development of Packaging line 3-DOF Robotic Arm and Conveyor for Sorting

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ABSTRACT

Sorting color objects is crucial in the packaging industry, especially during final dispatch. This involves classifying products by color, dimensions, and form to meet customer demands and streamline operations. This project provides small-scale businesses with a cost-effective bottle sorting solution using servo motors, an Arduino Mega 2560 microcontroller, a robotic arm, and a color sensor. An interactive TFT display enhances user engagement and provides real-time sorting feedback. The robotic arm, controlled by servo motors, sorts bottles precisely based on color, with the Arduino coordinating movements and the color sensor detecting bottle colors. The TFT display shows real-time data on sorted bottles and their colors, simplifying monitoring and configuration. This economical system optimizes sorting, reduces manual labor, and improves efficiency, making it ideal for small-scale operations. This project offers an affordable, effective solution for bottle sorting and packaging, enhancing productivity and reducing costs.

Keywords— Robotic arm, Sorting, Conveyor, Auduino,

I. INTRODUCTION

In today's rapidly evolving industrial landscape, automation and robotics have become integral components of production processes, revolutionizing the way products are manufactured, handled, and packaged. This shift towards automation enhances efficiency, precision, and consistency in various industrial tasks. The integration of robotic systems in packaging lines exemplifies this transformation, offering advanced solutions to streamline the packaging of diverse products.

In this context, we introduce a cost-effective, energy-efficient component sorting system designed to operate based on color detection. This system is positioned on a continuously moving conveyor belt powered by a D.C. motor. The primary goal of this project is to automate the sorting process according to the color of the components.

Our proposed solution aims to revolutionize the testing of manufactured components by replacing manual methods with automated procedures. This approach minimizes human involvement, reducing labor costs and

potential errors. Additionally, this automated system is expected to enhance productivity and accuracy levels beyond what manual operations can achieve.

II. LITERATURE SURVEY

[1] Rahul Basu and Swathi Padage discusses the development of a robot arm-gripper for sorting tasks and investigating RTM concepts. The paper emphasizes the importance of efficiency and ergonomics in the factory workplace and highlights the role of robotic units in replacing human sorters for production line work.The authors address the concept of economy of motion in robotic assembly lines and various applications of robotic technology in industries such as microelectronics, medical, and space applications. They also mention the use of AI programs to enable discrimination of objects and sorting in production lines, showcasing the potential for automation and improved efficiency .Furthermore, the paper touches upon the principles of Work Study by Gilbreth and Therbligs, emphasizing the need to reprogram automated assemblies to reduce energy consumption and improve ergonomics in the factory workplace.

[2] Gabriel Garcia et al presents a novel approach to inspecting belt conveyor structures using robotic technology. The system described in the paper consists of a mobile platform capable of navigating various terrains, a robotic manipulator with six degrees of freedom, and a set of sensors including microphone, accelerometers, laser, and cameras. The authors conducted preliminary field tests to validate the system for mining operations and identified areas for improvement in platform mobility and control strategy.

[3] K.R. Sughashini et al presents a novel approach to automated material handling and sorting using a pneumatic robotic arm integrated with a chromatic sensor module. The research addresses the inefficiencies and costs associated with manual material handling in manufacturing and distribution processes by introducing a smart robotic solution.

Key points highlighted in the paper include:The significance of material handling in manufacturing and distribution processes, with a focus on the high costs and inefficiencies involved .The use of automated robotic arms in industries like auto-manufacturing to improve efficiency and precision in tasks such as object sorting . The implementation of a pneumatic robotic arm for sorting objects based on color identification, showcasing the potential for increased productivity and reduced costs in various industries .The working methodology of the pneumatic robot arm, including the use of color sensors, conveyors, and programmable logical controllers for efficient object sorting. The potential applications of this technology in industries such as food and automobile manufacturing, highlighting its versatility and adaptability .

The paper also provides references to related works in the field of robotics and automation, demonstrating a thorough review of existing literature and research . Overall, the paper presents a promising solution for enhancing material handling processes through the integration of pneumatic robotic technology with advanced sensor modules, paving the way for increased efficiency and cost-effectiveness in industrial operations.

[4] Ashraf Elfasakhany et al work focuses on creating a robot arm that can perform simple tasks efficiently and at a low cost, making it a valuable asset in industrial settings. The robot arm was designed with four degrees of freedom and talented to accomplish accurately simple tasks, such as light material handling, which will be integrated into a mobile platform that serves as an assistant for industrial workforce. The robot arm is equipped with several servo motors which do links between arms and perform arm movements. The servo motors include encoder so that no controller was implemented. To control the robot author used Labview, which performs inverse kinematic calculations and communicates the proper angles serially to a microcontroller that

drives the servo motors with the capability of modifying position, speed and acceleration. Testing and validation of the robot arm was carried out and results shows that it work properly.

[5] Mohammadreza Lalegani Dezaki et al presented the design and development of a pneumatic conveyor robot specifically engineered for color detection and sorting applications. The authors have made significant contributions by integrating pneumatic technology with advanced color detection algorithms to create an efficient sorting system. The innovation lies in combining the speed and simplicity of pneumatic systems with the precision of modern sensors, offering a robust solution for industrial sorting applications. The paper details the construction of the pneumatic conveyor robot, which includes a thorough explanation of the hardware components, such as actuators, sensors, and the conveyor mechanism. The authors have employed advanced color sensors to accurately detect and classify objects based on their colors. The integration of these sensors with pneumatic actuators ensures quick and reliable sorting.

The experimental results demonstrate that the pneumatic conveyor robot is capable of sorting items with high accuracy and speed. The authors report impressive sorting accuracy rates, validating the effectiveness of their design. The system's performance in real-world scenarios indicates its potential for deployment in various industrial settings.

This research addresses the need for efficient and cost-effective sorting solutions in industries where color detection is crucial. The use of pneumatic technology not only reduces the complexity and maintenance requirements but also enhances the system's operational speed. This makes it particularly suitable for high-throughput environments.

[6] Kunto Aji W et al presented an innovative approach to object sorting using a 4-degree-of-freedom (DoF) robotic arm, leveraging color detection and inverse kinematics algorithms. This study significantly contributes to the fields of robotics and industrial automation by addressing the need for efficient, automated sorting systems.The research outlines a comprehensive methodology that integrates hardware and software components. The robotic arm, equipped with a color sensor, detects the color of objects and sorts them accordingly. The use of the inverse kinematics algorithm is crucial as it allows the precise calculation of joint angles to position the robotic arm accurately.The robotic arm's design includes detailed descriptions of the servos, joints, and sensors used, providing a solid foundation for replicating the system.The inverse kinematics algorithm is well-explained, highlighting how it calculates the necessary joint angles to achieve the desired end-effector position. This is essential for the accurate sorting of objects based on their detected color. The experiments conducted demonstrate that the 4-DoF robotic arm can accurately sort objects by color, showcasing high precision and reliability. The use of inverse kinematics significantly enhances the arm's ability to reach and manipulate objects in a confined space, proving the system's effectiveness in practical applications. This paper addresses the practical challenges faced by small and medium-sized enterprises (SMEs) in automating their sorting processes. By providing a cost-effective and efficient solution, the research has substantial implications for improving productivity and reducing labor costs in various industries.

III.METHODOLOGY

The "Design and Development of Packaging line 3-DOF Robotic Arm and Conveyor for Sorting" project involves a combination of mechanical, electrical, and software components that work in tandem to achieve efficient bottle sorting and packaging. The project can be broken down into several key elements.

A. Mechanical Setup:

The mechanical infrastructure supporting the Arduino Mega controlled conveyor belt aims to ensure stability, accuracy, and reliability in sorting bottles by color. This system integrates key components such as the conveyor belt, TCS3200 color sensor, IR sensor, and robotic arm. The mechanical framework is designed for seamless integration of these components, enabling smooth operation and efficient sorting, thereby enhancing productivity.

B. Conveyor Belt System

Serving as the primary conduit for bottle transportation, the conveyor belt comprises a robust belt made of materials like rubber or PVC, supported by rollers or pulleys.A motor, regulated by the Arduino Mega board, drives the conveyor belt. The mechanical framework for the conveyor belt includes a sturdy frame structure, ensuring rigidity to prevent deformation during operation. Tensioning mechanisms are incorporated to maintain belt tautness, ensuring smooth operation without slippage.

C. Mounting of TCS3200 Color Sensor and IR Sensor

The TCS3200 color sensor and IR sensor are strategically positioned along the conveyor belt to detect bottle color and presence, respectively. Sturdy mounting brackets securely hold these sensors, maintaining alignment and minimizing interference. The mounting locations are optimized for enhanced detection accuracy while reducing external interference. The mechanical support for these sensors allows for easy adjustment and calibration to meet sorting requirements.

D. Integration of Robotic Arm

The robotic arm, positioned adjacent to the conveyor belt, sorts bottles based on color and IR sensor feedback.
A dedicated mounting platform securely attaches the robotic arm, incorporating precision positioning mechanisms for accurate sorting. The platform design withstands dynamic robotic arm movements while minimizing vibrations that may affect sorting accuracy. Efficient cable management solutions organize and protect electrical connections between the Arduino Mega board, sensors, and robotic arm.

E. Adjustable Speed Control

Mechanisms for adjusting conveyor belt speed, based on color detection and IR sensor feedback, are integrated into the mechanical framework. Variable speed drives or pulley systems, controlled by the Arduino Mega board, facilitate smooth speed adjustments. Design considerations prevent sudden speed changes, reducing the risk of bottle jams and operational disruptions.

F. Structural Integrity

The entire mechanical support system is engineered for robustness and durability, suitable for continuous industrial operation. High-quality materials such as steel or aluminum are utilized, providing strength and longevity. Structural elements feature reinforcements and bracing to withstand operational loads and stresses.
Regular maintenance protocols are established to sustain optimal performance, maximizing operational uptime and efficiency. The establishment of a solid mechanical foundation for the Arduino Mega controlled conveyor belt system ensures precise and reliable bottle sorting, ultimately enhancing productivity and efficiency in industrial sorting operations.

G. Microcontroller (Arduino Mega)

The Arduino Mega serves as the central control unit for the entire system. It collects data from the color sensor and IR sensors and processes this information. The Arduino Mega also coordinates the movement and actions of the 3-DOF robotic arm, ensuring that it responds to the color and count data effectively.

H. User Interface (TFT Display)

A TFT display is seamlessly integrated with the Arduino Mega, serving as an intuitive user interface for monitoring the system's operation in real-time. This display interface offers operators a comprehensive overview of the sorting and packaging process, presenting detailed information regarding the count of bottles for each distinct color category. By providing real-time updates on bottle quantities, the TFT display empowers operators to effectively manage production flow and optimize resource allocation. Moreover, the user-friendly nature of the TFT display ensures ease of navigation and accessibility, allowing operators to quickly access pertinent data and make informed decisions. With its clear and concise presentation of information, the display facilitates efficient communication between operators and the automated system, fostering seamless collaboration and enhancing overall productivity. Additionally, the TFT display's capability to showcase real-time data enables operators to promptly identify and address any irregularities or issues that may arise during operation. This proactive approach to monitoring ensures timely intervention and minimizes potential disruptions, ultimately contributing to the system's reliability and performance consistency.

In summary, The integration of the TFT display with the Arduino Mega not only enhances the user experience but also plays a crucial role in optimizing operational efficiency and facilitating informed decision-making in the sorting and packaging process.

I. Control Logic

The control logic embedded within the Arduino Mega represents the central intelligence of the system, orchestrating a seamless integration of inputs from both the color sensor and IR sensors. These sensors work in tandem to provide comprehensive data on the color composition of each passing bottle, as well as their precise location along the conveyor belt. Leveraging this wealth of information, the control logic meticulously categorizes the bottles based on color and maintains an accurate count for each color category. Drawing upon this color and count data, the control logic then issues precise instructions to the robotic arm, dictating its movements with utmost precision. The robotic arm's actions are choreographed to perfection, ensuring that bottles are picked and placed in their designated packaging areas with meticulous care and efficiency.

Moreover, the coordination of the arm's movements is calibrated to ensure optimal grouping of bottles based on color similarity. This strategic grouping enhances the efficiency of downstream packaging processes, minimizing sorting time and maximizing throughput.

In essence, the control logic within the Arduino Mega serves as the brain of the operation, orchestrating a harmonious symphony of sensor inputs and robotic actions. Its ability to process complex data in real-time and translate it into actionable instructions underscores its pivotal role in the seamless operation of the bottle sorting and packaging system.

J. Safety Measures

Ensuring the safe operation of the robotic arm is paramount, and to achieve this, a comprehensive array of safety measures is integrated into the system. These measures encompass various elements designed to mitigate potential risks and safeguard both equipment and personnel. Emergency stop buttons are strategically positioned within easy reach, providing an immediate means to halt arm movement in case of emergency or unforeseen circumstances. Additionally, sensors are deployed along the arm's path to detect obstructions or obstacles, triggering automatic halts or redirections to prevent collisions and minimize damage. Protocols are also implemented to establish clear guidelines for safe operation, including training programs for personnel and regular maintenance checks to ensure optimal functioning of safety systems. In summary, the intricate workings of this project involve the seamless integration of sensor technology, a 3-DOF robotic arm, and

sophisticated control electronics. This synergy creates a cohesive and efficient packaging system capable of sorting and packaging bottles based on their colors with precision and accuracy. The synchronized operation of these components ensures the systematic and reliable sorting and packaging of products, ultimately contributing to heightened efficiency and enhanced quality in the industrial production process. By prioritizing safety measures and leveraging advanced technology, this project sets a new standard for automated packaging systems, offering reliability, efficiency, and peace of mind for operators and stakeholders alike.

K. Circuit Diagram

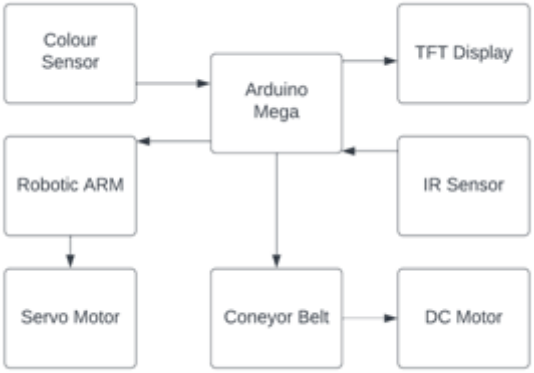

Fig. 1 Block diagram of the circuit

In fig. 1 block diagram of circuit is shown. Color sensor and IR sensor giving the input signal to Arduino Mega. Arduino mega giving output signal to robotic arm, TFT display and conveyor belt.

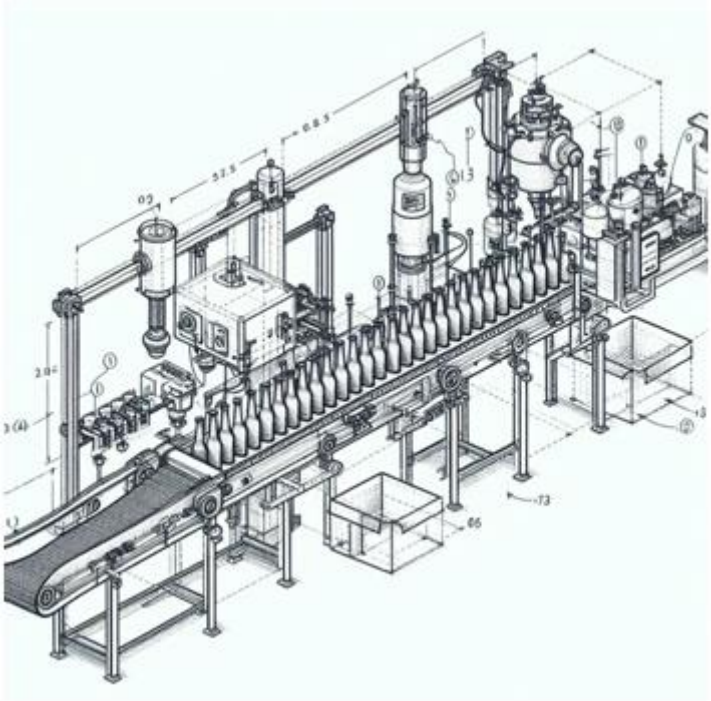

Fig 2 visual representation of future application

The theoretical framework of our system is elucidated through the visual representation depicted in the fig.2. In this schematic, our system employs a conveyor belt as the central component, orchestrating the smooth movement of bottles along the packaging assembly line. This conveyor belt acts as a vital link in the chain of

operations, facilitating the seamless transportation of unsorted bottles towards crucial elements including the robotic arm, IR sensor, and color sensor. The color sensor assumes the pivotal role of identifying the color composition of each passing bottle, employing advanced technology to accurately discern various hues and shades. Simultaneously, the IR sensor functions as the guiding force, pinpointing the precise location of the detected bottles within the conveyor belt's trajectory. This real-time positional data is then swiftly relayed to the Arduino micro-controller, forming the foundation for subsequent decision-making processes. Upon receipt of data from the sensors, the Arduino Mega springs into action, leveraging a meticulously crafted algorithm to execute the intricate task of sorting the bottles according to predefined criteria. This algorithm, intricately designed and finely tuned, takes into account factors such as color, size, and shape to make informed decisions regarding the optimal placement of each bottle. Once sorted, the bottles are methodically positioned into designated storage boxes, adhering to the prescribed organizational structure. As each bottle finds its rightful place within the storage boxes, it triggers a series of events orchestrated by the IR sensor. This sensor, functioning as the sentinel of the packaging line, detects the presence of the sorted bottles and initiates their onward journey along the conveyor belt. Simultaneously, the IR sensor data is transmitted back to the Arduino Mega, where it is meticulously compiled and analyzed. The culmination of these meticulously orchestrated processes culminates in the comprehensive presentation of production and packaging metrics on the TFT display connected to the Arduino Mega. This real-time display provides invaluable insights into the efficiency and efficacy of the packaging line, offering stakeholders a clear understanding of operational performance and productivity. In essence, the integration of this sophisticated system promises to revolutionize packaging line management, ushering in an era of enhanced efficiency, streamlined operations, and unparalleled productivity.

L. Design of Conveyor Belt.

The conveyor belt material is composite of pvc & Polyster Canvas. Length (L) of belt is 0.45m, width (b) is 0.13m, Belt thickness = 2.1mm. we have referred belt design book to determine properties of belt material. Density of belt material is 2.3kg / m^3. Coefficient of friction 0.2. Total load on Belt is 1kg (9.81N). Cycle time of conveyor assuming 30 seconds. Roller Diameter is 25.4 mm. Circumference of ro11er is 79.79mm

Mass of belt = Total area x unit density

Area of belt= $2 \times L \times b = 2 \times 0.45 \times 0.13 = 0.117\ m^2$

Mass of belt = $0.117 \times 2.3 = 0.2691\ kg$

Total load on Conveyor = 1+0.2691 = 1.2691 kg

speed of conveyor - Assume cycle time 30 second How much time take to flow material from one end Time 30 sec. for I Sec to other Length 0.45 m

Linear speed = Length of belt / Cycle time =0.015m/s.

Power required to drive the conveyor belt is given as

Power = Force × Displacement/time

Power = Force × velocity

AS force is pull force which is equal to frictional force between belt & belt support frictional force

Force = $0.2 \times 1.269 \times 9.81 = 2.489\ N$

Power = 2.489 X 0.015 = 0.037 W

Circumference of ro11er is 0.0797m

It means once 1 rev. the roller rotate at the belt can 0.0797 m travel 0.0797 m distance

1 Rev 1m = 1/0.0797 Rev

therefore for motor

0.9/0.0797 × Rev ==11.29 Rev

Rotational speed of motor =11.29 Rpm

Power =Torque × Angular speed

Torque = Power /Angular speed

for angular speed Rpm into Rad Isec. we have to convert

Angular speed = 11.29 x 27 60 =1.182 rad/sec.

Torque = 0.037 (Nm/sec) / 1.182 rad/sec)

Torque 0.031 Nm.

M. Conveyor belt Auto CAD Diagram

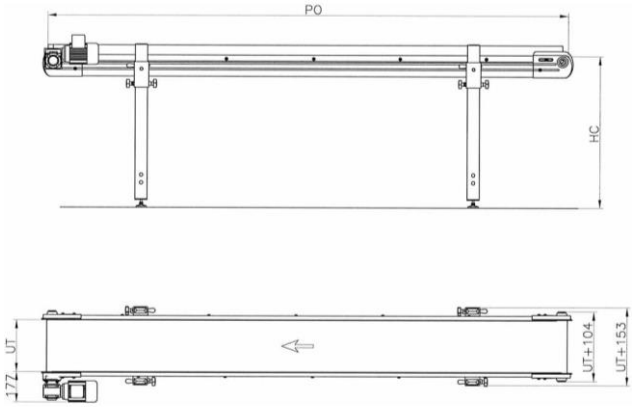

Fig. 3 Conveyor belt drawing

N. Sselection of components

1) Conveyor belt Components

Motor: Gear motor

Specifications

12 volt ,10 rpm, Power 12 watt,

2) Belt:

material of belt - composite of PVC and polyester canvas

Specifications:

Length -900 mm

Width -130 mm

Thickness - 2.1mm

3) Roller:

Length -130 mm

Diameter- 12.7 mm

4) Frame:

Length: 500 mm

Height: 100 mm

Aluminum is a material that has several benefits for robotic arms, and the choice of material is frequently determined by particular engineering specifications and factors. The following justifies the widespread use of aluminum in robotic arms

IV. WORKING PRINCIPLE

A. Base:

The robotic arm's base serves as its structural support. It houses the parts required for rotation and movement and offers stability. The arm can move horizontally through a rotating joint or a fixed base.

The points of articulation that provide the robotic arm its mobility are called joints. A 3-DOF robotic arm has three joints, each of which stands for a different degree of freedom.

B. Actuators and Motors:

Each joint's movement is propelled by either an actuator or a motor. Servo motors are utilized in rotational joints.

C. Links:

The stiff sections that join the joints are called links. Part of the robotic arm's overall reach and payload capacity is determined by the links' length and composition.

D. End effector:

The instrument or gadget affixed to the robotic arm's final link is known as the end effector.Depending on the use, it could be a gripper, a welding tool, a camera, or any other kind of tool. What interacts with the environment or carries out a particular activity is called the end effector.

E. Controller:

The robotic arm's "brain" is the controller. To produce the desired movement, it interprets commands input and signals the motors or actuators. The Arduino Mega 2560 is the controller in use.

F. Sensors:

By giving the controller feedback, sensors enable the robotic arm to sense its surroundings and modify its movements accordingly. The color sensor TCSS3200 is utilized in this instance to identify the bottle's specific color.nd IR sensor to tally the quantity of packed and sorted bottles.

G. Power Supply:

The robotic arm's power supply supplies the electricity required to run the motors and other electronic parts.

H. Frame/Structure:

All the parts are held together and supported by the frame or structure. For the robotic arm to move steadily and accurately, it must be strong and rigid.

I. Cabling and Wiring:

Connecting electronic components like motors, sensors, and controllers is done through wiring and cabling. The functioning and beauty of the robotic arm depend on the wiring being arranged properly.

J. Conveyor belt Working

The sensor systematically switches between the primary colors of RGB (Red, Green, Blue), evaluating the intensity of light reflected from the surface of the detected object. This reflected intensity is then converted into an 8-bit value, providing insights into the predominant color. For instance, a surface appearing red will strongly reflect red light, while a yellow surface will reflect both red and green light. By applying the principle of color induction, which states that combinations of the primary colors generate a spectrum of hues, the system determines the color of the object under scrutiny.

K. Microcontroller Integration and Stepper Motor Control:

Upon identifying the RGB values indicative of the object's color, the microcontroller processes this data and transmits corresponding signals to specific stepper motors. These stepper motors function as pistons, facilitating

the precise movement of objects along the conveyor belt. Before activation, an infrared (IR) receiver detects the presence of the object and assists in counting. The ULN2003A buffer IC serves to drive the stepper motors efficiently, ensuring seamless operation

L. Sorting Process and Data Transmission:

As an integral facet of the sorting mechanism, the microcontroller diligently awaits confirmation signals emanating from the IR receiver, which serve as indicators denoting the presence of a specific color-coded object on the conveyor belt. Upon the receipt of these crucial signals, meticulously processed by the microcontroller, a synchronized response is triggered, compelling the corresponding stepper motor into action. With precision and swiftness, the stepper motor initiates rotational movement, effectively displacing the identified object from the conveyor belt's trajectory. This seamless orchestration of actions ensures the efficient sorting of objects based on their predetermined color codes.

In tandem with the sorting operation, the system meticulously tallies the count of sorted objects, maintaining a meticulous record of the sorting process's efficacy. This valuable data is swiftly transmitted to a connected personal computer (PC), where it undergoes thorough analysis and interpretation. Facilitated by a dedicated Visual Basic (VB) program, the accumulated count of sorted objects is visually presented in real-time, offering stakeholders invaluable insights into the sorting process's efficiency and performance metrics. The dynamic display of this data empowers operators and supervisors to make informed decisions, fine-tune operational parameters, and optimize the sorting process for heightened productivity and accuracy. Thus, through the seamless integration of advanced technology and meticulous data tracking mechanisms, our system elevates sorting operations to new heights of efficiency and precision.

V. APPLICATIONS

In industrial settings, these systems offer the potential to automate the execution of repetitive tasks, ranging from bottle packaging and sorting to the meticulous packaging of diverse products. By leveraging advanced algorithms and sensor technology, these automated solutions streamline operations, enhance efficiency, and reduce labour costs.

Within warehouses, these systems play a crucial role in the selection, sorting, and picking of goods from distribution conveyors to fulfil consumer orders. Through the integration of intelligent robotics and machine learning algorithms, they optimize warehouse logistics, minimize errors, and expedite order fulfillment processes.

In the food industry, these systems are instrumental in developing consumables with consistent quality and quantity. By employing precise measurements, automated portion control, and adherence to stringent quality standards, they ensure product uniformity, safety, and compliance with regulatory requirements. Additionally, these systems enhance production throughput, minimize waste, and uphold the brand reputation for excellence in food manufacturing.

VI. PROTOTYPE

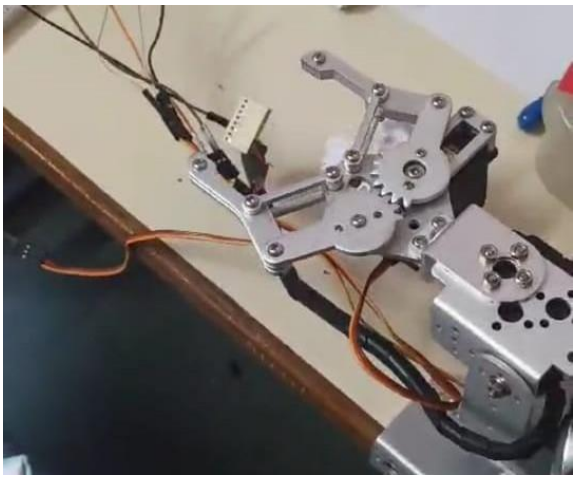

Fig 3. Prototype model of robotic Arm

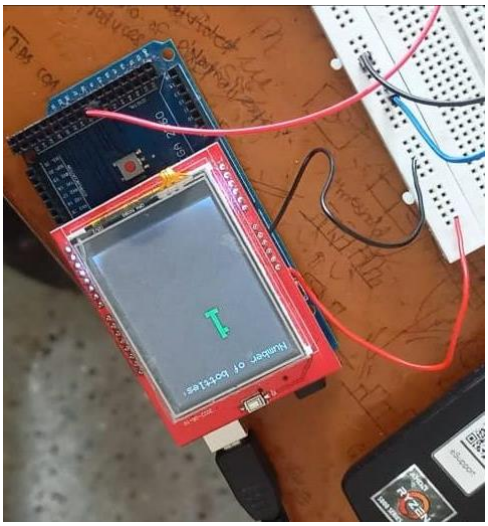

Fig 4. Bottle count displayed on TFT Display

Fig 5. Prototype model of Conveyor Belt

As depicted in the figure 3,4,5, there is a compelling opportunity to design and implement an affordable Arduino-based small-case bottle sorting and packaging line. This innovative solution presents a viable alternative to the expensive and complex PLC-based systems currently prevalent in industrial settings. By harnessing the versatility and cost-effectiveness of Arduino technology, coupled with sophisticated algorithms and sensor integration, we can develop a compact yet robust system capable of efficiently sorting and packaging bottles with precision and reliability.

Moreover, the Arduino-based approach offers greater flexibility and scalability, allowing for easier customization and adaptation to diverse production environments. This means that even small-scale enterprises with limited resources can benefit from the automation and efficiency afforded by our solution. Furthermore, the simplicity of the Arduino platform translates to lower maintenance costs and reduced reliance on specialized expertise, making it an attractive option for businesses seeking to streamline their operations while minimizing overhead expenses.

VII. CONCLUSION

The development of an Arduino-based small-case bottle sorting and packaging line represents a disruptive innovation poised to revolutionize industrial automation, offering a cost-effective and accessible alternative to traditional PLC-based systems.This will help in easy management of packaging efficiency and automate the production data accurately there by reducing the human errors.

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Pharmaceutical Data Optimization Using Quantum Machine Learning

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ABSTRACT

In this few years new diseases like COVID-19 and its variants are emerging. There needs deeper aspects involved in improving the drugs .Generic medicine companies like Pfizer, hindustanUniliver had done many clinical trials on patients who were acyually infected by COVID-19 .It is also important knowing the effects of drug on a mass population before making it into production. So emerges the need for optimization in drugs. The previous information or datasets from the pharma companies, hospitals and clinics can be studies and we can also predict how much safe the orally consumed drugs are safe for the patient . Doing so will definitely ease the control over the effect of drug whether it is harmful or not depending upon its severity or risk factor. This encourages the development of a standardised metric that is well accepted by many i.e. nothing but the WHO (World Health Organization) accepted scores which will eventually help in categorising the drug compositions. Everytime the new information is updated into the live dataset, the 'Risk Assesment' team can analyse the risk, bioactivity on the group of drugs. This can also adher the business intelligence of the overall system. Here comes the quantum advantage, a revolutioning promise of quantum algorithms in solving the optimization or combinatorial problems in managing complex relationships among the data. That tools will help to reduce the time consumption. This paper introduces new approach for "pharmaceutical data optimization using quantum machine learning". Quantum algorithms are thoroughly designed for performing the machine learning operations harnessing the power of Quantum Computing on a NISQ based quantum computing.This is based on qubits rather than classical bits in comparison with classical bits.

Index Terms—Pharmacy, Quantum Machine Learning, Optimization ,RiskAssessment,Quantum algorithms, NISQ (Noisy Intermediate scale Quantum)

I. INTRODUCTION

The pharmaceutical industry faces a constant challenge:developing safe and effective drugs in a timely and cost-efficient manner. Traditional drug discovery is a lengthy and expensive process, often riddled with trial and error. However, the emergence of quantum machine learning (QML) presents a potential paradigm shift for the industry .

This introduction will explore the limitations of current drug discovery methods and how QML offers a promising solution for optimizing pharmaceutical data analysis.Here are some key points to be covered in the introduction: Highlight the importance of drug discovery and the challenges faced by the pharmaceutical industry.Briefly explain the traditional drug discovery process and its limitations, such as time-consuming clinical trials and high costs.Introduce the concept of quantum computing and its potential to revolutionize various fields, including drug discovery.Define quantum machine learning (QML) and its unique capabilities, such as harnessing the power of quantum mechanics to accelerate data processing and analysis.Briefly mention the potential applications of QML in optimizing pharmaceutical data, including:Molecular modeling and simulation with better accuracy[7].Efficient selection of promising drug candidatesEnhanced drug safety assessmentsConclude by emphasizing the potential of QML to expedite drug discovery, reduce costs, and ultimately improve human health.This introduction provides a starting point for delving deeper into the exciting world of QML and its potential to revolutionize the pharmaceutical industry.

II. RELATEDWORK

The existing system is used to check the molecular design, information and find the functional groups.In drug discovery identifying hits from compound's historical data that may become leads for medicinal chemistry optimizationtechnique[3]. There are also protein folding simulations studied by pharma companies R&D sections. They might give a picture of reaction between target proteins i.e. based on ligands of the micro-organism causing disease. This cannot alone justify the bioactivity or reaction on the body of patient or other anthropological factors like accepting and rejecting a null hypothesis of medicine.This updated overview discusses the utilization of compound libraries, compounds derived from combinatorial and parallel synthesis campaigns and natural product sources; creation of mother and daughter plates; and compound storage, handling, and bar coding in HTS.The unit also presents an overview of established and emerging assay technologies (i.e., time-resolved fluorescence, fluorescence polarization, fluorescence-correlation spectroscopy, functional whole cell assays, and high-content assays) and their integration in automation hardware and IT systems. There are many recent discoveries in pharma companies. We were dependent on the criterias like hydrogen bond donor, hydrogen bond acceptor, molecular weight and p-IC50 value. Most of the researches in drug discovery are done on the basis of Lipinski's rule of 5 in designing orally consumable drugs.Along with the activity, other factors that determine the efficacy and potency of the hits, such as the absorption, distribution, metabolism, excretion and toxicity (ADMET) profile, among other pharmacokinetic properties, are optimized to produce a smaller set of better.candidates called lead compounds[5]. Author described detailed Survey On Creating Digital Health Ecosystem with Lifewellness Portal Including Hospital and Insurance Company with Cloud Computing and Artificial Intelligence.[12].

III.PROPOSEDSYSTEM

We have achieved quadratic time speed up by Classical to Quantum transfer of information where we can increase the accuracy of the model for further processing.Problems that have time complexity of thousand of year can be solved in a day (only if hardware is noise free).We can conquer any pandemic like 'Corona- SARS V2' or severe disease by new drug design methodology and technology(Quantum Machine Learning) in near future. Those lead compounds again can be refined by newer technique proposed by applying quantum model

which consists of algorithms like QAOA and quantum models. QSAR models for smaller datasets play a major role in the optimization, allowing for quickly judging whether certain modifications improve drug-likeness or not, especially when no target information is available. One thing that is implemented is on which side the risk factor lies. We have designed a metric that is based on generalized score which then is labelled depending on the WHO standardized rules for risk assessment. The Classification criteria given are,Severity(s): How significant the identified risk in terms of impact. Probability (p): How often is frequency of occurence.Detectability (d): includes methods to detect deviations or their associated parameters. The values are mapped by the program related to generalised score considering the terminologies stated. This system considers the clinical trials effectively. Drugs with a level of specific toxicity gets highlighted onto the interface. Correct result is constructively interfered and wrong results are destructively interfered based on quantum gates. This will potentially point out the classified drug name causing more or less harm. This is a highly time-saving in lead optimization introducing a factor in classification named 'activity'.

The bipartite graph i.e. nothing but the Hamiltonian a combinatorial graph formulation of a problem, helps a lot in assessing on which side the risk lies as discussed earlier and also the attributes or co-factors linked with the risk. This potentially also helps pharma companies in figuring out how the selected drugs in the production can or cannot cause the health issue on the overall population. In this way the drug safety profile of pharma companies will get benefited by prohibiting the collection on severe drugs in early production period. With highly fault tolerant Quantum Computers, this process will even get much faster with no time. The quadratic time speed up achieved from superposition and entanglement of bits is quite essential. A breakthrough in hardware and better understandings of complex mathematics behinds quantum mechanics willeliminate the imbalance in qubits stability, making the quantum advantage a true boon to humanity.

IV. QUANTUM APPROXIMATE OPTIMIZATION ALGORITHM:

Quantum Approximate Optimization Algorithm (QAOA) is a hybrid quantum-classical variational algorithm designed to tackle combinatorial optimization problems[8]. Despite its promise fornear-term quantum applications, not much is currently understood about QAOA's performancebeyond its lowest-depth variant. An essential but missing ingredient for understanding and deploying QAOA is a constructive approach to carry out the outer-loop classical optimization.

It provides an in-depth study of the performance of QAOA on MaxCut problems by developing an efficient parameter-optimization procedure and revealing its ability to exploit non-adiabatic operations[8].Building on observed patterns in optimal parameters, we propose heuristic strategies for initializing optimizations to find quasi-optimal p-level QAOA parameters in O(poly(p)) time, whereas thestandard strategy of random initialization requires 2O(p)optimization runs to achieve similar performance

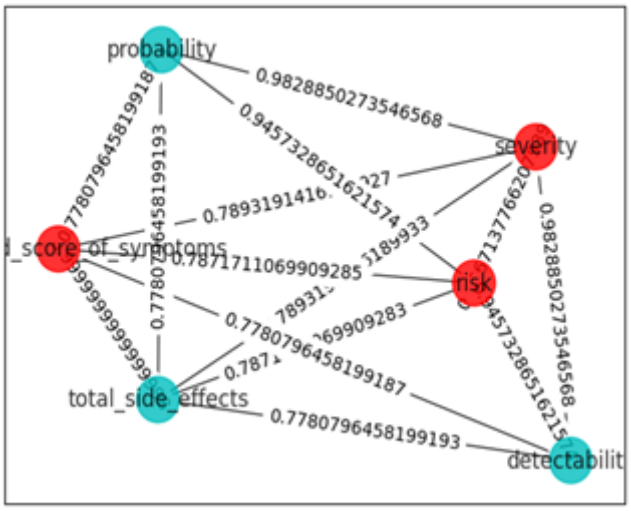

Fig. 1 Optimization Algorithm- QAOA Hamiltonian

We then benchmark QAOA and compare it with quantum annealing, especially on difficultinstances where adiabatic quantum annealing fails due to small spectral gaps. The comparison reveals that QAOA can learn via optimization to utilize non-adiabatic mechanisms to circumvent thechallenges associated with vanishing spectral gaps. Finally, we provide a realistic resource analysison the experimental implementationof QAOA. When quantum fluctuations in measurements areaccounted for, we illustrate that optimization will be important only for problem sizes beyond numerical simulations, but accessible on near-term devices. We propose a feasible implementation oflargeMaxCut problems with a few hundred vertices in a system of 2D neutral atoms, reaching theregime to challenge the best classical algorithms.

A. Quantum Kernel

The idea behind quantum kernels is to take advantage of quantum mechanics to achieve better results while mapping the feature vector[9]. The general guidelines for such mapping are encoding classical data into qubits, performing operations (such as superposition and rotations in the Bloch sphere), then computing the dot product of the resulting states.

Some of the proposals for the kernel have been made. For instance, Aram Harrow et al. proposed the following kernel circuit:

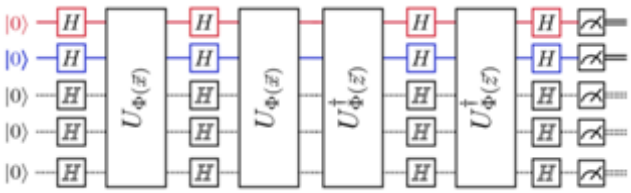

Fig. 2 Quantum Kernel

B. Harrow–Hassidim–Lloyd algorithm.

The Harrow–Hassidim–Lloyd algorithm or HHL algorithm is a quantum algorithm for numerically solving a system of linear equations, designed by Aram Harrow, Avinatan Hassidim, and Seth Lloyd. The algorithm estimates the result of a scalar measurement on the solution vector to a given linear system of equations.Firstly,

the algorithm requires that the matrix displaystyle A} be Hermitian so that it can be converted into a unitary operator. In the case where displaystyle A} is not Hermitian, define

$$C = \begin{bmatrix} 0 & A \\ A\dagger & 0 \end{bmatrix}$$

Although it may be complex, quantum kernels have to perform operations that are not available to a classical machine to outperform them. In the case above, the circuit uses Hadamard gates and Z Pauli matrices to get some advantage over them.

$$U_{\Phi(\vec{x})} = \exp\left(i \sum_{S \subseteq [n]} \phi_S(\vec{x}) \prod_{i \in S} Z_i\right)$$

Unitary gate for a classical feature function ϕ

System Architecture

- Inthismoduleanalysthastologinbyusingvalidusernameandpasswordwhichwerebecross-checkedwith our database. If user is authenticate then user canloginsuccessfullyotherwiselogingetfailed.
- After successfully login the analyst can the upload the dataset of collected drug molecules samples[10].
- Then by simply putting the dataset, the analystcananalyse the scenarios. This will enable him or her classify drugs properly and apply right set of configured drugs.Automatically after entering parameter values hitting categorise button, an event will call a quantum model function that comprises of quantum neural net will make prediction whether new drug is capable of passing the tests compared to other drugs into the cluster.
- Another aspect is KPIs (Key Performance Indicators)provides the sales histogram of current market. Then derivative pricing is predicted for the specific drug. Such decision support system helps in deciding , the introduction of new drug can affect market.
- Information retrieval is the sub-part involved in statistical analysis of the production.
- The newly generated dataset, graphs and reports from researchers are again checked. The changes are updated in the molecules database, policy formulation in drug discovery by board of members or AI assistance regarding drug safety.

Fig.3.Systemarchitecture

C. Figures

1) Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In UML's Activity diagrams show the overall flow of control is shown. The interaction of various processes and tasks is modelled. Graphical representation: Rounded rectangles represent actions; Diamonds represent decisions; Bars represent the start (split) or end (join) of concurrent activities; A black circle represents the start (initial state) of the workflow. An encircled black circle represents the end (final state). Arrows depict the process flow in activity diagram. From which terminal it originated and where it will head towards the body is denoted by the arrows. Swimlanes shows the partitioning between the modules. How much parallel tasks to be kept, how much concurrency is to be provided. The design tells that no matter how the modules are divided, the control, the flow and behaviour will be definitely mapped in this type of dynamic model i.e. Activity model. It truly says a lot about the real world objects. Here, it typically describes user control, processes, entities and decision making through forks joins and splits and other UML components

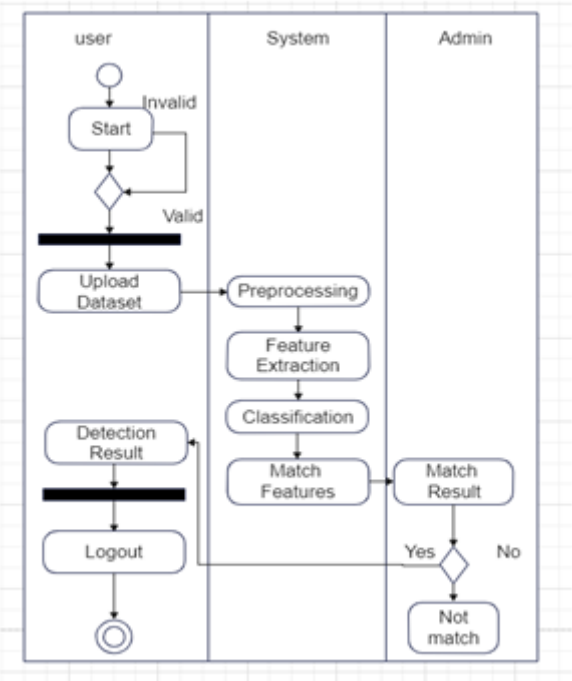

Fig.4.Activity Diagarm

2) DFD Level Diagram

Level 0

Level 1

Fig.5.DFD Level Diagram

3) Deployment Diagram

In this section, we are going to have an overview of Deployment diagrams that is used for visualizing the deployed software components in a toplogical manner. The connection between nodes, their relationship is described. In our project we have a jupyter notebook deployed on IBM server and datasets.This notebook contains most important function that maked prediction. It consists of pre-processing, feature extraction and classification algorithm. The quantum model does classification. It comprises 6 layered quantum neural net

made from quantum gates. Those gates can be runned on a real quantum hardware connecting the real quantum hardware available online through IBMQ account. That notebook is connected to the application server that has other files, custom database (user management) and system libraries that gives access to server side scripts in anvil framework (HTML, CSS, python, bootstrap and python). The deployment diagram when detailed functionalities of Model-view-Control architecture are included, it can then be evolved into a 'Component Diagram'.

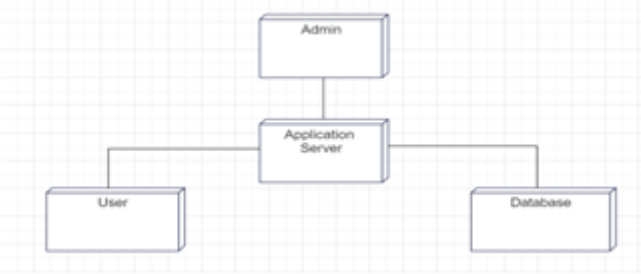

Fig.6.DeploymentDiagram

V. MATHEMATICALMODEL

TheModelingProcedureHasBeenDoneaccordingtotheFollowingAssumptions:
LetSbetheWholesystemS
Input:
Identify the inputs F= f1, f2, f3 ....., FN— F as set of functions to execute commands.

- I= Severity , Probability, Detectability , Activity of Drug
- O= Drug name after classification, Drug Suggestion
- S= Preprocessing, Extraction, Classification, Feture Mapping
- Risk=Severity*Probability*Detectability

Space Complexity:

1. The space complexity depends on Presentation and visualization of discovered patterns.
2. More the storage of data more is the space complexity.
3. Size of the program, generated temporary state space or variable consumes space.
4. Extra generated field after one-hot encoding may increase the size of dataset if we want modify the dataset.

Time Complexity:

1. Check No. of patterns available in the datasets= n
2. If (n(1)) then retrieving of information can be time consuming.
3. So the time complexity of this algorithm is O (nˆn). = Failures and Success conditions.
4. Increasing the number of layers in the quantum model can lead to minute increase in time.

VI. HARDWAREANDSOFTWAREREQUIREMENTS

A. HardwareRequirements

- Processor - Intel i3/i5/i7

- Speed - 3.1 GHz
- RAM - 2GB(min)
- Virtual Machine
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor – SVGA

B. Software Requirements

- Application Server - Apache Tomcat
- Front End - HTML,Bootstarp,CSS
- Language - Python.
- Database -Cloud
- IDE - Pycharm,VisualStudio,IBM Platform

VII. RESULT ANALYSIS

Hereistheresultanalysisforourproposedsystem.

Fig. 7 Login and Registration

Fig.8Information Retrieval- Sales

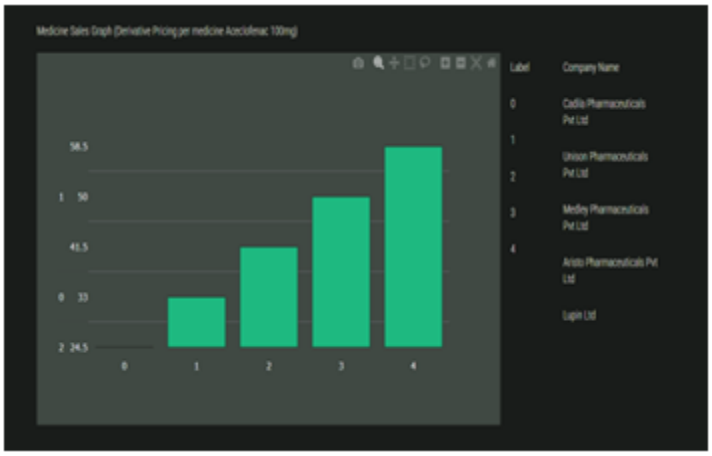

Fig. 9 Histogram- KPI

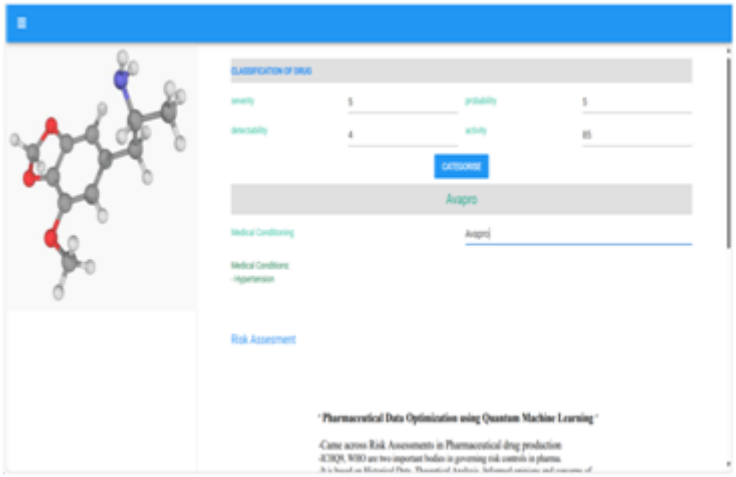

Fig. 10Classification- Quantum machine learning

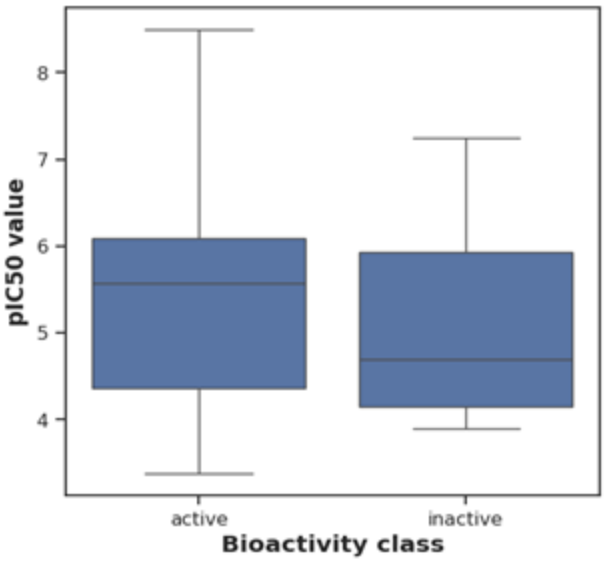

Fig. 11Bioactivity- Selected target protein(prostaglandin)

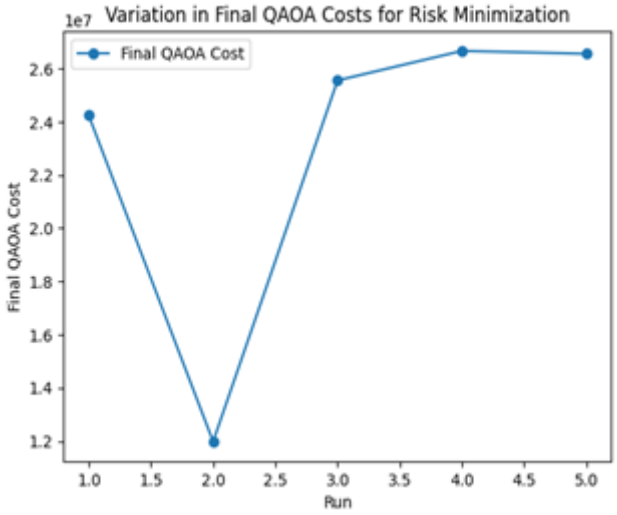

Fig.12Risk assessment- Drug safety production

VIII. COMPARISON

As we compare proposed system with existing system, the proposed system is more faster and efficient. It is due to use of quantum bits in our proposed system. Our proposed system provides lots of advantages like HTS, Lead Optimization, Drug Safety with newer metrics Applied, Quadratic time speed up. It also provides us drug name with medical conditioning.

IX. CONCLUSION

Our project we have accomplished risk assessment according to WHO (World Health Organisation) guidelines and performed QAOA and classification. It is not about proteins structure but an alternative method that is capable, of predicting drug safety, drug testing and business intelligence that can direct towards the drugs that needs enhancement, then indirectly point out drug improvement by combining classical machine learning for drug discovery.

X. ACKNOWLEDGMENT

We would also like to give special thanks to Mr. KarthiganeshDurai, (Chief Quantum Architect, BosonQ Psi) for giving idea about appropriate algorithms to use in the project development. Also greetings to Dr. S.T. Shirkande (Principal at SBPCOE, Indapur), giving opportunity by accepting the idea and Dr.A.B. Gavali for sharing their pearls of wisdom with with us to dot the research regarding the “Pharmaceutical Data Optimization using Quantum Machine Learning”.Also,thanksMr.SangramDeshpande(Senior Quantum Researcher, Qkrishi) for approving our project.

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Analysis of Battery Pack Used in BTMS by Using ANSYS Software

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ABSTRACT
Efficient thermal management is crucial for the performance, safety, and longevity of lithium-ion battery packs, especially in high-demand applications such as electric vehicles. Traditional cooling methods, including air cooling, often face challenges in maintaining uniform temperature distribution, which can lead to overheating, reduced efficiency, and safety hazards like thermal runaway. This study aims to address these challenges through a detailed Computational Fluid Dynamics (CFD) analysis using ANSYS software, focusing on optimizing air cooling strategies.By developing a comprehensive 3D model of the lithium-ion battery pack and simulating its thermal behavior under various operating conditions, this research evaluates different air cooling configurations to identify the most effective strategies. The findings of this research highlight the critical role of proper cooling strategies in enhancing the thermal performance and safety of lithium-ion battery packs. The results contribute to the development of more efficient and reliable Battery Thermal Management Systems (BTMS), providing valuable guidance for future advancements in battery technology and electric vehicle design

Keywords— ANSYS, Li-ion battery, Design, Meshing, Heat Dissipation

I. INTRODUCTION

The increasing reliance on lithium-ion batteries (LIBs) across various sectors, such as electric vehicles (EVs), portable electronics, and renewable energy storage systems, underscores the importance of efficient thermal management to ensure their performance, longevity, and safety. Among the various methods available, Computational Fluid Dynamics (CFD) analysis has emerged as a powerful tool to study and optimize Battery Thermal Management Systems (BTMS).

This project focuses on performing a CFD analysis of a lithium-ion battery pack using ANSYS software, with air as the chosen cooling medium. Air cooling is a practical and cost-effective method widely used to maintain the temperature of battery packs within safe and efficient operating ranges. By simulating the thermal behavior and heat dissipation characteristics of the battery pack under various conditions, this study aims to enhance the understanding of aircooled BTMS and identify optimal configurations for improved thermal management.

Importance of CFD Analysis in BTMS

CFD analysis is a crucial tool in understanding and optimizing BTMS due to its ability to simulate complex fluid flow and heat transfer phenomena with high accuracy. By leveraging ANSYS software, this project aims to provide detailed insights into the thermal behavior of lithium-ion battery packs and explore innovative air cooling strategies to enhance their performance and safety. By leveraging the capabilities of ANSYS for CFD analysis, this project aims to provide valuable insights into the thermal management of lithium-ion battery packs. The findings will contribute to the development of more efficient and reliable BTMS, ultimately enhancing the performance and safety of energy storage systems.

II. LITERATURE REVIEW

Informed by an exhaustive review of over 10 journal papers and additional scholarly sources, the project's literature review delves into the intricate facets of technology.

In summary, the literature on the analysis of battery thermal management systems using ANSYS software demonstrates the software's pivotal role in understanding, optimizing, and ensuring the safety and performance of batteries in a wide range of applications. This research field continues to evolve as battery technology advances, and ANSYS software remains a valuable tool for engineers and researchers in this domain. We have read the research paper of A.L.Akhawayn university. A study by A.L.Akhawan university (2023) used ANSYS to simulate the performance of battery management system for a PCM based battery. They found the result of the ANSYS simulated system was able to reduce the temperature of the batterypack upto 10 degree C.

A study by Khalil et al. They studied that Thermal management of stationery battery systems. The heat generation mechanism in stationery battery system and their research are provides more efficient and reliability of the battery thermal management system.

A study by Fantin.et.al. (2023) To study by the author used ANSYS to design and optimize an air cooling system for battery pack. The study showed that shows the to reduce the maximum temperature of the battery through the conventional air cooling. They found the result of the use conventional air cooling system we reduce the heat of the battery for it useful to increasing the performance of battery.

We have read the one research paper of Battery Management Systems For Electric Vehicle by researching A. Hariprasad . This present paper focuses on the study of BMS and optimizes the power performance of electric vehicle. Based on the particular situation, different strategies can be applied to upgrade and optimize the performance of BMS in EV's

III.RESEARCH GAP

There are various methods of cooling for BTMS. In which air cooling, liquid cooling. The majority of the literature explains about the air cooling and direct liquid cooling. Few researches related to comparative experimental study of different types of cooling system. Very less research observed on experimental analysis tube cooling using channel and battery pack. The analytical study for Liquid cooling were carried out by few researchers. The experimental study for coolant used again for cooling is not reported yet. So, there is huge scope for use of coolant for repeatedly. In future it is useful to increasing efficiency improvement of battery pack. An actual design for an electric vehicle or energy storage application needs transient simulations based on the expected driving or load cycle. It is helpful to working on battery cell life improvement.

IV.PROBLEM STATEMENT

To design a battery cell pack using CATIA software and To perform thermal Analysis , simulation and optimization of lithium ion battery cell by using ANSYS software for reducing and analyzing the heat of battery by using CFD analysis for better performance of battery.

V. METHODOLOGY

Part – 1

The methodology for analyzing battery thermal management systems using ANSYS software involves a structured approach that combines simulation, modeling, and analysis. Here's a general outline of the methodology:

1. Prepare 3D-CAD Model of battery cells:

With great attention to detail, the design of the battery pack model incorporating a sophisticated cooling system is meticulously crafted using CAD software. The 3D CAD models are skillfully prepared utilizing the CATIA V5R21 software version, ensuring precision and accuracy in the design process. The battery pack is specifically configured with 96 cells, each carefully spaced with a 1.5 mm gap, dimensions that have been thoughtfully selected based on reliable research papers.

2. Prepare 3D- CAD model of cell stack :

With this information, a CAD model can be developed using software like CATIA V5R21, AutoCAD which allows for the creation of a 3D model considering the specified dimensions, arrangement, and interconnections of the cell stack.

3. Prepare the 3D-CAD Model of cells :

With this information ,a CAD model can be designed using appropriate software, considering the dimensions, layout, and interconnections of the 96 cells. This model can help visualize the physical arrangement and aid in further analysis or design development.

4. Assemble the cells in stacks :

By following these steps, you can assemble the 40 cells into stacks, considering their arrangement, connections, safety, and the overall design of the structure that contains them.

5. Prepare the 3D model of casing and enclosing cell

6. Evaluation of results:

After conducting a meticulous analysis and thoughtful evaluation of the results, the most favorable outcome is determined.

7. Final conclusion:

After a thorough evaluation, the study's conclusion reveals valuable insights and significant findings

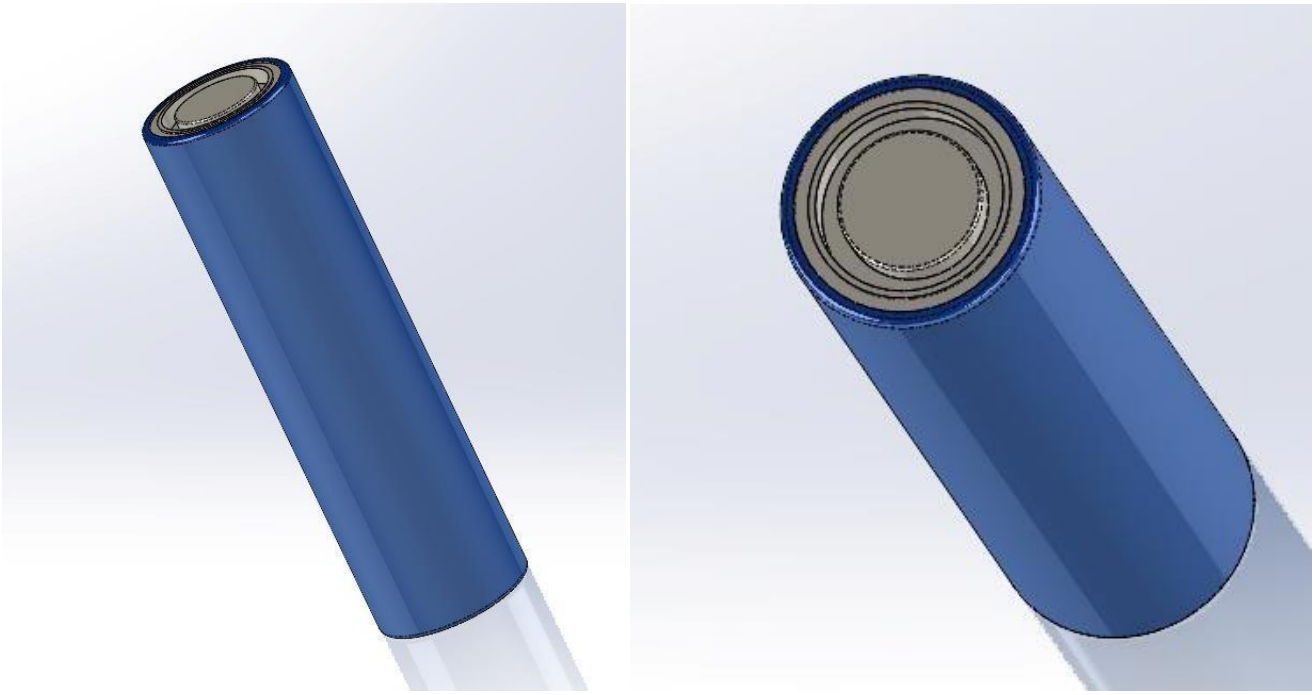


Fig. 1 3D CAD model of a battery cell

Dimensions of the Battery Cell:
Length Of Battery Cell= 100mm
Diameter of Cell = 1.5mm
Width of Cell = 2mm

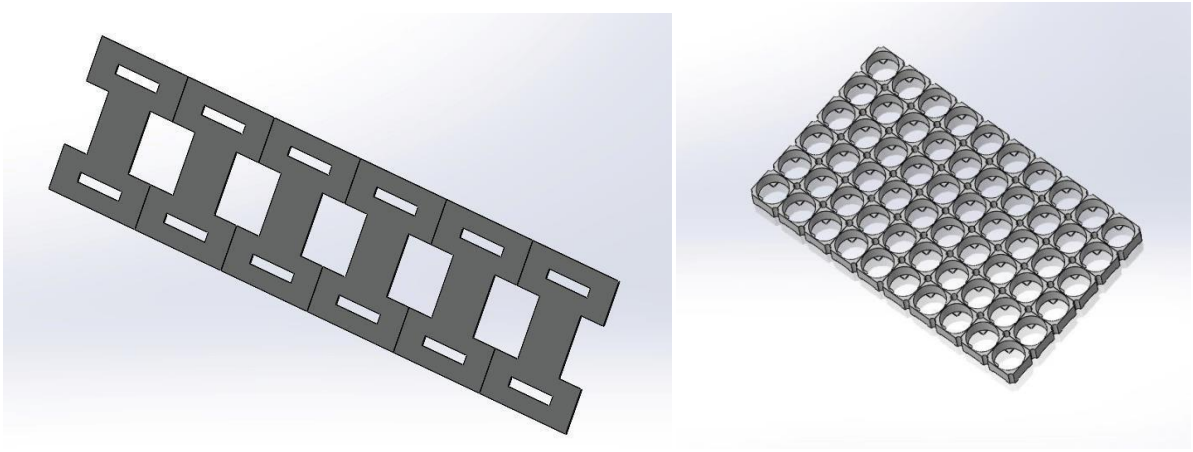


Fig. 3 3D CAD Model of a cell Stack & Upper Stack of Battery cell pack

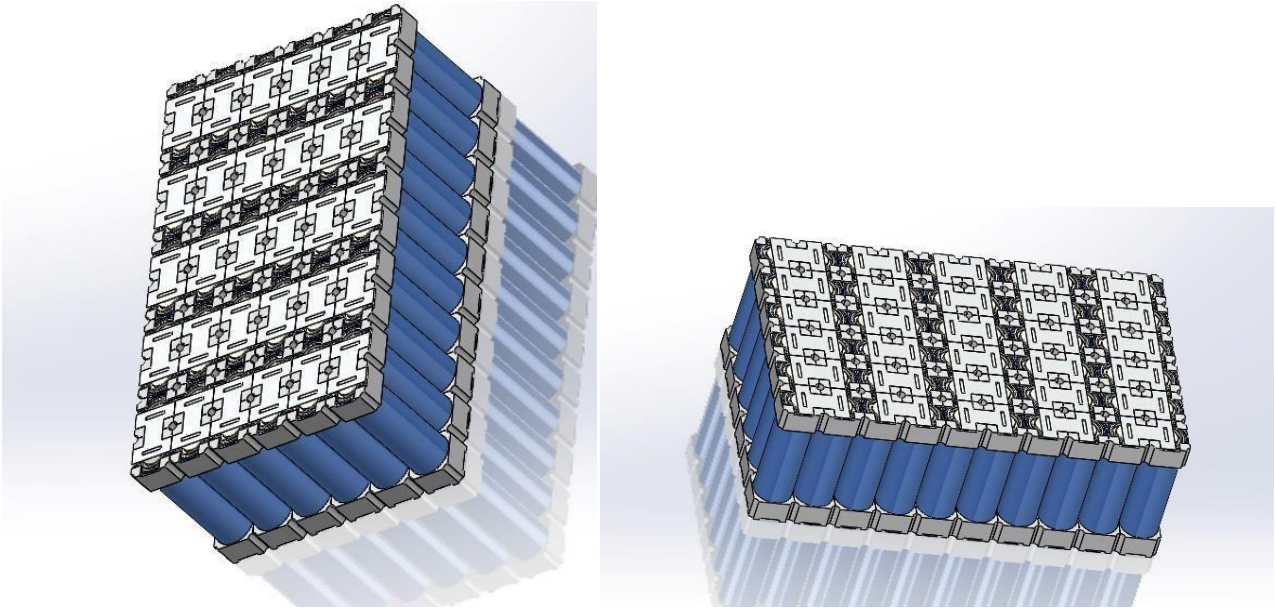


Fig. 4 3D Model of cells

Steps of CFD Analysis of Air Cooling System of Li-ion Battery

Methodology Part – II

Step-by-step methodology for conducting a CFD analysis of a battery air cooling system using Ansys Workbench, with the given condition of an initial air temperature of 22 degrees Celsius:

1 Geometry Creation:

Start by creating a detailed 3D model of the battery cooling system geometry using a CAD software or within Ansys Design Modeler if available.

Ensure the model accurately represents all components including the battery, cooling ducts, inlet, outlet, and any other relevant features.

2 Mesh Generation:

Import the geometry into Ansys Workbench.

Generate a mesh using Ansys Meshing module.

Pay attention to mesh quality, especially near walls and regions of interest.

Refine the mesh as necessary to ensure accurate results, especially in areas of high temperature gradients.

3 Material Properties:

Define material properties for all components involved in the simulation, including the battery, cooling ducts, and surrounding air.

Specify thermal conductivity, density, and specific heat capacity for air and other materials as appropriate.

4 Boundary Conditions:

Define boundary conditions based on the problem statement.

Set the initial air temperature to 22 degrees Celsius.

Specify inlet and outlet boundary conditions for the airflow.
If the battery generates heat, apply appropriate heat generation boundary conditions.

5 Solver Setup:

Choose the appropriate solver within Ansys Workbench, such as Fluent for fluid flow and heat transfer simulations.
Define solution controls including convergence criteria, time step (if transient analysis), and any other relevant settings.

6 Solution:

Run the simulation and monitor the progress.
Ensure that the solution converges within acceptable limits.
If running a transient simulation, monitor the time evolution of the solution.

7 Post-Processing:

Once the simulation is complete, post-process the results to extract relevant information.
Visualize temperature contours, velocity vectors, and other flow characteristics using Ansys CFD-Post or equivalent.
Analyze temperature distributions within the battery and cooling ducts.
Calculate heat transfer rates and other relevant parameters to assess system performance.

8 Analysis and Optimization:

Analyze the results to identify areas for improvement or optimization.
Make design changes as necessary to enhance system performance, such as modifying cooling duct geometry or adjusting airflow rates.
Conduct parametric studies to understand the effects of different design variables on system performance.

9 Validation:

Validate the simulation results against experimental data if available.
Compare simulation predictions with real-world observations to ensure accuracy and reliability.

10 Documentation:

Document the simulation setup, methodology, and results for future reference. • Provide clear explanations of the findings and any recommendations for design improvements.

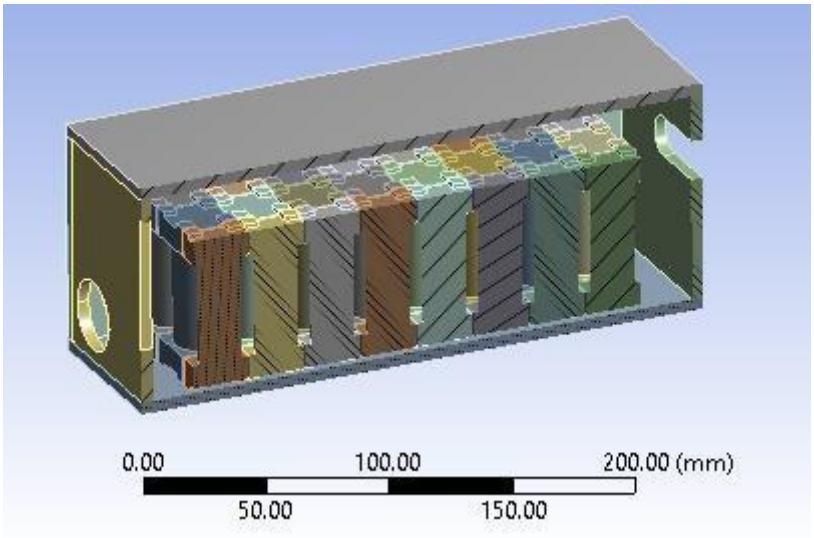


Fig.5 Impetrated geometry in the design Modular with Sectional Cut view

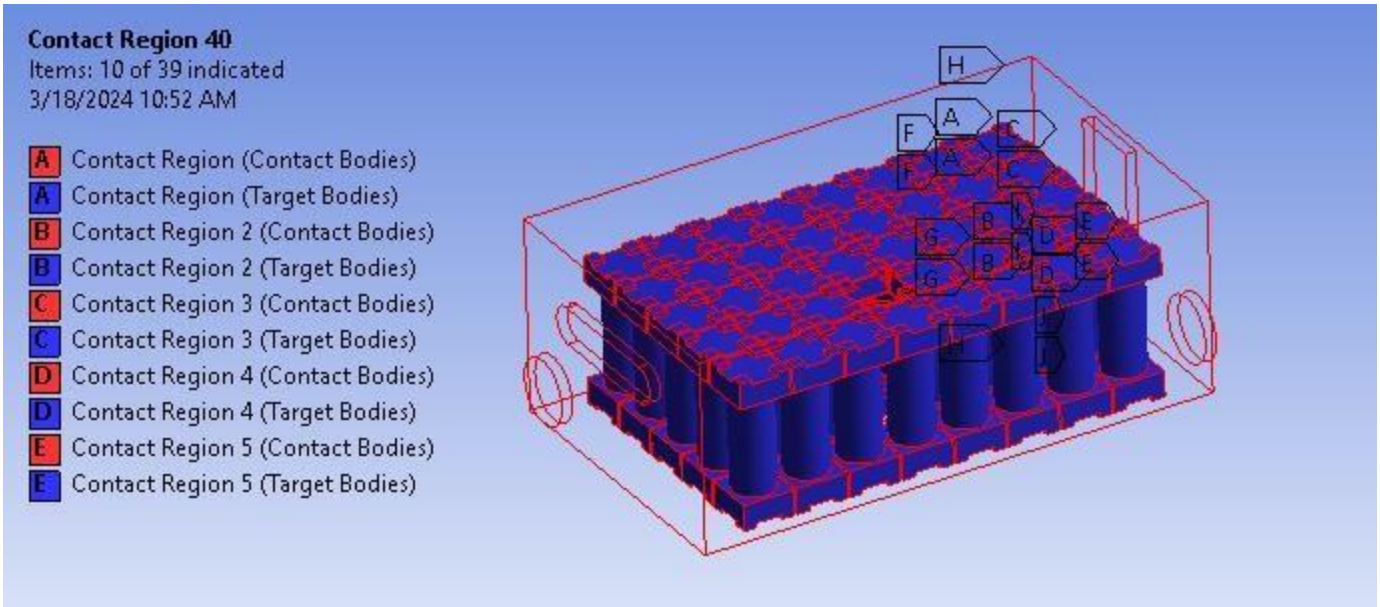


Fig.6 Contact regions of battery case with battery cells

Mesh Generation :

Meshing: - Generate a mesh for the fluid volume. - Pay attention to mesh quality, refinement near critical areas, and ensuring an adequate boundary layer mesh.

Statistics			
Nodes	2160	3090	2160
Elements	905	2085	905

Table Number of Nodes & Elements Generated on the mesh body Mesh

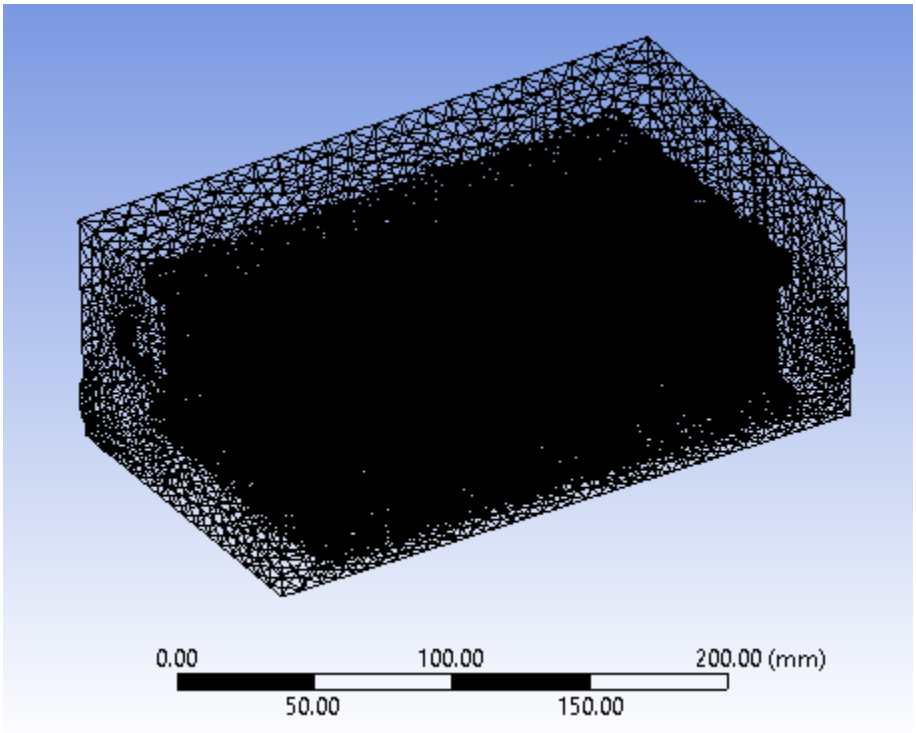


Fig.7 Mesh Generation

- Type of Mesh used 3D Element
- Type of Shape used Tet-Mesh Type
- Size adopted 10 mm

Physics Setup :

Double precision with 1 processing solver

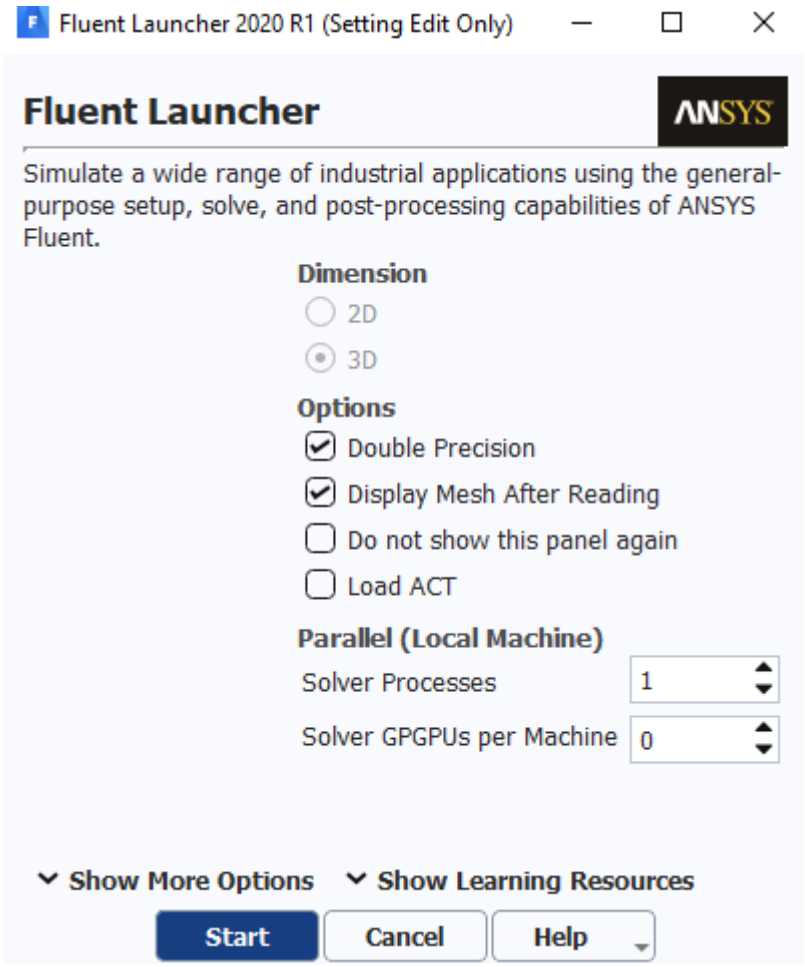


Fig.8 Physics Setup modular

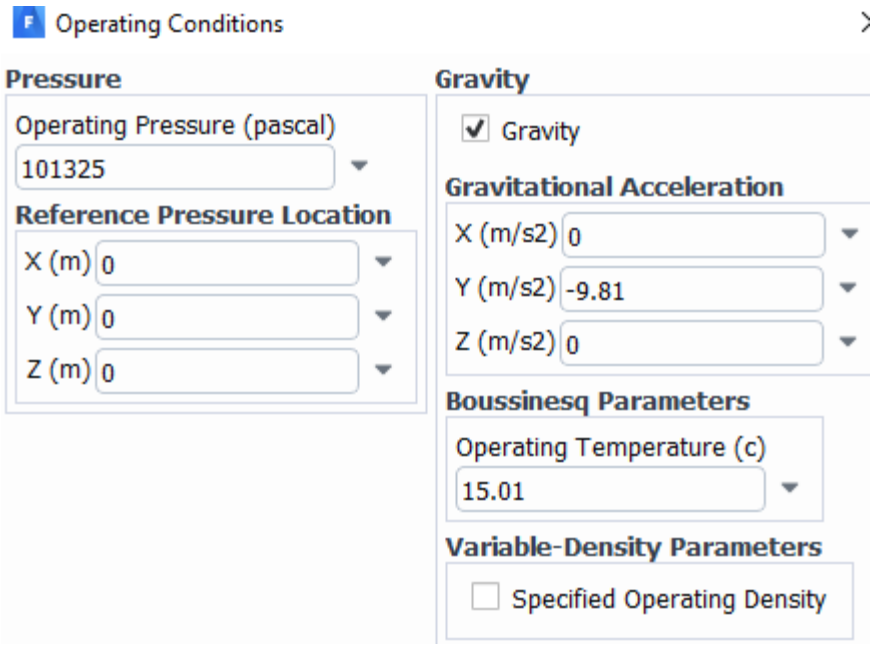


Fig.9 General Operating Conditions

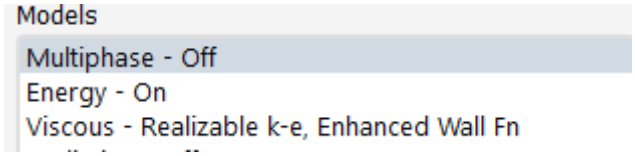


Fig.10 Energy equation turning on

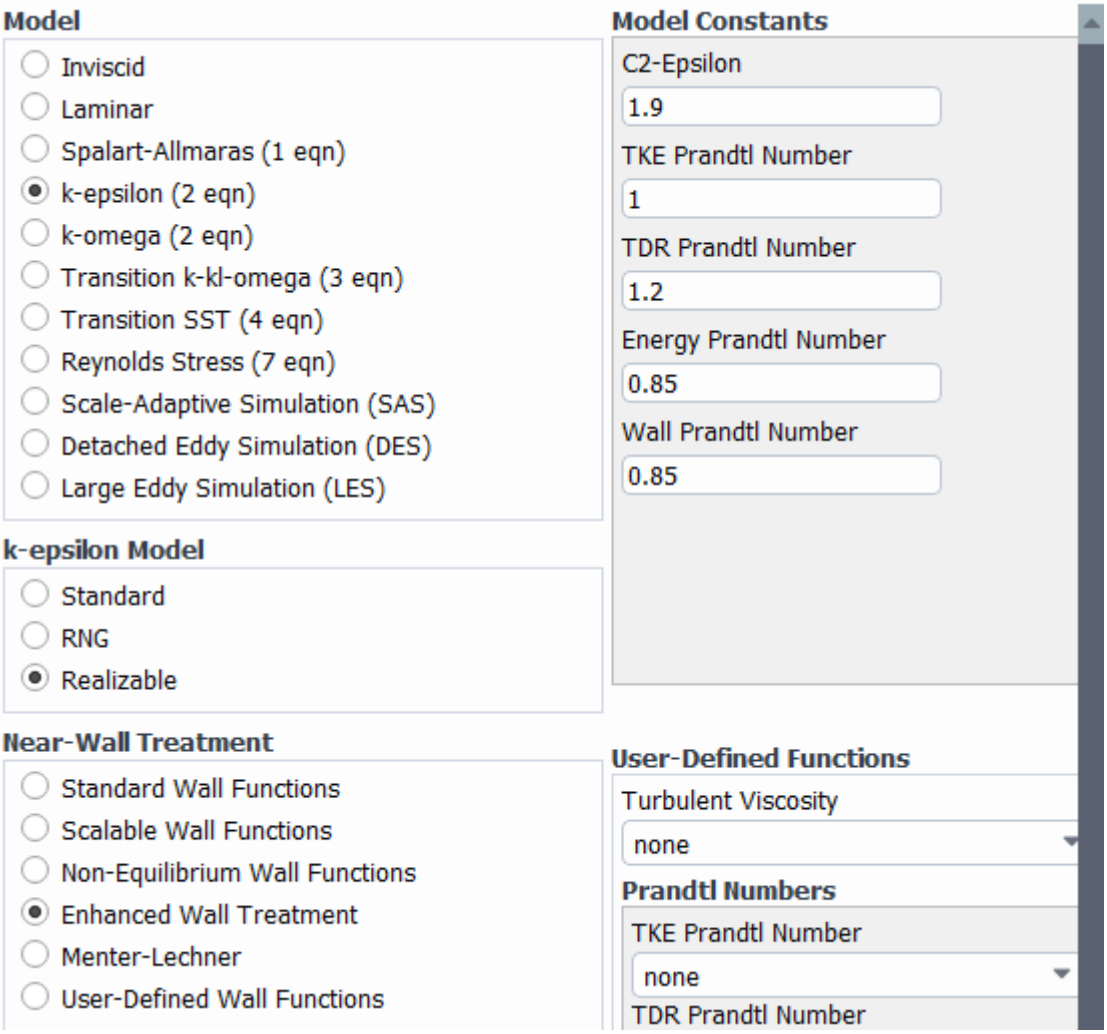
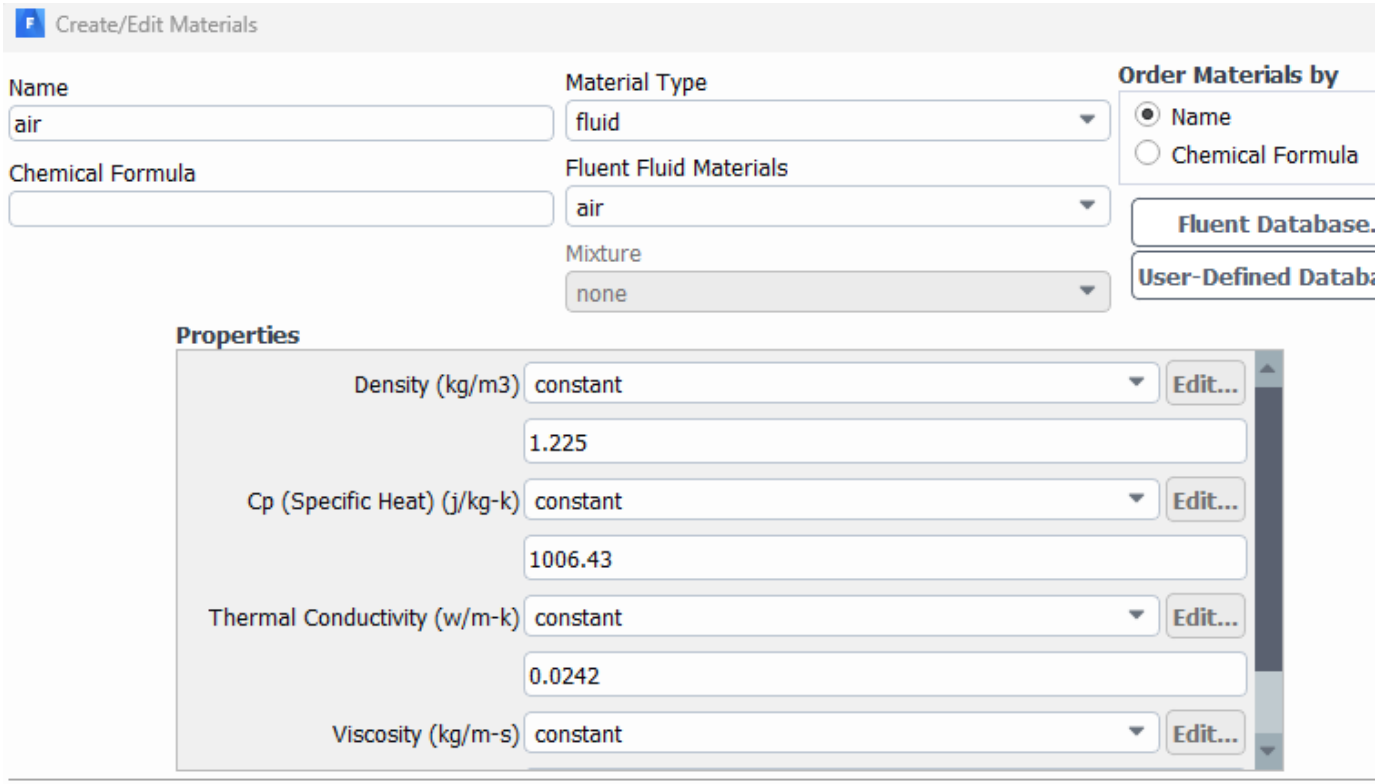


Fig.11 Viscous Flow to K-epsilon Setting

Material Properties

- Define material properties for all components involved in the simulation, including the battery, cooling ducts, and surrounding air.
- Specify thermal conductivity, density, and specific heat capacity for air and other materials as appropriate.



Boundary Conditions:

- Define boundary conditions based on the problem statement.
- Set the initial air temperature to 22 degrees Celsius.
- Specify inlet and outlet boundary conditions for the airflow.
- If the battery generates heat, apply appropriate heat generation boundary conditions.

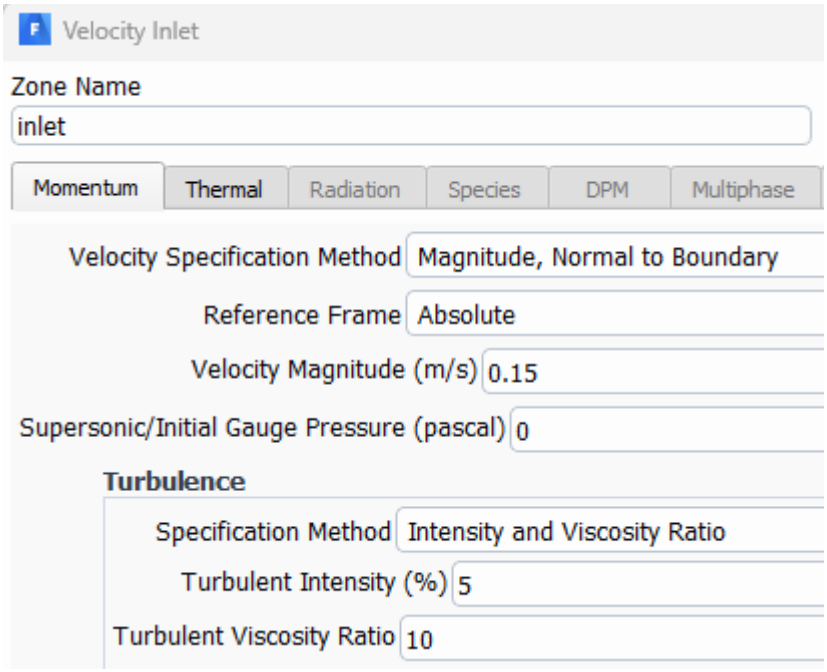


Fig. 12 Boundary Conditions Initial velocity & Air Temperature

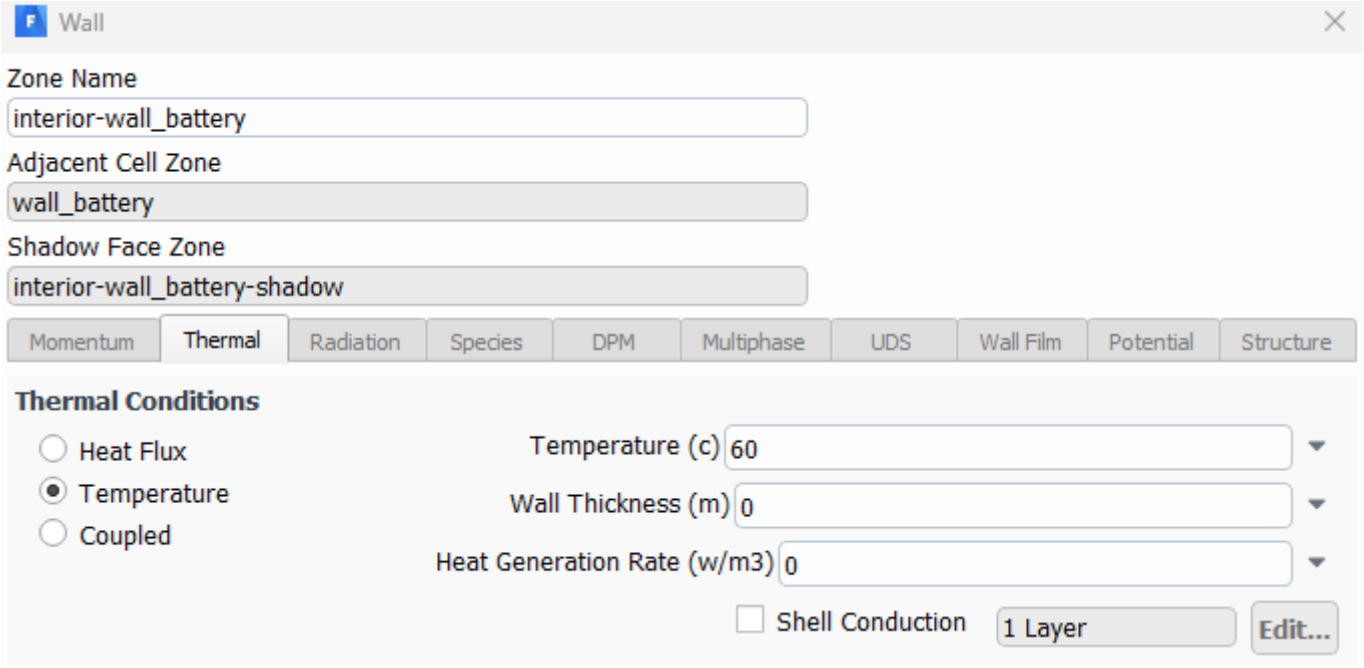
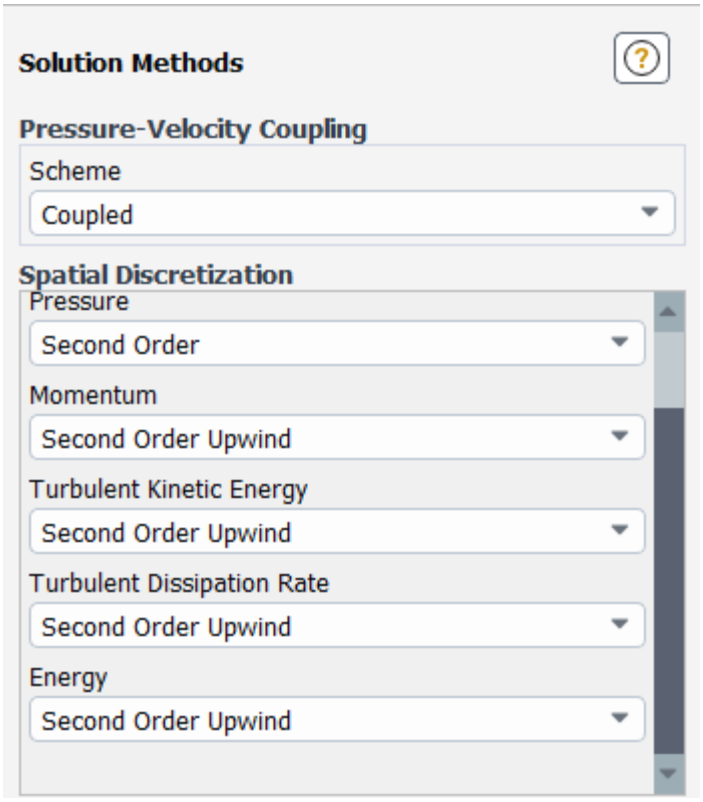


Fig. 13 Battery temperature set for solution

Solver Setup:

- Choose the appropriate solver within Ansys Workbench, such as Fluent for fluid flow and heat transfer simulations.
- Define solution controls including convergence criteria, time step (if transient analysis), and any other relevant settings.



Solution:

- Run the simulation and monitor the progress.
- Ensure that the solution converges within acceptable limits.
- If running a transient simulation, monitor the time evolution of the solution.

Run the Simulation: - Solve the CFD problem using the specified settings. - Monitor the solution for convergence and stability.

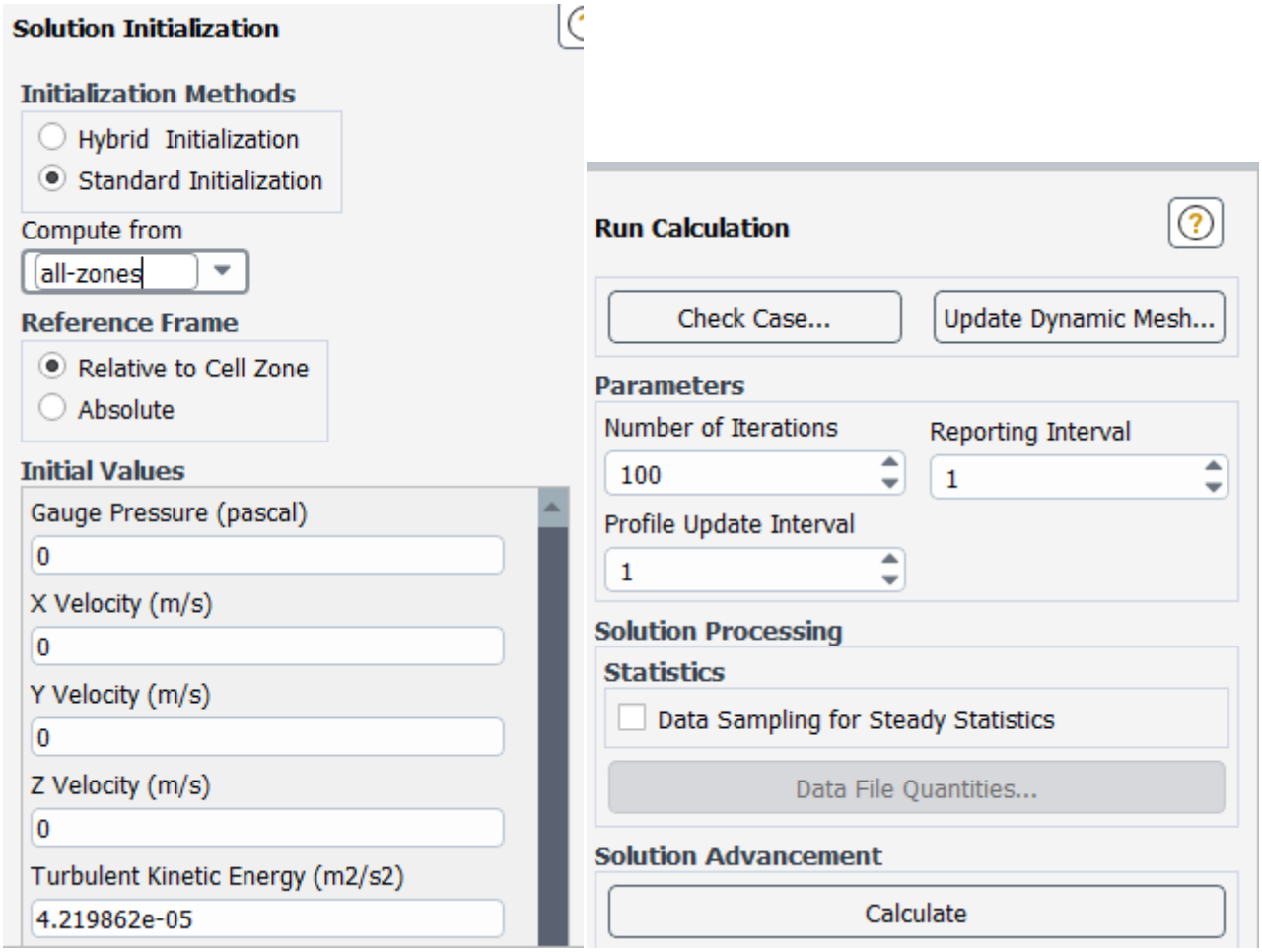


Fig.14 Solution initialization method Standard all Zone & Iteration performed

VI.RESULTS AND DISCUSSION

CFD (Computational Fluid Dynamics) analysis is a powerful tool for simulating and analyzing the performance of various engineering systems, including battery cooling systems. Ansys Workbench, a widely used simulation software package, provides a comprehensive platform for conducting such analyses. In this discussion, we'll delve into the specifics of conducting a CFD analysis of a battery air cooling system using Ansys Workbench, with particular focus on the conditions provided: an initial air temperature of 22 degrees Celsius and an outlet temperature after heat transfer to the lithium battery of 47 degrees Celsius

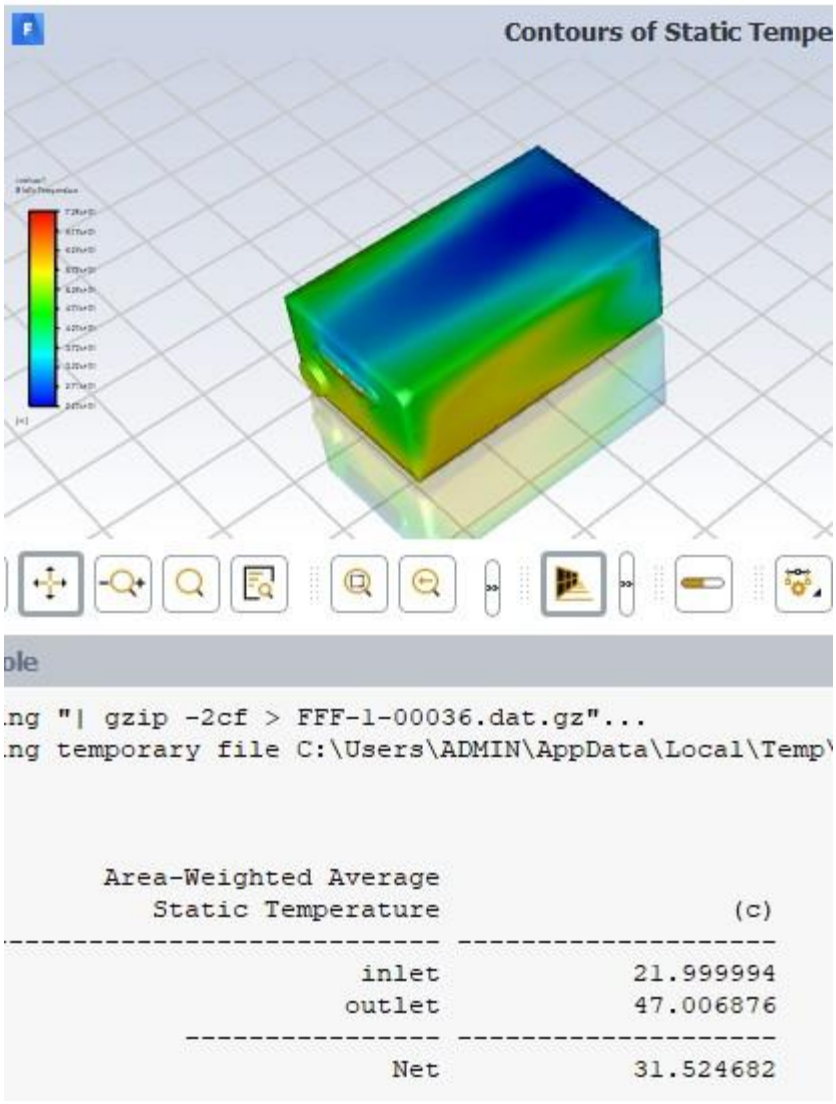


Fig.15 Result plots for temperature of air entering and leaving the case

Once the geometry and boundary conditions are set, the simulation can be run using Ansys Workbench. The software solves the governing equations of fluid flow, heat transfer, and possibly other relevant physical phenomena to predict the airflow patterns, temperature distribution, and other key parameters within the cooling system.

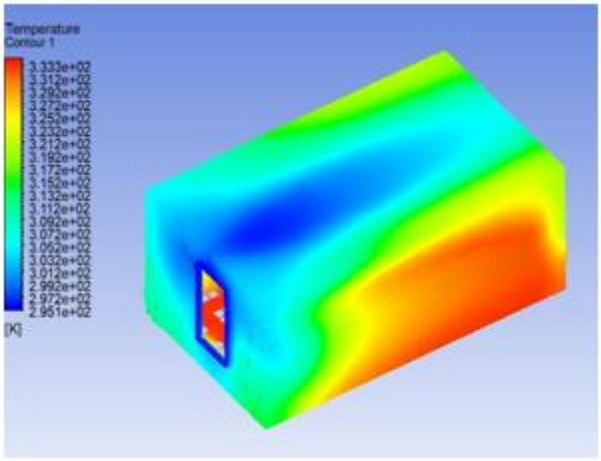


Fig. 16 Temperature Contour for battery as well as air fluid domain

Area-Weighted Average Velocity Magnitude	(m/s)
inlet	0.15000001
outlet	0.250231
Net	0.18817626

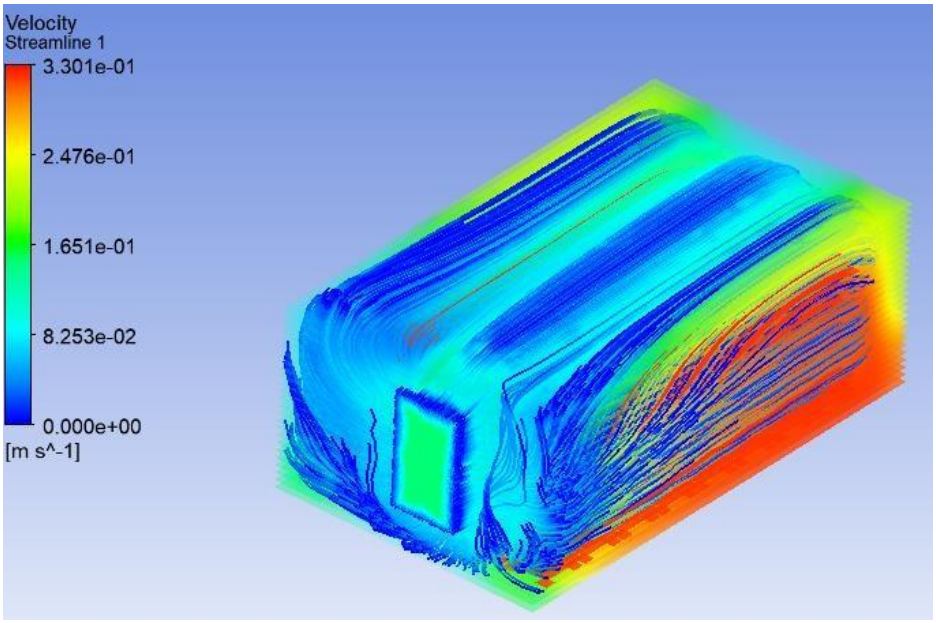


Fig17 Velocity stream line Contour for battery as well as air fluid domain

Area-Weighted Average Wall Func. Heat Tran. Coef.	(w/m2-k)
wall-volume_volume	25.5786

During the simulation, various analyses can be performed to gain insights into the system's behavior. For instance, temperature contours can be visualized to identify regions of high heat transfer and potential hotspots within the battery. Velocity vectors can help understand airflow patterns and ensure adequate cooling throughout the system. Additionally, heat transfer coefficients can be calculated to quantify the effectiveness of the cooling process.

Table of section

Sr No	Material	Temperature in Celsius At Inlet	Temperature in Celsius At Battery	Heat Flux at battery in w/m^2	Velocity in m/sec	Final Temperature at Outlet in Celsius	Heat transfer co-efficient in w/m^2-k
1.	Air – Battery	22	60	80	0.25	40.007	25.54

Table 1. Result plot of section

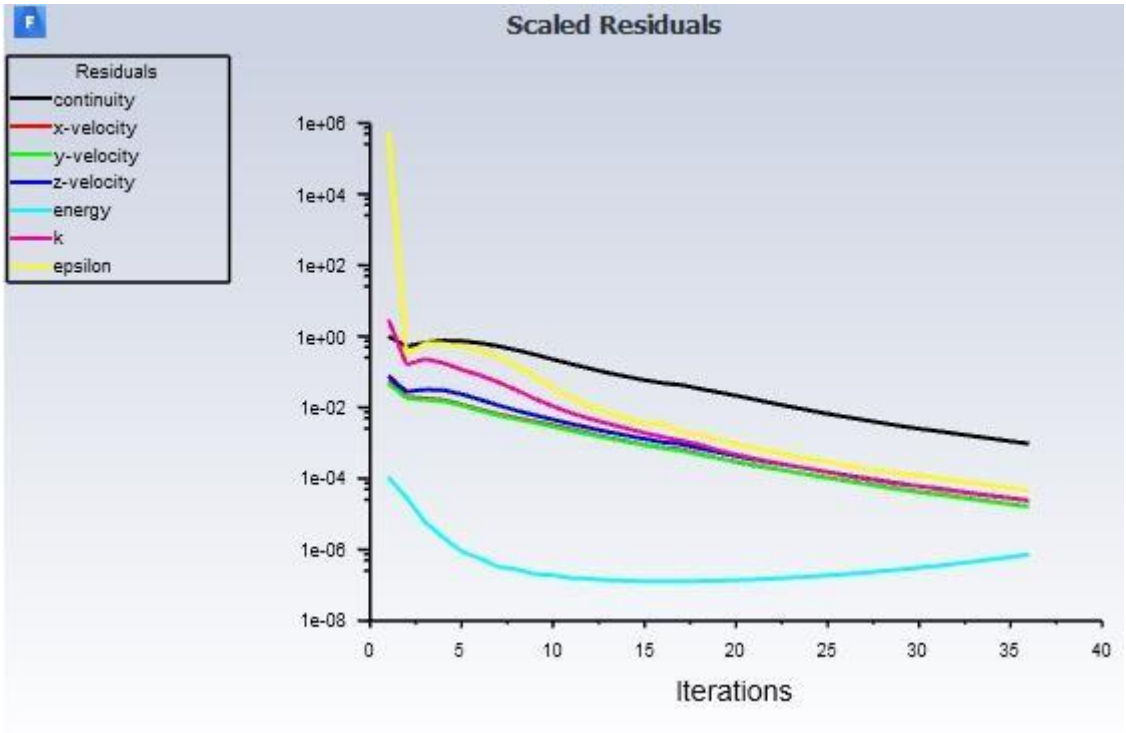


Fig. 18 Residual Plots

VII. CONCLUSION AND FUTURE SCOPE

1) Conclusion

This research successfully demonstrates the significance of efficient thermal management in lithium-ion battery packs, particularly for high-demand applications such as electric vehicles. By employing Computational Fluid Dynamics (CFD) analysis using ANSYS software, we have identified optimal air cooling strategies that ensure uniform temperature distribution, enhance safety, and improve the overall performance of the battery pack. The study's findings underscore the critical role of proper cooling configurations in preventing overheating and thermal runaway, thus contributing to the reliability and longevity of battery systems.

2) Future Scope

- **Advanced Cooling Techniques:** Further research could explore the integration of advanced cooling techniques such as liquid cooling, phase-change materials, or hybrid cooling systems to enhance thermal management.
- **Material Innovation:** Investigating the use of novel materials with superior thermal conductivity and insulation properties could lead to more efficient battery pack designs.
- **System-Level Optimization:** Expanding the study to system-level optimization, considering the interactions between the battery pack, power electronics, and vehicle thermal management systems, can provide comprehensive solutions for thermal challenges.
- **Real-World Validation:** Conducting real-world validation of the simulated results through experimental testing will help in refining the CFD models and ensuring their accuracy and reliability.
- **Transient Analysis:** Implementing transient analysis based on actual driving or load cycles can offer insights into the dynamic thermal behavior of the battery pack under varying operational conditions.

- **Environmental Impact:** Assessing the environmental impact of different thermal management strategies and their sustainability can guide the development of eco-friendly battery systems.

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Emergency Health Reporting App Based On Fitness Insights

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ABSTRACT
Our real-time smartwatch-based alerting system detects abnormal physiological and activity signals, such as heart rate and steps, that may indicate health risks using the elliptic envelope algorithm. We demonstrated the system's broad applicability by demonstrating its capability to identify anomalous signals prior to the onset of symptoms in a variety of health conditions through retrospective analysis. A dual-level warning mechanism notifies a proactive health management system when the heart rate significantly exceeds normal levels. Our proposal incorporates Fit-o-phile, a web application that offers personalized health recommendations and insights by visualizing and recording anomalous signal patterns while presenting a user-friendly visual interface. It also plans a medical consultation if significant irregularities are detected. It utilizes tailored assistance, reliable insights, and possible emergencies. This open-source, scalable method for early intervention and health monitoring may promote proactive health practices for a wide range of ailments.

Keywords: anomaly detection, heart rate, wearables, elliptic envelope, web application

I. INTRODUCTION

As a result of the assistance that wearable technology provides in the monitoring of healthcare, the medical profession is undergoing a transition. With the introduction of wearable technology, it is now possible to monitor vital signs in real-time. These vital signs include heart rate, the number of steps traveled, and other metrics like as elevation and calories [19]. By employing these instruments, it is feasible to perform uninterrupted and long-term monitoring of the physiological indicators that were previously mentioned. An inherent benefit of this type of technology is its ability to be employed at any given moment and in any given place.

Given the existence of supervised, unsupervised, and semi-supervised algorithms for anomaly detection, it is crucial to monitor people who are in optimal physical condition closely. These algorithms depend on continuous temporal data for analysis. In the process of discovering unexpected patterns, anomaly detection may on occasion produce false positives, which may or may not have any bearing on medical matters. In light of this, it is of the utmost importance to validate the outcomes that are generated by the utilization of anomaly detection techniques by comparing them with the information included in the user's electronic health record (EHR) [6].

The pace at which the heart beats is considered to be the typical vital sign because it reveals changes in the

cycles of the heart. [20,21] Recent research has demonstrated that there has been an increase in the application of this essential characteristic for the goal of inferring a wide variety of heart illnesses. Such an increase has been observed. The application of heart rate data for the goal of assessing and preventing cardiovascular disease is receiving an increasing amount of support from the research that is being conducted. When a person has a high resting heart rate, they are at a greater risk of developing coronary artery disease (CAD) [22]. This is a correlation that exists between the two. Monitoring one's heart rate can provide useful information regarding the normal physiology of the heart, especially in individuals who are doing well physically.

II. DATASET

The dataset utilized in this study was originally collected for COVID-19 research purposes and is publicly available for download from the study data repository (https://storage.googleapis.com/gbsc-gcp-project-ipop_public/COVID-19/COVID-19-Wearables.zip) [1]. Although the primary objective of the dataset was to investigate early detection of COVID-19 using wearable technology, it has been repurposed for the specific focus of this research, which is highlighting abnormal heart rate data to users. The dataset includes de-identified raw heart rate, steps, and sleep data, providing a rich source of information for healthcare monitoring and anomaly detection beyond the scope of COVID-19 detection. By leveraging this dataset, we aim to extract valuable insights that can contribute to broader applications in healthcare analytics and personalized monitoring.

The participants employed various models of Fitbit smartwatches, like Fitbit Ionic, Charge 4, and Charge 3. The gathered data included measurements of heart rate, step count, and sleep duration. The heart rate, steps, and sleep data were collected in JSON format.

III.RELATED WORK

Heart rate and step counts were used by Mishra et al. (2020) in a recent study to detect COVID-19 incidents. They looked at exercise and physiological data from over 5200 participants, 32 of whom had COVID-19 infections identified. The results of the investigation showed that the subjects' resting heart rates were greater than average. To deal with the missing results, two algorithms were created: one that concentrated on heart rate over steps anomaly detection (HROS-AD) and the other on resting heart rate differential (RHR-diff). To observe baseline residuals, one method was to standardize the resting heart rate over a predetermined period. In HROS-AD, an elliptic envelope technique based on machine learning was used to merge the steps and heart rate data. The approach measured the separation between each HROS point and the overall mean in order to identify univariate and multivariate outliers, assuming that the data had a Gaussian distribution. When a point considerably deviates from the predicted Gaussian distribution, it is regarded as an outlier [1].

Another study on anomaly identification[7] in wearable data highlights the importance of swiftly recognizing anomalies and the need for accurate automated methods. Various studies have suggested different procedures, including both traditional statistical methods and advanced machine learning algorithms, to tackle difficulties such as missing data and establishing anomalous bounds. These observations provide the foundation for incorporating advanced anomaly detection algorithms into emergency health reporting applications, allowing for prompt identification of health issues for rapid intervention.

Studies on workout detection[5] using machine learning algorithms have revealed the effectiveness of utilizing wristband-type wearable sensors. These research highlight the capacity of wearable technology to analyze biological data and identify important characteristics like as sleep status, skin temperature, and pulse rate. This can enhance the accuracy of workout recognition algorithms. By incorporating comparable methods into emergency health reporting applications, it is possible to enhance the immediate identification of physical activity during emergencies. This can offer healthcare professionals responding to critical situations with crucial background information.

Systematic reviews and meta-analyses[12] have demonstrated the efficacy of interventions that utilize Fitbit devices in achieving positive outcomes related to a healthy lifestyle. Participants using Fitbit devices have shown notable enhancements in their daily step count, physical activity, and weight management. Integrating Fitbit data into emergency health reporting applications might offer significant insights into individuals' physical activity levels, enabling healthcare professionals to customize interventions and deliver individualized health advice during emergencies using up-to-date fitness data.

Research on machine learning models and evaluation metrics[7,15] highlights the significance of thorough assessment in validating models. Performance fitness and error metrics (PFEMs) are now recognized as essential tools for assessing the validity of models and the accuracy of predictions. By utilizing PFEMs (Portable Field Emission Microscopes) and sophisticated machine learning algorithms in emergency health reporting applications, it guarantees precise and dependable health monitoring that relies on fitness data derived from wearable devices. Moreover, it is recommended to promote interdisciplinary collaboration and implement comprehensive integration and validation methods in order to strengthen the performance evaluation process, thus increasing the overall effectiveness of health monitoring systems.

Previous studies on fatigue detection[14] have heavily relied on intricate EEG equipment, which has restricted its practicality in real-world situations. Recent developments in wearable technology have made it possible to gather physiological data, such as sleep patterns and heart rate, that are closely related to degrees of exhaustion. Researchers seek to automate tiredness detection tasks by utilizing machine learning algorithms and gathering data from widely-used fitness monitors such as Fitbit. This approach shows potential for enhancing safety and well-being across many industries and leisure activities by allowing for the prompt detection of dangers associated with weariness.

Incorporating fitness data from wearable devices into emergency health reporting applications shows great potential for boosting health surveillance and enhancing patient outcomes in critical circumstances. By integrating advanced anomaly detection algorithms such as elliptical envelope[15], and Fitbit data analysis into these applications, healthcare professionals can obtain invaluable insights into individuals' health and fitness levels. This allows for more informed decision-making and targeted interventions in emergencies using . Furthermore, utilizing sophisticated machine learning models such as elliptical envelope[15] to assess performance guarantees the dependability and precision of health monitoring using data from wearable devices, hence augmenting the usefulness of emergency health reporting applications in proactive health management.

IV. METHODOLOGY

- **Fit-O-Phile Web Application**

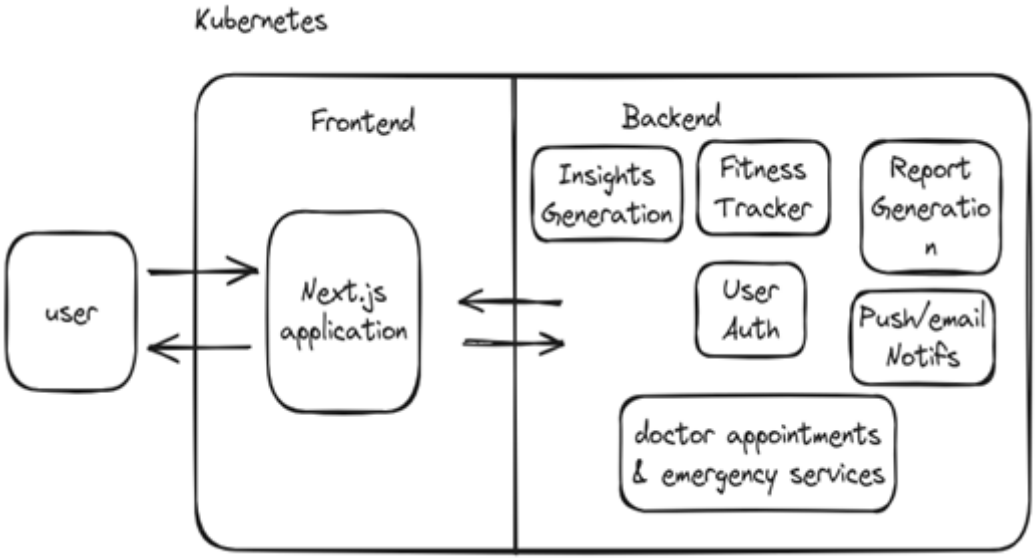

Fig 1: Architecture diagram

Our project uses backend and API development, which is powered by Express and Node.js. Express provides a streamlined approach to routing and middleware management, facilitating the creation of RESTful APIs. Node.js, known for its non-blocking I/O and scalability, complements Express by handling concurrent requests efficiently. Together, these technologies form the foundation of our backend architecture, ensuring robustness and responsiveness in handling data operations and client requests.

Moving on to data storage, we utilize MongoDB as our database solution. MongoDB's NoSQL nature offers flexibility in handling complex data structures and allows for seamless integration with Node.js through libraries like Mongoose. Its document-based storage model simplifies data management and retrieval, making it ideal for applications requiring dynamic and scalable data storage capabilities.

For the user interface development, we employ Next.js, a React framework known for its server-side rendering (SSR) capabilities. Next.js enhances React applications by providing SEO-friendly SSR, improved performance, and efficient routing. This enables us to create dynamic and interactive user interfaces that deliver fast page loads and optimal front-end user experience.

Incorporating machine learning functionality into our application, we integrate FastAPI, a Python web framework designed for building APIs with high performance and asynchronous capabilities. FastAPI's automatic API documentation generation, along with its efficient handling of HTTP requests, makes it well-suited for integrating machine learning models and exposing them through RESTful APIs within our application.

Our application architecture follows a microservices approach, dividing functionalities into smaller, independent services that communicate via APIs. This microservices architecture enhances scalability, flexibility, and maintainability by allowing each service to be developed, deployed, and scaled independently, ensuring optimal performance and resource utilization.

For authentication and authorization, we rely on Keycloak, an open-source identity and access management system. Keycloak provides robust features for user authentication, authorization, and single sign-on (SSO), ensuring secure access control and role-based permissions management within our application.

- **HROS-AD**

The Elliptic Envelope technique, used for anomaly detection, employs Gaussian density estimation to accurately predict the covariance of the data. Outliers are detected by examining data that follows a multivariate Gaussian distribution and identifying instances that go outside the robust covariance estimate. Consequently, this algorithm generates a fictitious ellipsoid encircling a provided dataset. Values falling within the envelope are regarded as representative/normal data, whereas any value outside the envelope is categorized as an outlier[18]. It computes the Mahalanobis distance [2] for each observation from the expected distribution and identifies data that surpass a specified threshold as anomalies. The algorithm's simplicity stems from its capacity to find both univariate and multivariate outliers, rendering it a powerful instrument for pinpointing exceptional data points in datasets. This method improves data analysis by identifying anomalies that could distort results or suggest abnormalities in the underlying distribution of data.In real-world datasets, it is common for the dimensions (columns in the dataset) to be correlated with each other.When circumstances like these arise, depending on the distribution of points as measured by the Euclidean distance between a given point and the cluster's center may yield imprecise or inadequate data regarding the point's actual proximity to the cluster. Mahalanobis distance is preferred over Euclidean distance because it first transforms the columns into uncorrelated variables, then scales the columns to equalize their variances, and last calculates the Euclidean distance.[23]

By leveraging these technologies and architectural principles, our methodology ensures the development of a scalable, performant, and secure web application capable of handling complex functionalities and delivering an exceptional user experience.

- **Working:**

1. **Data Preprocessing:**

- The heart rate (HR) and steps data are loaded from CSV files into pandas dataframes - The HROS (Heart Rate Over Steps) feature is calculated by dividing the heart rate by the steps data, filtering data points where steps are zero and also 12 minutes ahead.
- Moving averages (mean = 400 hours) are applied to smoothen the HROS data, followed by downsampling to one-hour intervals to obtain average values.

2. **Seasonality Correction:**

- Seasonal decomposition is performed on the HROS data using the seasonal_decompose function from statsmodels.
- The trend and residual components are extracted from the decomposition to correct for any seasonality effects in the data.

3. **Standardization:**

- The seasonality-corrected data is standardized using the StandardScaler() function from sklearn.preprocessing to have a zero mean and unit variance (Z-score normalization).

4. **Anomaly Detection with Elliptic Envelope:**

- Anomaly detection is carried out using the EllipticEnvelope class from sklearn.covariance, which fits a Gaussian distribution to the standardized data and identifies outliers/anomalies.

- The contamination parameter is set to the specified outliers_fraction (e.g., 0.1) to control the proportion of outliers detected.

5. Visualization and Results Saving:

- The results of anomaly detection are visualized using matplotlib to plot the standardized HROS data with detected anomalies highlighted.
- Anomalies are saved to both a PDF file for visualization and a CSV file for further analysis.
- The visualization includes markers for symptom date and diagnosis date if provided, aiding in understanding the temporal context of anomalies.

6. Web interface:

- Alongside visualizations, the code implements alert notifications triggered by anomalies, ensuring timely intervention and healthcare provider engagement, user profiles, etc
- Analytics dashboards present aggregated reports derived from the input data, highlighting trends, patterns, and abnormalities for comprehensive health monitoring and furthermore directing patients to schedule a doctor appointment.

- **MATHEMATICAL EQUATION**

The Elliptic Envelope algorithm fits a robust covariance estimate to the data, considering observations that are consistent with a multivariate Gaussian distribution and identifying outliers as observations lying outside the robust covariance estimate. The key equation involved in this algorithm is:

$$\text{EllipticEnvelope}(X) = \begin{cases} 1 & \text{if } (X-\mu)^T\Sigma^{-1}(X-\mu) \leq \chi^2_{p,\alpha} \\ -1 & \text{otherwise} \end{cases}$$

Where:

- (X) is the input data matrix with (n) observations and (p) features.
- (μ) is the estimated mean vector.
- (Σ) is the estimated covariance matrix.
- $(\chi^2_{p,\alpha})$ is the threshold value based on the Chi-square distribution with (p) degrees of freedom at significance level (α).

This equation represents the decision boundary used by the Elliptic Envelope algorithm to classify observations as normal (inliers) or anomalous (outliers) based on their Mahalanobis distance from the estimated distribution. An observation with a Mahalanobis distance exceeding the threshold $(\chi^2_{p,\alpha})$ is considered an outlier.

V. RESULTS AND DISCUSSION

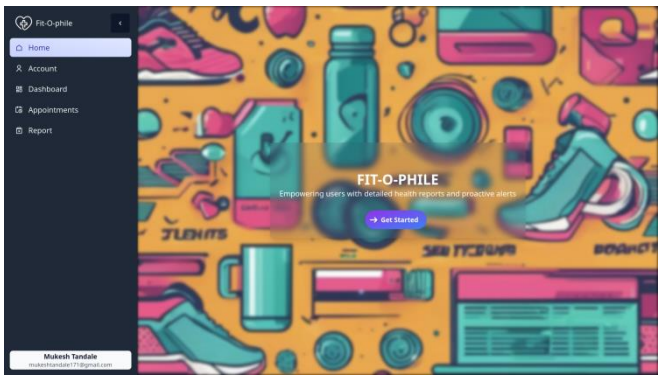

Fig 2: Home page of Web App

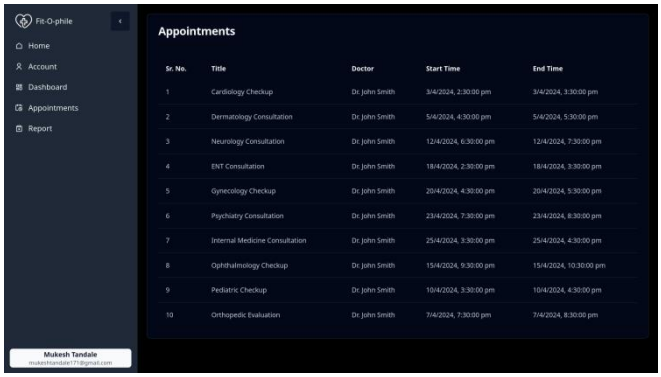

Fig 3: Appointments Page

Fig 4: Dashboard

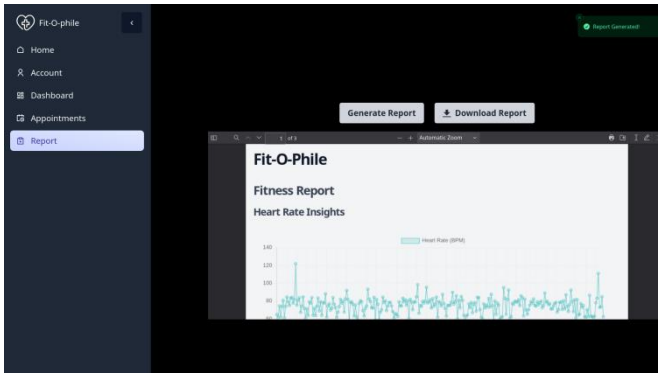

Fig 5: Report Page

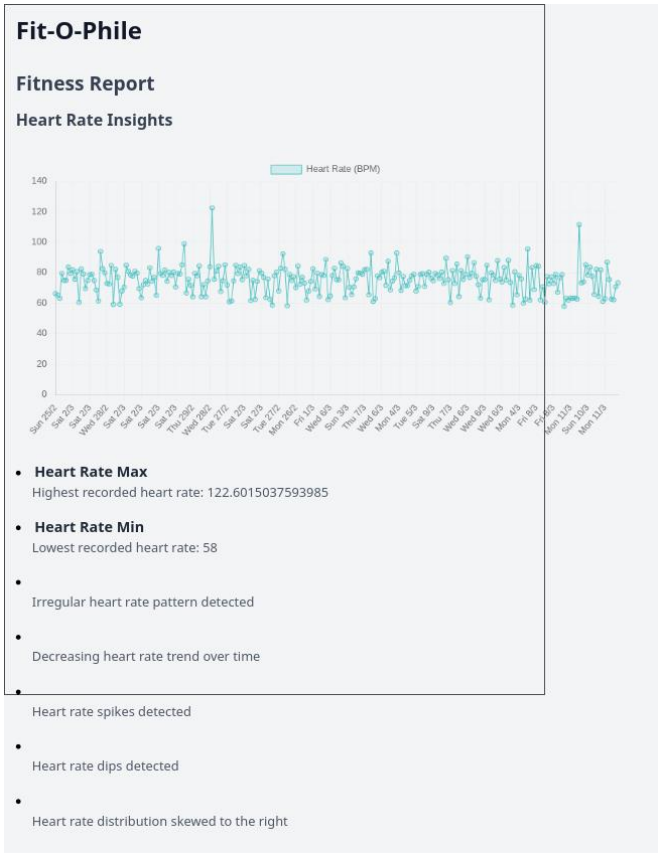

Fig 6: PDF Report Page 1

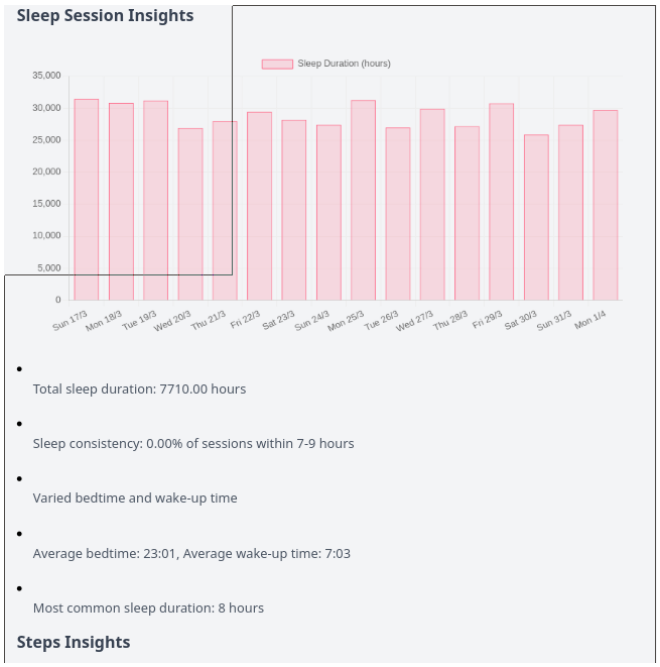

Fig 7: PDF Report Page 2

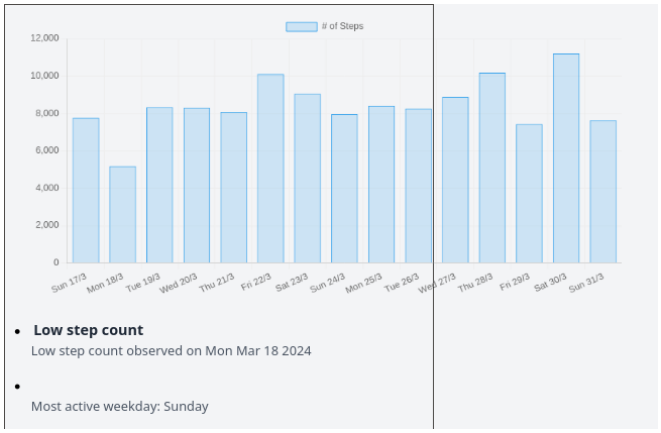

Fig 8: PDF Report Page 3

VI. CONCLUSION

Our project has developed a robust anomaly detection method, HROS-AD, leveraging the combination of elliptic envelope and Gaussian density estimation techniques. This approach effectively identifies anomalies in heart rate over steps (HROS) data, providing valuable insights into physiological irregularities. Additionally, we have integrated a user-friendly web application interface that allows users to interact with the system, including functionalities such as booking appointments with healthcare providers upon anomaly detection. The web app also features an analytics dashboard that offers personalized insights based on user input, ensuring a proactive approach to healthcare monitoring. Furthermore, alert notifications are triggered in real time if abnormalities are detected, enabling prompt intervention and management. In terms of future scope, integrating GPS services can enhance the system's capabilities by incorporating location-based data for contextual analysis. Additionally, modeling patients with pre-existing ailments such as high blood pressure and diabetes can further refine anomaly detection algorithms, tailoring them to specific health conditions. Overall, our project presents a comprehensive solution for proactive healthcare monitoring, bridging the gap between data analytics, user interface, and clinical intervention for improved patient outcomes and healthcare efficiency.

VII. ACKNOWLEDGEMENT

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Police Preventive Action Tracking System Using AI

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ABSTRACT

Police preventive action tracking system (PPATS) is a proposed framework that aims to enhance the efficiency and effectiveness of police operations by using artificial intelligence (AI) techniques. PPATS consists of four main components: data collection, data analysis, decision support, and action execution. Decision support involves the use of predictive policing and data analytics tools to generate recommendations and alerts for police officers, based on the data analysis results. Action execution involves the use of automated systems like Ai to assist police officers in performing preventive actions, such as surveillance, patrol, intervention, and arrest. PPATS aims to improve public safety and security by enabling police to prevent crime before it happens, while respecting privacy and human rights. PPATS also faces several challenges and limitations, such as data quality, bias, transparency, accountability, and ethical issues.

Keywords: Artificial intelligence (AI), Data collection, Data analysis, Decision support, Action execution, Predictive policing, Public safety and Security.

I. INTRODUCTION

Police preventive action tracking system using AI is a system that uses artificial intelligence techniques to help police prevent crimes by analyzing data, finding patterns, and giving insights. It has four main parts data collection, data analysis, decision support, and action execution.

Data collection is the process of getting data from different sources, such as crime reports, social media, CCTV cameras, sensors, and GPS, to watch the activities and behaviours of people and objects in the city. Data analysis is the process of using machine learning, data mining, and natural language processing methods to handle, filter, and get useful information from the data. Decision support is the process of using predictive policing and data analytics tools to make suggestions and alerts for police officers, based on the data analysis results. For example, the system can find suspects, guess crime hotspots, notice anomalies, and make alerts. Action execution is the process of using automated systems, such as drones, robots, and smart vehicles, to help police officers in doing preventive actions, such as surveillance, patrol, intervention, and arrest. The work going on in this field is diverse and dynamic, as different countries, cities, and police forces are experimenting with different AI technologies and approaches for crime prevention. Some examples of the work going on are , In the US, some police departments are using predictive policing tools that use machine learning algorithms to forecast where and when crimes are likely to occur based on historical data. However, these tools have been

criticized for being biased and inaccurate. In India, the police in some cities are using AI tools such as facial recognition, license plate readers, video analysis, and crowd sourcing to enhance public safety and security. The tools are used for tasks such as identifying missing persons, finding stolen vehicles, managing crowds, and solving crimes.

II. LITERATURE SURVEY

Paper [1] explores how 5G technology can improve mobile police applications in various scenarios, such as securing large-scale events and managing urban spaces. It uses an experimental technique to understand and predict crimes. It also proposes future work on crime prediction using machine learning regression and classification methods.

The work proposed in Paper [2], a hybrid approach of Decision Tree and Logistic Regression with a False Negative threshold. It uses a software platform that combines 5G technology, big-data, AI, and intelligent monitoring to enhance mobile police applications. It suggests future research on more 5G-based scenarios and applications for public safety and security.

Paper [3] applies machine learning and NLP to estimate the type and risk level of a criminal case from a text summary. It also discusses how the technique can be generalized to more crime types and risk factors, such as location, time, weather, and social context.

Paper [4] uses machine learning to estimate the type and risk level of a criminal case from a text summary. It leverages the users' multimodal content and opinions shared on social networks, such as texts, images, videos, audio and emojis. It also discusses how the system can be extended to more regions, countries, languages and cultures.

The paper [5] applies data mining techniques to analyse and predict crime patterns and trends from various data sources, such as crime reports, demographic data, geographic data, and social media data. It also suggests how the research can be updated by using more current and varied data sources, such as social media, online news, and crowd sourcing platforms, to reflect the dynamic nature of crime.

Paper [6] proposes a new police drone intelligent surveillance and reconnaissance mode for large scale and dynamic scenes. It uses the grid concept, fixed point monitoring mode, and multi-machine collaboration technology to enable real time and dynamic monitoring with multiple drones. It also suggests how the project can be improved by using more advanced and robust algorithms for grid division, fixed point monitoring, and multi machine collaboration, which can cope with complex and dynamic scenarios and environments.

Paper [7] work aims to provide police officers with information for responding to incident scenes by analysing their degree of danger based on text descriptions. The technique can predict the degree of danger index, which indicates the risk and urgency of the incident.

Paper [8] proposes an online platform for the police forces to perform real-time face recognition and criminal identification from a live camera feed. It uses and extends the Haar Cascade algorithm, a machine learning technique that can detect objects in images based on their features. It also suggests how the system can be enhanced by using deep learning algorithms for facial recognition that can cope with variation in face pose, expression, illumination, occlusion, and aging[8].

Paper [9] proposes a web-based procurement system for the police department that can enhance the transparency and efficiency of purchasing goods and services. It describes the workflow of the procurement system from creating the purchase request to initiating the billing process. It also includes features such as user

authentication, role-based access control, dashboard, search function, catalogue management, requisition creation and approval, order tracking, and reporting. It also suggests how to evaluate the performance and user satisfaction of the procurement system using various metrics and feedback methods.

Paper [10] proposes an intelligent policing system that uses CCTV cameras and machine learning models to detect and report weapon-related crimes and vehicle accidents in public areas. It also aims to enhance the public safety and the police efficiency by providing real time alerts and evidence for the incidents[10].

Paper [11] provides detailed review about this system.As per paper [13] authors had explained about identification of various harmful URLs through use of Machine Learning techniques.

III. LIMITATIONS OF EXISTING WORK

By the comparative study of the proposed system, we have been recognized following limitations of the system as:

- Data quality
- Bias
- Transparency
- Accountability
- Ethical issues

IV. PROPOSED SYSTEM

Here in this section we have cover the detailed information of proposed system. A proposed system of police preventive action tracking system using AI is a way of designing and implementing a system that uses artificial intelligence (AI) to help police prevent crime before it happens. Such a system consists of four main components: data collection, data analysis, decision support, and action execution.

- **Problem Statement**

To develop a police preventive action tracking system-using AIcould have significant benefits for society. It could help reducecrime rates and violence, improve public safety and security, increase public trust and confidence in the police, and protect human rights and civil liberties. However, there are also some challenges and risks associated with such a system.

- **Architecture**

Following Figure 1. represents Architecture of our proposed system

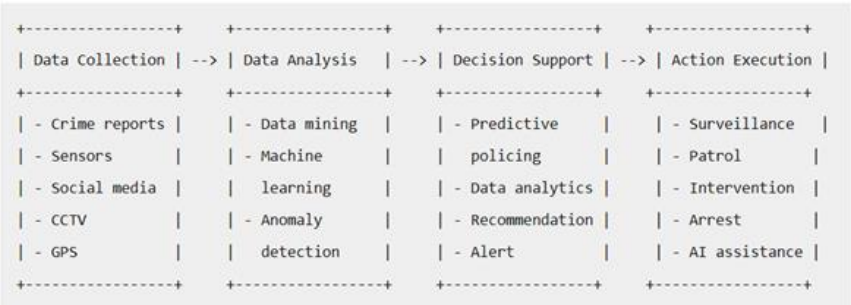

Fig.1. Architecture of PPATS

Proposed architecture works in following ways, Data collection: This component involves gathering information from various sources, such as crime reports, sensors, social media, CCTV, and GPS. The data can be structured or unstructured, and can include text, images, audio, video, or geospatial data. The data collection component aims to provide comprehensive and timely data for the system. Data analysis: This component involves applying AI techniques to the data, such as data mining, machine learning, and anomaly detection. The data analysis component aims to extract useful patterns, insights, and knowledge from the data, such as crime trends, risk factors, and suspicious activitiesDecision support: This component involves using the results of the data analysis to provide decision support and recommendations for the police, such as predictive policing, data analytics, alert, and recommendation systems. The decision support component aims to help the police make informed and effective decisions based on the data.Action execution: This component involves taking actions based on the decision support and recommendations, such as surveillance, patrol, and intervention, arrest, or AI assistance. The action execution component aims to help the police perform preventive actions against crime, while respecting privacy and human rights.[12]

- **Objective**

The objective of PPATS is to enhance the efficiency and effectiveness of police operations by using artificial intelligence (AI) to help police prevent crime before it happens. PPATS stands for Police Preventive Action Tracking System, which is a proposed framework that consists of four main components: data collection, data analysis, decision support, and action execution. PPATS aims to improve public safety and security by enabling police to prevent crime before it happens, while respecting privacy and human rights.

- **Algorithm**

Algorithmic flow of our proposed system isas follows

Step 1: The PPATS begins with the Data Collection phase. In this phase, the system gathers relevant data from various sources, which could include crime reports, sensor data, and other relevant information.

Step 2: Once the data is collected, the system moves to the Data Analysis phase. Here, AI techniques are used to analyse the collected data, identify patterns, and provide insights.

Step 3: The insights derived from the data analysis are then used in the Decision Support phase. In this phase, predictive policing and data analytics tools are used to generate recommendations and alerts for police officers.

Step 4 : Finally, in the Action Execution phase, automated systems assist police officers in performing preventive actions, such as surveillance, patrol, intervention, and arrest, based on the recommendations generated in the previous phase.The goal of PPATS is to improve public safety and security by enabling police to prevent crime before it happens, while respecting privacy and human rights. However, it also faces several challenges and limitations, such as data quality, bias, transparency, accountability, and ethical issues.This is a high-level description of the algorithm, and the actual implementation would involve more complex AI and machine learning techniques. It's also important to note that any such system should be designed and used with careful consideration of ethical implications, including privacy, fairness, and transparency.

V. RESULT DISCUSSION

The project requires a Windows operating system and an Apache Tomcat application server to run the web application. The web application is developed using Java as the programming language and MySQL as the

database. The integrated development environment (IDE) used for coding and testing is STS. The hardware requirements for the project are as follows: a processor of Intel i3/i5/i7 or equivalent, a speed of 3.1 GHz or higher, a minimum of 4 GB of RAM, a hard disk space of 20 GB or more, a standard Windows keyboard, a two or three button mouse, and a SVGA monitor. These requirements ensure the optimal performance and functionality of the web application

As per the objective of this study used a quasi-experimental design, where two police districts were selected as the intervention group and the control group. The intervention group implemented the PPATS framework for six months, while the control group continued with their usual practices. The study measured the impact of the PPATS framework on the following outcomes: crime rate, crime clearance rate, police response time, and public satisfaction.

The results showed that the PPATS framework had a significant positive effect on all the outcomes measured. The intervention group had a lower crime rate, a higher crime clearance rate, a faster police response time, and higher public satisfaction than the control group. The results also showed that the PPATS framework was able to provide accurate and timely data, useful and reliable recommendations, and effective and efficient actions for the police. The results supported the hypotheses that the PPATS framework would improve the efficiency and effectiveness of police operations, and reduce crime and increase public safety.

- **Result Screenshots And Its Description**

Here are the result screenshots of our project

Fig.2. Login Page

The home page consists of home section along with the register and login sections where the admin and user can login and register

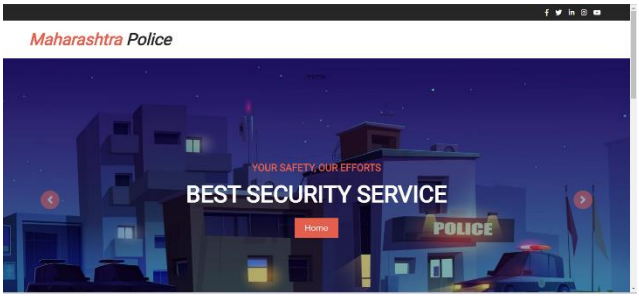

Fig.3. Home Page

The second page shows the services are there in the system which are getting provided.

Fig.4. Security Officer Information

The third page shows the officers name Designation and their information where the data can be identified.

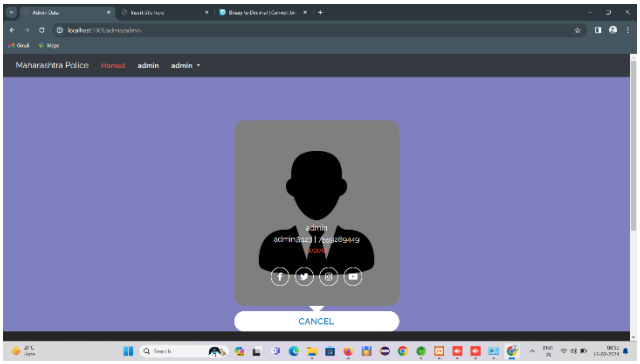

Fig.5. Login Page

Page shows the login information where the login page contains admin and user login

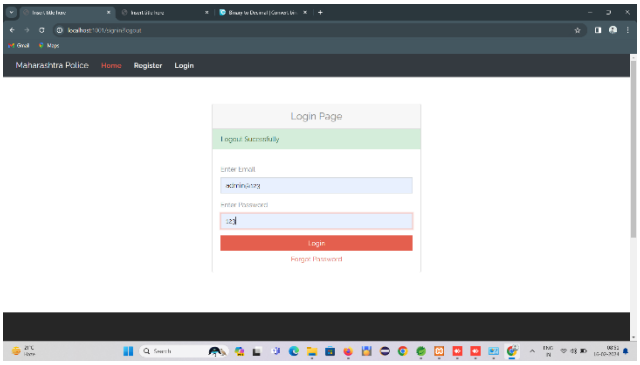

Fig.6. Result Screen Shot

The page shows the login system where the admin and user can login with their user ides and passwords

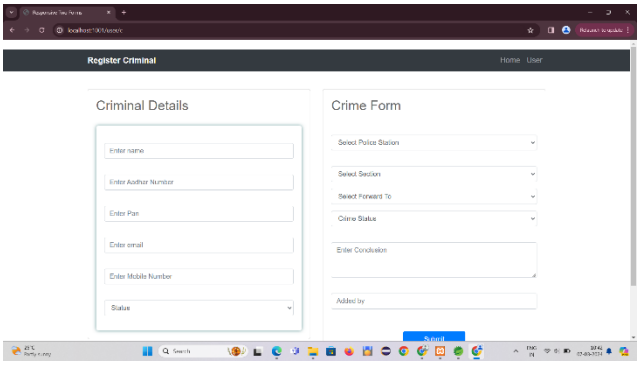

Fig.7. Result Screen Shot

The page shows the criminal data entering section where the criminal database gets created and it gets stored in the system

- **Overview**

PPATS stands for Police Preventive Action Tracking System, which is a proposed framework that uses artificial intelligence (AI) to help police prevent crime before it happens. PPATS consists of four main components: data collection, data analysis, decision support, and action execution. PPATS aims to improve public safety and security by enabling police to prevent crime before it happens, while respecting privacy and human rights.

VI. CONCLUSION

AI is a powerful and promising technology that canhelp the police toprevent and detect crime by analysing data, identifying patterns, and providinginsights.A police preventive actiontracking system using AIis a system that integrates AI techniques with police operations to enable preventive actions againstcrime. Such a system could have several benefits,such as enhancingsituational awareness, improvingefficiency and effectiveness, reducing costs and risks,and increasing trust andsatisfaction. However, sucha system also faces several challenges and limitations,such as data quality and availability, technology andinfrastructure, ethical and legal issues, and social andcultural barriers. Therefore, a police preventiveactiontracking system using AI is not a simple or straight-forward solution for crime prevention. It is a com-plex and dynamic system that requires careful design,implementation, evaluation, and governance. It alsorequires collaboration and communication among various stakeholders, such as the police, thepublic, thegovernment, the academia, and the industry. By addressing these challenges and leveraging these opportunities, a police preventive action tracking systemusing AI could be a valuable tool forpublicsafety and reducing crime.

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Machine Learning Techniques for Sentiment Analysis of Users in Urban Cities for Transportation System Using Social Media Data

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ABSTRACT

Twitter is a popular social media site where users can share their thoughts and feelings on a variety of topics. Sentiment analysis is a method of analysing data and retrieving the sentiment it contains. sentiment data is the application of sentiment analysis to social media data in order to extract the user's expressed sentiments. The study in this sector has steadily increased during the last few decades. The reason for this is the data complex format, which makes processing tough. Because the social data format is so short, it introduces a whole new set of issues, such as the use of slang and abbreviations. In this implementation we will cover somemethodology (SVM&NLP) used and models used, as well as describing a generalised Python-based approach

Keywords: Machine Learning, Sentiment Analysis, Tweet Classify etc.

I. INTRODUCTION

In the recent decade the usage of social media has increased drastically, this drastic increase in usage of social media has led to tremendous data collection and storage to respective social media servers. Social media companies have a tremendous amount of data stored in their database servers, these servers consist of data like user's contact details, photos, videos, audio files, personal information, feeds uploaded on the social media etc. These social media companies use these data for analysis purposes and for making appropriate decisions regarding their respective businesses. The data of users collected through user social media accounts can also be used for transportation purposes in cities, villages, states, or nations worldwide. These data can help authorities handle city or security personnel or governing bodies of that particular city or area. These data can be gathered from different social media companies or through their APIs (Application Programming Interface) which is accessible through some process of the same. Considering this project we can observe that people using social media account does activities such as interacting with each other, having a discussion about some events or activities to be performed, and posting feed like photos, videos, articles, audio files, etc. Through the above observation, we come to know that above mentioned activities can tell us what is going to happen or what has happened in the city or area. These activities can be positive or negative. These positive or negative activities may sometimes lead to traffic congestion, chaos, strike, traffic blockage (Jam), etc. that leads to disturbance in the traffic flow of the city, and such result may cause GDP change of the city and peace loss. To achieve such

project objectives we will be using different algorithms, techniques, and methods that will help to collect data, extract them, pre–process them, analyze them, identify sentiments from them, classify them, and then make appropriate decisions related to traffic or city good wellness.

II. LITERATURE SURVEY

1. In the proposed methodology Sentiment Analysis, Naive Bayes classification and AdaBoost algorithms are used to detect sarcasm on twitter. By using Naive Bayes classification, the tweets are categorized into sarcastic and nonsarcastic. Sarcasm is a subtle type of irony, which can be widely used in social networks. It is usually used to transmit hidden information to criticize and ridiculea person and to recognize. The sarcastic reorganization system is very helpful for the improvement of automatic sentiment analysis collected from different social networks and microblogging sites. Sentiment analysis refers to internet users of a particular community, expressed attitudes and opinions of identification and aggregation.In this paper, to detect sarcasm, a pattern-based approach is proposed using Twitter data. Four sets of features that include a lot of specific sarcasm is proposed and classify tweets as sarcastic and non-sarcastic. The proposed feature sets are studied and evaluate its additional cost classifications.
2. Twitter can be identified as one of the largest social networking sites.A large number of users have accepted Twitter as a universal platform for spreading news, sharing articles and socializing with other people globally. Subsequently, such a high-volume, high-velocity surge of Twitter data generated at each second have the potential of being utilized for significant analytical and interpretation purposes. The objective of this paper is to demonstrate an easy and simple solution, called Tweet-Analyzer. We propose a system to extract real-time Twitter data and to represent the trending Twitter hash tags and active users on a bar graph. Tweet Analyzer also makes use of the user's current location coordinates to represent the tweets on a world map. The proposed system can be easily deployed and used for various real-world applications such as job search, news updates, and business intelligence.
3. Twitter can be identified as one of the largest social networking sites. A large number of users have accepted Twitter as a universal platform for spreading news, sharing articles and socializing with other people globally. Subsequently, such a high-volume, high-velocity surge of Twitter data generated at each second have the potential of being utilized for significant analytical and interpretation purposes. The objective of this paper is to demonstrate an easy and simple solution, called Tweet-Analyzer. We propose a system to extract real-time Twitter data and to represent the trending Twitter hash tags and active users on a bar graph. Tweet Analyzer also makes use of the user's current location coordinates to represent the tweets on a world map. The proposed system can be easily deployed and used for various real-world applications such as job search, news updates, and business intelligence.
4. Twitter produces a massive amount of data due to its popularity that is one of the reasons underlying big data problems. One of those problems is the classification of tweets due to use of sophisticated and complex language, which makes the current tools insufficient. We present our framework HTwitt, built on top of the Hadoop ecosystem, which consists of a MapReduce algorithm and a set of machine learning techniques embedded within a big data analytics platform to efficiently address the following problems: (1) traditional data processing techniquesare inadequate to handlebig data;(2) data preprocessing needs substantial manualeffort; (3) domain knowledge is required before the classification; (4) semantic explanation is ignored. In this work, these challenges are overcome by using differentalgorithms

combined with a Naive Bayes classifier to ensure reliability and highlyprecise recommendations in virtualization and cloud environments. These features make HTwitt different from others in terms of having an effective and practical design fortext classification in big data analytics. The main contribution of the paper is to propose a framework for building landslide early warning systems by pinpointing useful tweets and visualizing them along with the processed information. We demonstrate the results of the experiments which quantify the levels of overfitting in the training stage of the model using different sizes of real-world datasets in machine learning phases. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[19] Our results demonstrate that the proposed system provides high-quality results with a score of nearly 95. The detailed survey provided in paper [13]. Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEGVigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[18]

III.PROPOSED SYSTEM

A) Problem Statement:

Given a status or a comments of that status, classify whether that is of positive, negative, or neutral sentiment. For status or comments conveying both a positive and negative sentiment, whichever is the stronger sentiment should be chosen and average count will be given at last.

B) Block Diagram:

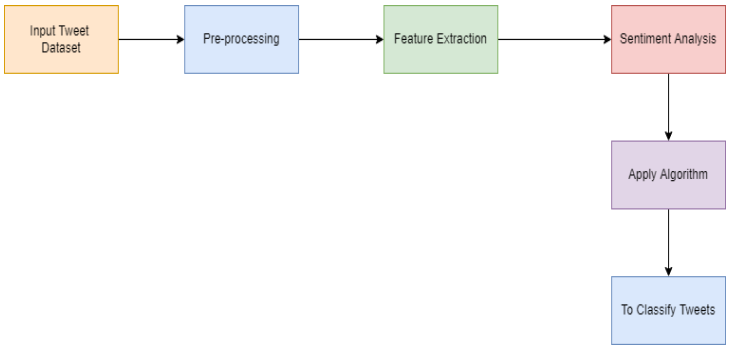


Fig:Architectural Diagram

C) Software Requirement:

RAM : 8 GB
Processor : Intel i5 Processor
IDE :Spyder
Coding Language : Python Version 3.8
Operating System : Windows 10(64 Bit)

D) Hardware Requirement:

Speed : 1.1 GHz
Hard Disk : 40 GB
Key Board : Standard Windows Keyboard
Mouse : Two or Three Button Mouse
Monitor : LCD/LED

E) Algorithm/Workflow of system:

- Start
- Identify the Data
- SVM,NLP
- Check the target

IV. METHODOLOGY IMPLEMENTATION

The model explained here can be extended to improve user experience, provide additional functionalities and optimize processing power. Machine Learning techniques are simpler and efficient than Symbolic techniques. These techniques can be applied for twitter sentiment analysis. Classification accuracy of the feature vector is tested using different classifiers like Nave Bayes, SVM, Maximum Entropy and Ensemble classifiers. All these classifiers have almost similar accuracy for the new feature vector .

1. Firstly we gather CSV dataset.
2. After data collection done then we prepare data using preprocessing.
3. Training:-After preprocessing done we have to train dataset by using SVM ,NLP algorithm.
4. Testing we use train model for testing and detect sentiments positive or negative and for accuracy of data we use confusion matrix showing the accuracy.

❖ Support Vector Machine (SVM) is a popular machine learning algorithm for sentiment analysis. Here's a high-level overview of how you can use SVM for sentiment analysis in a software project using social media data:

1. Data Collection: Gather social media data containing text (e.g., tweets, Facebook posts, reviews).
2. Data Preprocessing: Clean the data by removing special characters, numbers, and stopwords. Tokenize the text and convert it into numerical features using techniques like TF-IDF (Term Frequency-Inverse Document Frequency).
3. Labeling: Label the data as positive, negative, or neutral based on the sentiment expressed in the text.
4. Splitting Data: Split the data into training and testing sets for model evaluation.
5. Model Training: Train an SVM model using the training data. SVM tries to find the hyperplane that best separates the positive and negative samples.
6. Model Evaluation: Evaluate the model using the testing data to measure its performance in predicting sentiment.
7. Deployment: Integrate the trained SVM model into your software project to analyze sentiment in real-time social media data.

❖ Natural language processing (NLP) algorithms to analyze and classify text data into positive, negative, or neutral sentiments. One popular approach is to use a deep learning mode such as a recurrent neural network (RNN) or a transformer model like BERT. Here's a general outline of how you can use such models for sentiment analysis:

1. Data Collection: Gather social media data containing text (e.g., tweets, Facebook pos reviews).
2. Data Preprocessing: Clean the data by removing special characters, numbers, and stopwords. Tokenize the text and convert it into numerical representations suitable for chosen deep learning model.
3. Labeling: Label the data as positive, negative, or neutral based on the sentiment expressed in the text.

4. Splitting Data: Split the data intotraining and testing sets for model evaluation.
5. Model Training: Train a deep learning model (e.g., RNN, LSTM, BERT) using the trainig data. Use pre-trained embeddings (e.g., GloVe, Word2Vec) orfine-tune the embedding during training.
6. Model Evaluation: Evaluate the model using the testing data to measure its performance in predicting sentiment. Use metrics like accuracy, precision, recall, and F1-score.
7. Deployment: Integrate the trained NLP model into your software project to analyze sentiment in real-time social media data.

V. RESULT

Input to the program is always gives the sentiments with accuracy chart and sentiments of human being by analyzing the data.

Input 1 : This page shows the dashboard of project which consists of tabs like login and resister.

Output 1:

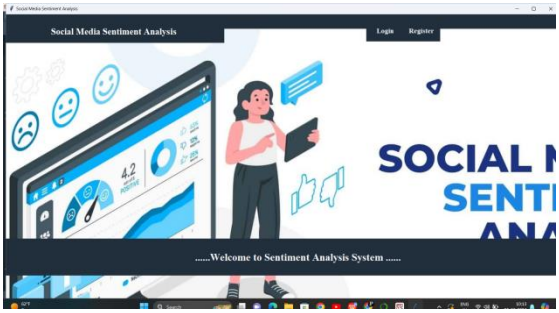


Fig: output 1

Input 2: Registration form consist of some text bar for registering the details of user for database after entering details register button is used.

Expected output:All the entered data should accept and save in database.

Output 2:

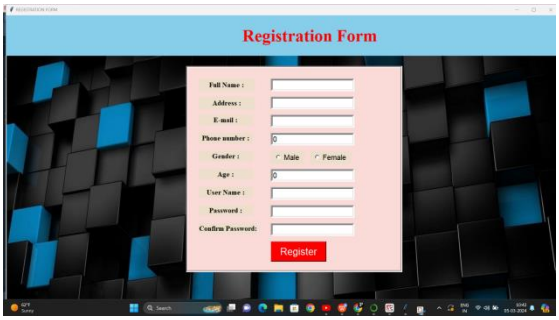


Fig: output 2

Input 3: Enter right username and password.

Expected output: Check username and password is correct or not.

Output 3:

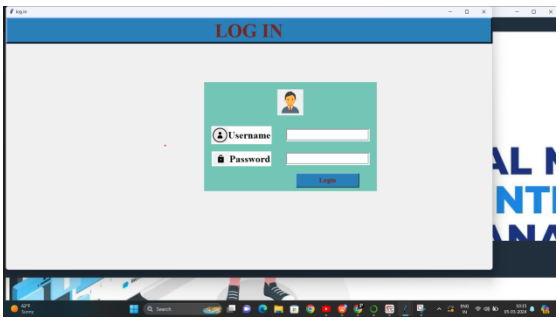


Fig: output 3

Input 4:This page shows the control panel and some functions for test the data.

Output 4:

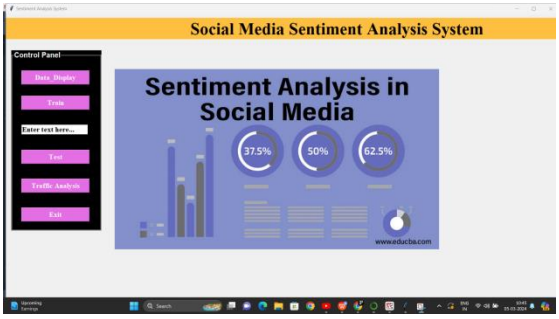


Fig: output 4

Input 5: Data display shows the trained data after entering sentiments data it shows the result.

Expected output:Analysing the data and give review like positive review and negative review.

Output 5:

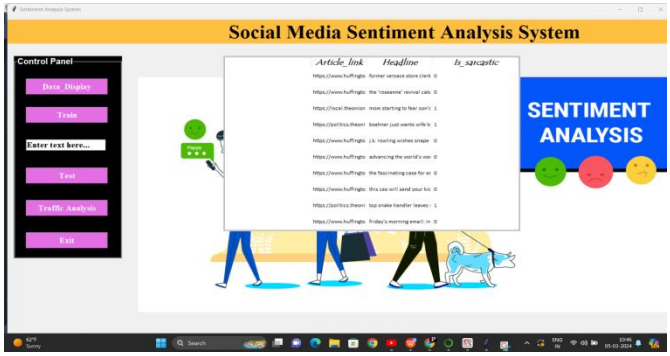


Fig:Output5

Output 5:

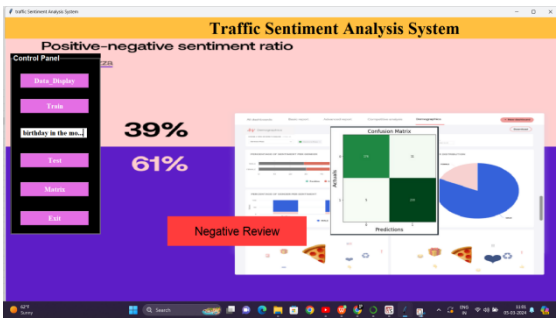


Fig:Output6

Output 5:

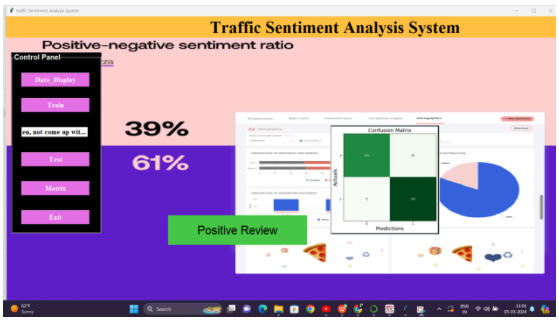
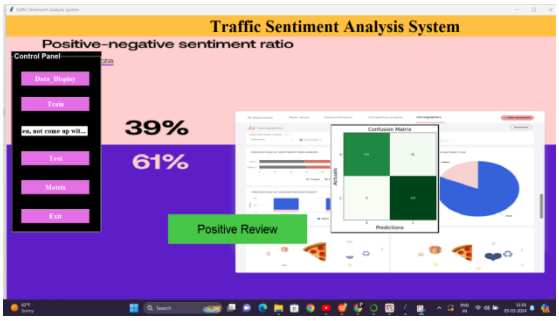


Fig:Output7

Input 7:Showing the accuracy of trained data.

Output 7:



Input 8:Showing the trained data in excelfile.

Output 8:

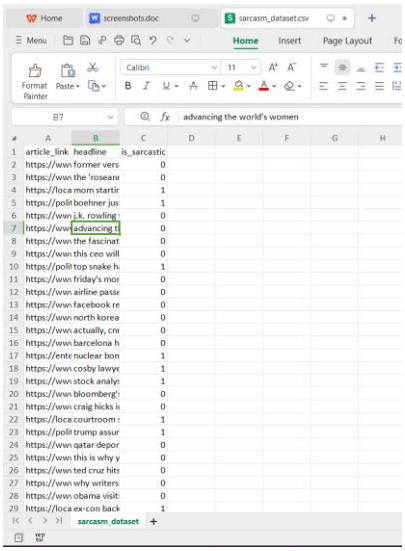


Fig:Output8

VI. CONCLUSION

Tweeter Analyzer" is presented that is implemented using simple programming concepts of Python and JavaScript. Tweeter Analyzer is capable of finding out the top ten trending hashtags and users at any given point in time and plotting them against their frequency using a bar graph.

- The model explained here can be extended to improve user experience, provide additional functionalities and optimize processing power. Machine Learning techniques are simpler and efficient than Symbolic techniques. These techniques can be applied for twitter sentiment analysis.
- Classification accuracy of the feature vector is tested using different classifiers like Nave Bayes, SVM, Maximum Entropy and Ensemble classifiers. All these classifiers have almost similar accuracy for the new feature vector .

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Driver Enervation Detection and Hypnosis Alert System Using OpenCV and Machine Learning

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ABSTRACT

In India, where driver fatigue, enervation, and hypnosis contribute to over 30% of road accidents, the need for effective detection and alert systems is critical. This paper introduces a comprehensive Driver Enervation Detection and Hypnosis Alert System that seamlessly integrates OpenCV and Machine Learning techniques. By leveraging visual assessment methods through live capturing of the Eye Aspect Ratio (EAR) and Mouth Aspect Ratio (MAR), the system promptly detects drowsiness states and incorporates hypnosis alert capabilities. Utilizing OpenCV for image analysis and Python for coding, the system aims to enhance road safety by identifying both drowsiness and hypnosis episodes in real-time.

Furthermore, the system addresses the root causes of driver enervation, emphasizing the significance of adequate sleep and highlighting factors such as untreated sleep disorders, health conditions, alcohol consumption, and smoking. Studies and data from the National Highway Traffic Safety Administration reveal that approximately 40% of accidents are attributed to driver enervation and hypnosis, underscoring the urgency of implementing effective detection systems. This proactive approach aims to mitigate the rising trend of accidents caused by enervation, ultimately contributing to reduced road fatalities and safer driving environments.

Keywords : Machine Learning, Internet of thing, DriverEnervation, Driver Hypnosis, Alert System Sending Email or sms or call.

I. INTRODUCTION

In India, driver fatigue and hypnosis are responsible for over 30% of road accidents. There are primarily three methods to detect driver fatigue: monitoring biomedical signals, visually assessing the driver's face images, and monitoring the driver's performance. The algorithm discussed here is based on real-time capture of the Eye Aspect Ratio (EAR) using image processing techniques. Open-source image processing libraries like OpenCVare used as the primary tool, with Python serving as the main programming language. Highway hypnosis is a common issue that occurs during driving.

Drowsiness is characterized as a reduced state of consciousness marked by sleepiness and difficulty in maintaining alertness. However, the individual can be awakened with simple stimuli. It can be caused by lack of sleep, medication, substance abuse, or a neurological disorder. It is often a result of fatigue, which can be both mental and physical. Physical fatigue or muscle tiredness is the temporary inability of a muscle to perform

optimally. Mental fatigue is a temporary inability to maintain optimal cognitive performance. The onset of mental fatigue during any cognitive activity is gradual and depends on an individual's cognitive ability, as well as other factors such as sleep deprivation and overall health. Mental fatigue has also been shown to reduce physical performance.

Initially, the HAAR Cascade algorithm is used to extract only face images from the live camera feed. Then, about 68 facial landmarks are assigned to the face image with the help of the Dlib library. Since our main focus is on calculating the EAR, the Support Vector Machine (SVM) Algorithm assigns 6 landmark points to the eye. With these 6 landmarks, SVM calculates the EAR (Euclidean distance between measured eye coordinates). This EAR is compared with the threshold EAR value, which has been calculated by training a dataset. By comparing this threshold value with the live EAR values, a live graph of blinks and microsleepis drawn using the Pyplot function. Blinks and fatigue levels are displayed on the monitor screen along with an audio warning for microsleep detection. An alert email or sms or call is sent using the SMTP or twilio library available in Python.

II. LITERATURE SURVEY

1. In Paper [1] the writer have covered Discussion of additional features such as providing the driver's location to emergency contacts and detecting accidents.
2. In Paper [2] the writer have covered Functionality of the IoT module in issuing warning messages upon detecting driver fatigue, including collision impact and location information.
3. In Paper [3] the writer have covered Integration of an LDR sensor to adjust headlight intensity and prevent accidents caused by blurry vision.
4. In Paper [4] the writer have covered Implementation of a classification algorithm trained with images of drowsy and non-drowsy faces for drowsiness detection
5. In Paper [5] the writer have covered Identification of insufficient sleep before long drives and various factors such as untreated sleep disorders, medical conditions, alcohol consumption, and smoking as primary causes of driver enervation
6. In Paper [6] the writer have covered Paper Overall aim of the system to mitigate the risk of drowsy driving and enhance road safety through innovative technology and research-based approaches.
7. In Paper [7] the writer have covered Reference to research findings indicating that around 40% of accidents result from driver enervation detection and driver hypnosis.
8. In Paper [8] the writer have covered Highlighting the physiological method as a notable approach for alerting drivers and redirecting attention away from drowsiness.
9. In Paper [9] the writer have covered Emphasis on the crucial need for real-time and accurate detection and warning systems to reduce the rate of fatigue-related driving accidents, including their impacts on trauma, economic losses, injuries, and fatalities.
10. In Paper [10] the writer have covered Proposal of a cost-effective and efficient driver drowsiness detection system utilizing advancements in machine learning and artificial intelligence.
11. For safe, secure and smart transport now a day's IOT based smart technologies are used.

III. LIMITATIONS OF EXISTING WORK

- The system may not always accurately detect signs of driver fatigue or hypnosis. Factors such as lighting conditions, facial expressions, or physical movements could lead to false alarms or missed warnings.
- Individuals display signs of fatigue or drowsiness in varying ways. The system may encounter challenges in adapting to diverse individual characteristics, potentially reducing its effectiveness for certain users.
- The system may sometimes misinterpret typical behavior as signs of drowsiness or fail to detect genuine fatigue indicators. These errors could result in unnecessary alarms or missed warnings.
- The system's monitoring of an individual's physical state raises privacy and ethical considerations.

IV. PROBLEM STATEMENT

Create an innovative Driver Fatigue Detection and Hypnosis Alert System that utilizes cutting-edge biometric sensors and AI algorithms. This system continuously monitors physiological indicators, identifies signs of driver fatigue, and promptly issues real-time alerts. By doing so, it ensures timely intervention to prevent accidents and enhance road safety.

V. PROPOSED SYSTEM

ARCHITECTURE

Following Figure represents Architecture of our proposed system

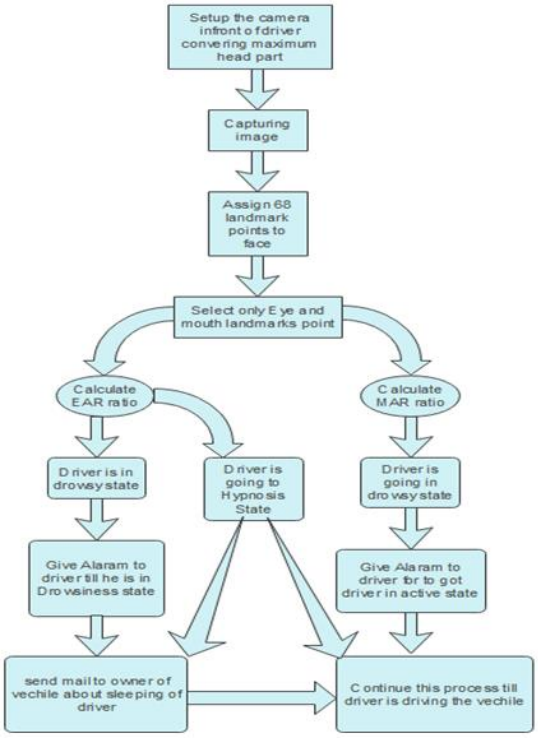


Fig.1. Architecture of Driver Enervation and Hypnosis Alert System

ARCHITECTURE DESCRIPTION

The system utilizes a camera mounted inside the vehicle, facing the driver, to capture their facial features at regular intervals. This data is then processed through several stages to assess the driver's state and identify potential signs of drowsiness or hypnosis.

1. **Facial Landmark Detection:** Specialized software analyzes the captured images to identify and mark 68 specific points on the driver's face. These points correspond to key facial features like eyes, nose, mouth, and jawline.
2. **Feature Selection:** From the 68 points, only those related to the eyes and mouth are selected for further analysis.
3. **Ratio Calculations:** Two key ratios are calculated based on the selected landmarks:
   - **Eye Aspect Ratio (EAR):** This ratio compares the distance between specific points on the eye's outer corners to the distance between the eye's center and the midpoint between its inner corners. Generally, a lower EAR indicates drowsiness as fatigued eyes tend to partially close.
   - **Mouth Aspect Ratio (MAR):** This ratio compares the distance between the mouth's corners to the distance between its top and bottom. Significant changes in MAR may suggest potential hypnosis or yawning, which can be a sign of drowsiness.
4. **Driver State Determination:** Based on the calculated EAR and MAR values, the system categorizes the driver's state:
   - **Drowsy:** If the EAR falls below a predefined threshold, the system identifies the driver as drowsy.
   - **Hypnosis:** If the MAR deviates significantly from a baseline, the system may classify the driver as potentially entering a hypnotic state.
   - **Impending Drowsiness:** The system might issue an alert if it detects the EAR approaching the drowsiness threshold, indicating potential fatigue.
5. **Alerting and Notification:**
   - **Drowsiness:** Upon detecting drowsiness, the system triggers an alarm to alert the driver. This alarm might persist until the EAR value rises above the threshold, signifying the driver's alertness.
   - **Hypnosis:** If hypnosis is detected, the system raises an alarm to warn the driver.
   - **Vehicle Owner Notification (Optional):** The system can be configured to send an email notification to the vehicle owner if the driver is found to be drowsy or potentially entering a hypnotic state.
6. **Continuous Monitoring:** The system operates continuously, capturing images, analyzing facial features, and issuing alerts as necessary, ensuring ongoing monitoring of the driver's state while they are behind the wheel.

OBJECTIVE

In our project objective is follows

- Enhance roadsafety.
- Preventingaccident.
- Protect occupant and other road users.
- Increasedriverawareness.
- Reduce fatigue related road accidents in specific sector.

HARDWAREAND SOFTWARE REQUIREMENTS

In our project hardware and software requirements are given below

A. Operating System : Windows 7/8/10/11, Linux
B. RAM : Minimum 4 GB
C. Hard Disk : up to 1 TB
D. Network Connection
E. Python
F. Webcam
G. Sensors

ALGORITHM

Algorithm of our project are follows

1. The NTHU CVlab Dataset is a valuable resource for calculating the threshold EAR (Eye Aspect Ratio) value. This dataset includes recordings of different individuals under various conditions, such as wearing glasses, sunglasses, and bareface scenarios. The simulated driving environment captures actions like normal blinking, yawning, falling asleep, and laughter. Recordings were conducted during both day and night conditions, with subjects seated in a chair and interacting with a simulated driving wheel and pedals. Additionally, participants were instructed to exhibit different facial expressions while driving. The dataset spans a total of 9.5 hours and covers scenarios related to drowsiness (e.g., yawning, slow blink rate) as well as non-drowsiness actions (e.g., talking, laughing, looking in different directions). By training on this diverse dataset, the system can effectively recognize various driving-related scenarios.

2. The HAAR Cascade Algorithm is a machine learning technique used for face detection in images or live video. It operates based on the concept of positive and negative images. Positive images represent the target objects we want to process—in this case, we focus on detecting faces, making them our positive images. Negative images, on the other hand, are those we can disregard. In the context of face detection, any image that is not a face serves as a negative image.

3. DLIB Library for landmarks detection As HAAR algorithm returns the faces from the given image or recording. For finding drowsiness we need to consider different landmarks for face which is given by DLIB library, it identifies the nodal points on face and give about 68 landmarks to face including 6 landmarks to eye. This landmarks are displayed as light green dots. This landmarks are easy to recognize distinct human face.
   Below is code for Landmark Detection
   Face_Detector=dilb.get_frontial_face_detector1()
   Landmark_Finder1=dilb.shape.predictor(FACIAL_LANDMARK_PREDICTOR)
   Webcam_Feed1=cv2.VideoCapture1(0)

4. Hidden Markov Model(HMM) based dynamic modeling to detect drowsiness Hidden Markov models(HMMs) are sequence models. That is, given a sequence of inputs, such as words , an HMM will compute a sequence of outputs of the same length. An HMM model is graph where nodes are probability distributions over labels and edges give the probability of transitioning from one node to the other. Together, these can be used to computer the probability of a label sequence given the input sequence. A good HMM accurately models the real world source of the observed real data and has the ability to simulate the source. A lot of Machine learning techniques are based on HMMs have been successfully applied to problems including speech recognition, optical character recognition, computational biology and they have become a fundamental tool in bioinformatics. For their robust statistical foundation, conceptual simplicity and malleability, they are adapted fit diverse classification problems.

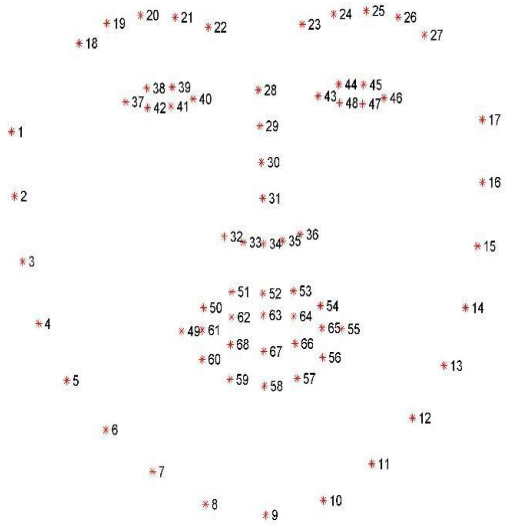


Fig. 2. Facial Landmarks

5. Support Vector Machine (SVM) is a classification algorithm used for separating data items. Proposed by Vladimir N. Vapnik, SVM is based on statistical learning theory and is commonly applied in pattern recognition. Its primary objective is to find decision boundaries that divide or distinguish data into two or more classes. In the context of drowsiness detection, SVM assigns label 0 to indicate that the driver is experiencing drowsiness, while label 2 signifies that the driver is not tired. The 68 facial landmarks provided by the DLIB library are processed using SVM. Specifically, only the landmarks associated with the eyes are considered. SVM identifies 6 eye landmarks, which are then used to calculate the EAR (Eye Aspect Ratio) using OpenCV functions. By comparing this EAR value with a predefined threshold, the system determines whether the driver is drowsy. The EAR ratio is computed from the geometric coordinates of the eyes, calculated using the Euclidean distance formula(EAR).

$$\textbf{EAR(Eye Aspect Ratio)}=\frac{|p2-p6|+|p3-p5|}{2|p1-p4|}$$

APPLICATIONS

Application of the our project are following

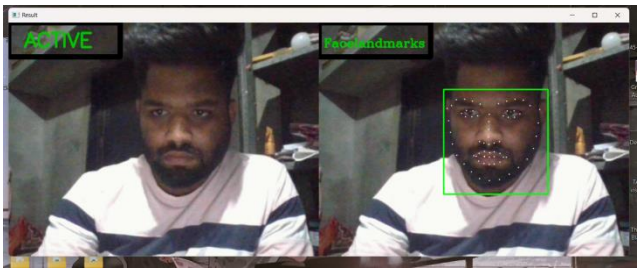
a) PreventingAccident
b) Longdistancetraveling
c) Commercialvehicle
d) FleetManagement
e) AlertMessage

VI. RESULT DISCUSSION

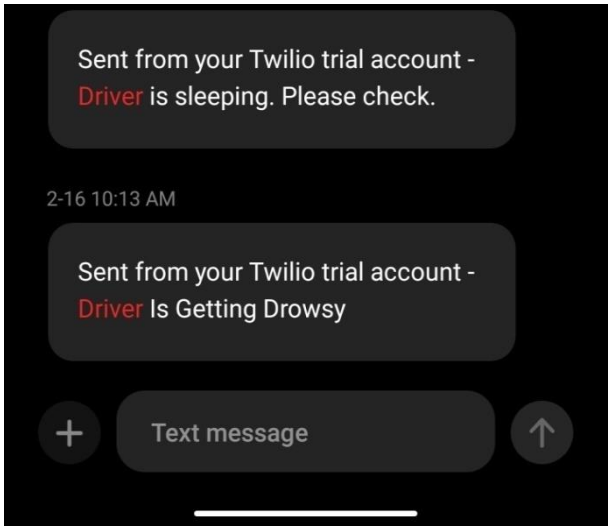
The “Driver Enervation Detection and Hypnosis Alert System” project is designed to address the critical issue of driver fatigue and hypnosis while driving. It incorporates advanced sensor technologies and possibly machine learning algorithms to accurately detect signs of fatigue or drowsiness while maintaining user privacy. By analyzing various driver behavior indicators such as eye movement and steering patterns, the system generates alerts to prevent accidents caused by impaired driving. Its user-friendly interface allows for seamless interaction, making it accessible to drivers and enhancing road safety. The system has diverse applications, including use in individual vehicles, commercial fleets, and transportation infrastructure, thereby significantly improving road safety and saving lives. In conclusion, the Driver Enervation Detection And Hypnosis Alert System offers a crucial solution to a pressing safety concern, promoting safer driving practices and safeguarding lives.

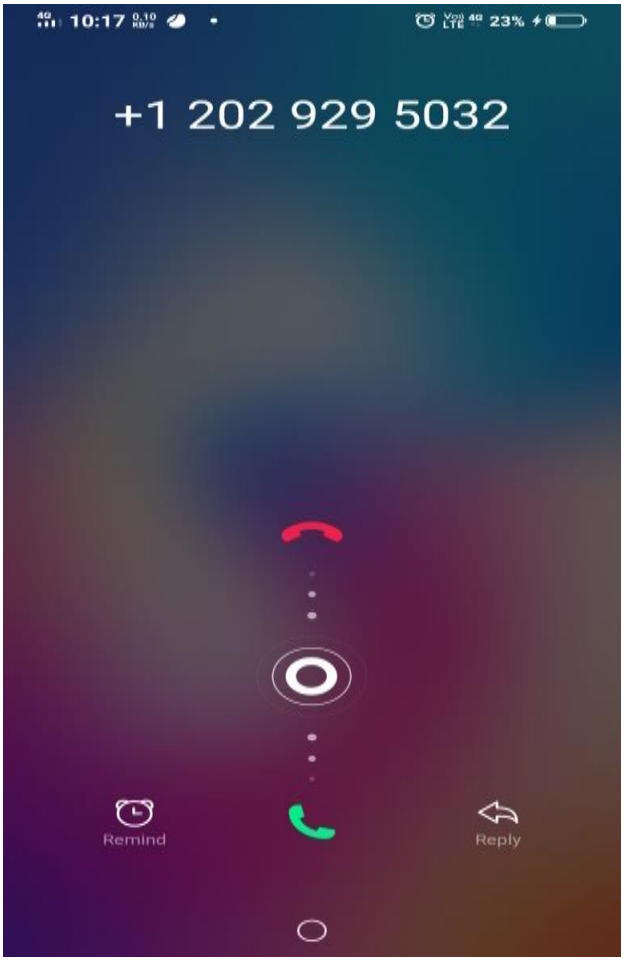
VII. RESULT SCREENSHOTS AND ITS DESCRIPTION

Here are the result screenshots of our project




ACTIVE
HYPNOSIS ALERT!
ACTIVE
HYPNOSIS ALERT!


Sent from your Twilio trial account - Driver is sleeping. Please check.
2-16 10:13 AM
Sent from your Twilio trial account - Driver Is Getting Drowsy
Text message


10:17
23%
+1 202 929 5032
Remind
Reply

OVERVIEW

Implemented a system for the detection of drowsiness of driver & its alertness to the driver as well as to the vehicle's owner through email or message by providing the name of driver and at what time the driver was sleepy. The system will respond only if the driver's eyes pass the threshold value of EAR ratio for a specific time and for more accuracy, the author had also used yawn detection techniques to minimize the number of false positives.

KEY FEATURES

Driver Enervation Detection Hypnosis Alert System:
Enhanced Safety: Continuous monitoring of the driver's physiological signals detects signs of fatigue or drowsiness, allowing timely intervention to prevent accidents.
Reduced Accidents: Early detection of driver fatigue reduces the likelihood of accidents caused by impaired driving due to exhaustion.
Customized Alerts: Personalized visual or auditory warnings prompt corrective actions or rest breaks, ensuring safety.
Integration with Vehicle Systems: Seamless integration with existing safety systems ehances overall road safety.
Improved Driver Experience: Customizable alert preferences prioritize safety while providing a secure driving experience.
Prevention of Hypnosis-Induced Accidents: By monitoring driver behaviour, the system detects signs of hypnotic induction, preventing accidents caused by trance-like states or distractions.
Enhanced Driver Awareness: Alerts prompt heightened vigilance, reducing the risk of accidents due to hypnosis.

VIII. CONCLUSION

We proposed an approach to generate driver enervationdetection system with EAR ratio calculation. This has a lot of application as accidents due to driver drowsiness are major issues causing deaths or serious injuries. The techniques used previously have been studied like drowsiness detection by visual assessment, biomedical signals and monitoring vehicle behaviour. Out of which visual assessment to detect enervation is more accurate and convenient approach. We have studied this existing system and find some changes that can lead to increase in accuracy of system such as using dataset to train our SVM algorithm so it can give accurate result in case if driver is wearing glasses or there is low intensity light in car. The only drawback of this system is that it increases the cost as we are using infrared camera, so it can work in any weather condition. For sending the alert system the TWILIO is used to send the alert call as well as ringing the alarm when the person is detected in drowsiness state.

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Comparative Study of Prototype Model Results and Simulation Results of TCSC Facts Controller for Congestion Management

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ABSTRACT
TCSC prototype comprises 400 KV, 300 Km transmission line model operates on lab voltage of 400 V, 8 Amp, 50 Hz. Compensator consists of capacitors in series with transmission line across which thyristor (valve) connected back to back and is connected in series with air gap type linear inductor. Simple hardware consisting of measuring circuits using CTs and PTs, with AVR ATmega 2560 controller, thyristor firing circuit using IC-MOC3021 is implemented and avoided the circuit complications as compared to when firing circuit incorporated with pulse transformers and different transistors. Simple software strategy of either proportional plus integral (PI) or proportional plus integral plus derivative (PID) control is introduced to maintain the voltage level at receiving end within desirable limit for variation of load. In this paper, TCSC simulation results are compared with prototype results to validate the controller design parameter with manual tuning. However, the aim of this dissertation is to enhance the voltage stability and increase the power transfer capability of the long transmission line

Keywords: FACTS, Series Compensator, TCSC, thyristor, MATLAB, physical model, controller, experiment.

I. INTRODUCTION

During the last several years interest in the possibilities to control the (active) power flows in transmission systems has increased significantly. There is a number of reasons for this, originating both from the application side that is, from the power system operation and from the technological side, that is, the advent of new system components such as semiconductor based devices. In many countries the operation of power systems has changed due to higher utilization of the transmission network and a deregulation of the power market. In certain deregulated environments, transmission capacity becomes a commodity. For the use of transmission capacity, fees have to be paid, and the transmission grid operator depends economically on these fees. The new components that are becoming feasible are to a large extent based on advances in power electronics and related technologies.

The scope of application of such devices has been extended considerably in recent years, as these devices provide much better transient responses, compared with their mechanical, electrical and electromechanical counterparts. The use of any such device can increase the level of power that can be transferred over a transmission corridor without endangering the system stability.(TCSC) is a type of series compensator, can provide many benefits for a power system including controlling power flow in the line, damping power

oscillations, and mitigating sub synchronous resonance. Shunt compensation is ineffective in controlling the actual transmitted power as given The variable series compensation is highly effective in both controlling power flow in line and improving stability, design, model and implement the TCSC in power system model is simulations are performed using the MATLAB.The use of any such device can increase the level of power that can be transferred over a transmission corridor without endangering the system stability.

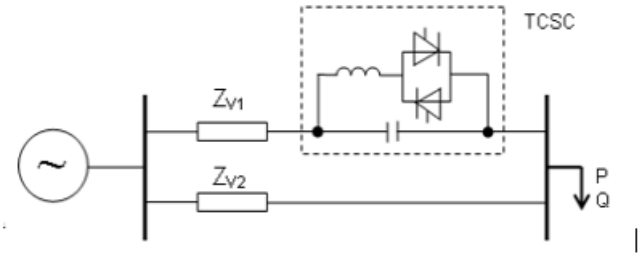

Figure1:Generalized Block diagram of TCSC scheme

The Thyristor Controlled Series Capacitor (TCSC) belongs to the Flexible AC Transmission Systems (FACTS) group of power systems devices. Essentially a TCSC is a variable reactance device that can be used to provide an adjustable series compensating reactance to a transmission line. Its advantage over other series compensating devices is that its reactance can be instantaneously and precisely controlled. This makes the TCSC well suited to enhance the power transfer capability of a power system.

A TCSC is typically made up of the following major components:

- Thyristor valves
- Reactors
- Capacitors (often tuned for harmonic filtering)

II. METHODS AND MATERIAL

Thyristor Controlled Reactor (TCR) in combination with a Fixed Capacitor (FC) is used, to provide a smoothly variable series capacitive reactance. It is a one-port circuit in series with transmission line; it uses natural commutation; its switching frequency is low; it contains insignificant energy storage and has no DC-port. Insertion of a capacitive reactance in series with the line's inherent inductive reactance lowers the total, effective impedance of the line

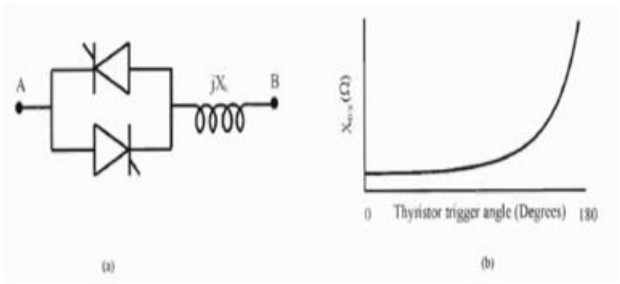

Figure2:(a) TCR; (b) Plot of TCR reactance versus thyristor trigger angle

As a result, both angular and voltage stability gets improved. Furthermore, in contrast to capacitors switched by circuit breakers, TCSC will be more effective because thyristors can offer flexible adjustment, and more

advanced control theories can be easily applied.This gives continuously controllable lagging to leading VARs by thyristor control of reactor Current only. This is depicted in Fig2.

III.DESIGN OF TCSC CONTROLLER

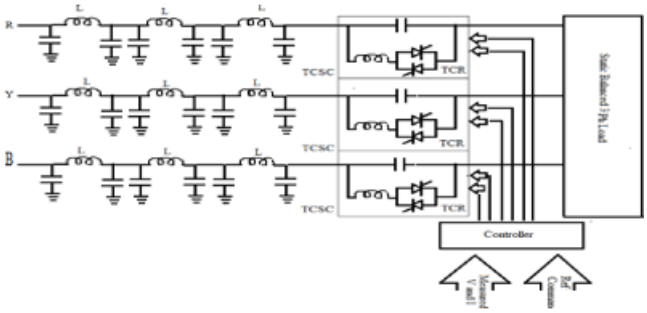

Figure 3:Schematic of Three Phase Transmission Line and TCSC

The Three phase TCSC (TCR) prototype consist of,
Three phase long transmission line
Three phase compensation reactor and capacitor
Three phase static load

- Sensing of receiving end bus voltage and compare it with the set point voltage and give appropriate signal to TCR to reduce the error of voltage.
- Regulation of the power factor, system shall be designed to continuously monitor the present power factor and compare it with the set power factor (unity power factor) and give appropriate signal to TCR to reduce the error.
- Display magnitude of measured signals and firing angle in percentage

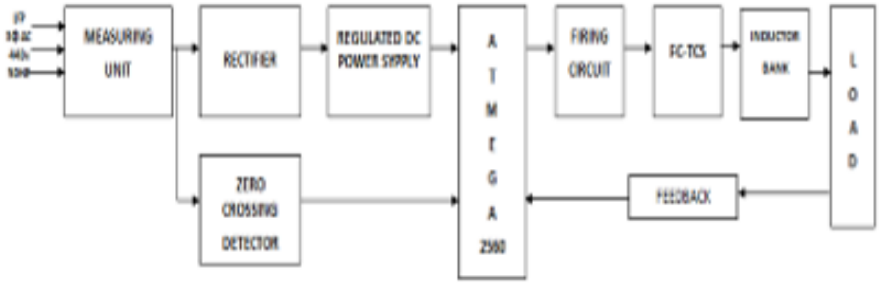

Figure 4: Block diagram of the System

A. The current sensing

The current sensing is done with the help of current transformer (CT) (15A/0.1A). The output of the CT is converted into appropriate voltage (maximum 5 volts) with the help of resistor, and it is given as input to ZCD.A current transformer is a type of "instrument transformer" that is designed to provide a current in its secondary which is accurately proportional to the current flowing in its primary. Current transformers are designed to produce either an alternating current or alternating voltage proportional to the current being measured. Current transformers produce either an alternating current or alternating voltage that is proportional to the measured current.

B. The Voltage sensing

For voltage sensing, potential transformer (PT) (440/15V) is used and its output is given to second channel of ZCD. The standards define a voltage transformer as a device in which "the secondary voltage is substantially proportional to the primary voltage and differs in phase from it by an angle which is approximately zero for an appropriate direction of the connections. This, in essence, means that the voltage transformer has to be as close as possible to the "ideal" transformer. In an "ideal" transformer, the secondary voltage vector is exactly opposite and equal to the primary voltage vector, when multiplied by the turn's ratio.

In a "practical" transformer, errors are introduced because some current is drawn for the magnetization of the core and because of drops in the primary and secondary windings due to leakage reactance and winding resistance. One can thus talk of a voltage error, which is the amount by which the voltage is less than the applied primary voltage, and the phase error, which is the phase angle by which the reversed secondary voltage vector is displaced from the primary voltage.

A simple circuit with an opto-isolator. When switch S1 is open, LED D1 is off, so Q1 is off and no current flows through R2, so Vout = Vcc. When switch S1 is closed, LED D1 lights. Phototransistor Q1 is now triggered, so current flows through R2 Vout is then pulled down to low state. This circuit, thus, acts as a NOT gate.

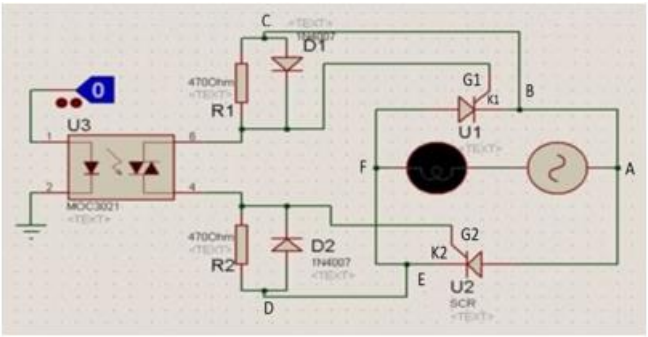

Figure 5: Firing Circuit

Let us consider a cycle of the given AC source, when point "A" is at higher potential than "F". So the current starts from point "A" and then reaches a junction at B. It will not go to "K1" since it is a cathode and will go to point "C" instead. Now the current would choose a low resistance path through a forward biased diode "D1" and would enter the "Pin 6" of the opto-coupler IC.Now the current would pass through the inbuilt Triac only if the LED inside the IC is forward biased by the micro-controller. Let us assume that the "Pin1" of the IC receives a positive potential from the micro-controller, which forward biases the LED so the Triac starts conducting and current reaches "Pin 4" of the IC from where it goes to Gate "G1" instead of passing through high resistive path of Resistor "R2" or Diode "D2". Current flows from the gate "G2" to cathode "K2" of SCR "U2" and then completes the circuit through the load and back to the supply.

Once the current flows from the Gate-Cathode junction of the SCR it starts conducting. From the next cycle the current takes the path: A – U2 – F – Load – Supply. It keeps on tracing this path till the internal LED of the IC is forward biased. Once the LED is switched off, the current ceases to flow through the IC and the SCR regains its Blocking state. The same flow of events occurs for the other SCR too. So just by forward biasing an LED in the IC by the micro-controller, the SCRs are triggered. This happens to be a more responsive circuit than the conventional one involving UJT and pulse transformer.

IV. SYSTEM COMPENSATION

To find line compensation a load test is conducted. The power consumption is calculated to find the exact compensation required, ABCD constants are found, circle diagram of line is drawn.

Load specifications: Resistive load: 3-Phase incandescent lamp bank. Bulb rated as 40, 60, 100, 230 V

TABLE I OBSERVATIONS BEFORE COMPENSATION

Vs	Is	Vr	Ir	3ph load app.
220	0.5	230	0	0
220	-	225	-	120
215	0.8	220	0.6	420
212	1.5	222	1.0	720
208	2.1	210	2.0	1320
200	3.8	192	3.2	1920
185	4.8	180	5.0	2820

Characteristics of Receiving End Voltage Vs. Load Current is drawn which shows that at no load and light load condition the receiving end voltage is greater than sending end voltage up to the 1 amp But as load increases beyond 1 amp receiving end voltage decreases From this graph we can say that, the transmission line generate capacitive reactive power (Var) up to the 1 amp load, with this farrenty effect the receiving end voltage get increased up to the 1 amp load. To maintain voltage at receiving end voltage equal to sending end voltage we have to provide reactive power at each loading condition. The amount of reactive power at each loading condition is easily found with the help of receiving end circle diagram. For drawing circle diagram first we need to calculate ABCD parameter of transmission line.

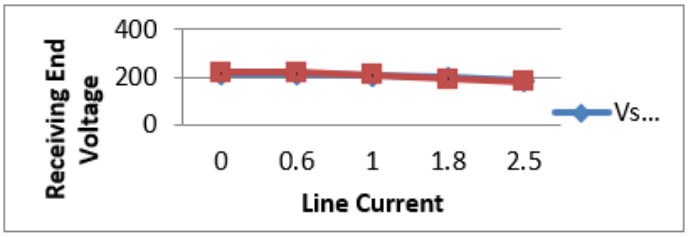

Figure 6: Receiving End Voltage VS Load Current

TABLE III (PIE) MODEL TRANSMISSION LINE PARAMETERS

Particulars	Unit
Input Supply Voltage	3 Phase,400 v, (L-L), 50 Hz,AC.
Current Capacity	8 Amps.
Line Voltage assumed	400 Kv, (L-L)
Surge Impulse Loading (SIL)	400 Mw.
Line Length (Long Line)	300 Km.
Inductance per Phase	24mH, 8Amp, 50 Hz.
Resistance per Phase	0.5Ω, 50 watt, 50Hz.
Capacitor per phase	2.44μf, 630V

After Calculations values of A, B, C, D parameter for 300Km long transmission line are Values for /phase/km are

TABLE IIIII

Parameter	Value
R	1.5Ω
X	j(22.61)Ω
Z	22.65∠86.20 *Ω*
Y	$4.59\times10^{-3}\angle90$ ʊ
A	1∠*0.2081*
B	22.65∠*86.20 Ω*
C	$4.47\times10^{-3}\angle$*90.10*
D	1∠*0.2081*

At each loading condition required reactive power is calculated simply multiplying power scale in circle diagram as illustrated in following table.

TABLE IVV REQUIRED VAR FROM CIRCLE DIAGRAM

Per Phase load App.	Required VAr
R	410
L	580
R-L	550

V. SELECTION OF CAPACITOR AND INDUCTOR FOR SINGLE PHASE TCSC CIRCUIT

Reactive power is calculated by circle diagram as shown in above Table. The maximum reactive power was generated in pure inductive load and minimum reactive power was generated in resistive load. Reactive power in single phase (Qmax) = 580 VAR

Calculations to find required capacitor value in single phase line for TCSC circuit

$Q = 2\pi\times f\times C\times V^2\times10^{-6}$

$580 = 2\pi\times50\times C\times10^{-6}$

$C = (\frac{580}{2\pi\times50})\times10^{-6}$

C = 34.91 μFD

Three phase reactive power = 3×(single phase reactive power)= 3× (580)= 1740VAR

Current calculation for required capacitor

$(Q_{3\text{-phase}}) = \sqrt{3}\times V_L\times I_L\times \sin(85.73)$

$1740 = \sqrt{3}\times 400\times I_L\times \sin(85.73)$

I_L = 2.51 Amp

VI. SPECIFICATIONS OF CAPACITOR

TABLE V SPECIFICATIONS OF CAPACITOR

Full load current	Rated frequency	Capacitor	Rated KVAR	No of phase
3.6667 Amp	50 Hz	40 μFD	2.0 KVAR	3

Selection of Inductor: The inductor is used in TCR (Thyristor controlled reactor) for varying the total impedance of the line. This inductor is totally controlled by back to back thyristor as shown in schematic diagram. Basically, it varies the capacitive reactive power.

VII. SPECIFICATIONS OF INDUCTOR

TABLE VI SPECIFICATIONS OF INDUCTOR

Rated KVAR	Rated voltage	Rated frequency	No of phase	Type	Connection
2.41 KVAR	400 volts	50 Hz	3	Gapped core	Star

VIII. LOAD COMPENSATION

Star connected R-L star load test is conducted with transmission line in star
Load specifications
Resistive load: 3-Phase incandescent lamp bank. Bulb rated as 40, 60, 100, 230 V
Inductive Load: L/phase/element = 0.91H, I= 0.8Amps, Z= 285 Ω,

TABLE VII OBSERVATIONS BEFORE COMPENSATION

Ir(A)			Power Transferred Pr (W)		
1.6	1.6	1.61	540	725	662
2.14	2.15	2.15	948	1005	972.7
2.5	2.5	2.5	952	1255	1125

TABLE VIII CONSUMED POWER OF STAR CONNECTED R-L LOAD

Vs(V)			Is (A)			Vr boost (V)		
222	224	229	1.78	1.70	1.80	232	265	242
224	225	229	2.28	2.26	2.20	256	270	259
224	226	230	2.96	2.89	2.60	250	290	260

TABLE IX CONSUMED POWER OF STAR CONNECTED R-L LOAD

Vs(V)			Is(A)			Vr(V)		
222	224	229	1.78	1.70	1.80	240	238	239
224	225	229	2.28	2.26	2.20	245	290	237
224	226	230	2.96	2.89	2.60	230	290	240

TABLE X COMPENSATION RESULT OF STAR CONNECTED R-L LOAD

Ir (A)			Power Transferred(W)			α
1.67	1.75	1.74	694	721	720	55
2.3	2.15	2.4	976	1079	985	38
2.56	2.57	2.74	1019	1290	1138	23

Thyristor-Controlled Series Capacitor is one of the fastacting power electronic controllers which can provide current and power flow control in the transmission line by varying its firing angle. Thus, TCSC can be used as a series capacitor to reduce the overall transmission line reactance. Depending on the enhancement of power transfer desired at the time, without affecting other system-performance criteria, series compensation can be varied by TCSC. Thus TCSC is one of the important FACTS controller, which increases the overall power transfer capacity in the transmission line. The difference between the implemented TCSC model in Matlab-Simulink and Prototype is less than 4 %, moreover, increasing the order of load gives more accurate results, and the disturbance introduced by load resistance can be overcome within 1sec. The control circuit has been designed on the assumption that the three phase load at the receiving end is balanced. However, by taking voltage feedback from each phase, independent control of reactive power in each phase is achieved. The results shows that there is improvement in the both synchronous and voltage stability margins, when TCSC is connected in the test system. Series capacitive compensation is thus used to reduce the series reactive impedance to minimize receiving end voltage variation and the possibility of voltage collapse and it can improve power flow capability of the line. It is also observed that the compensation by using this technique i.e. TCSC is more effective than other compensating techniques such as mechanical switching capacitors and synchronous condensers.

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An Analysis of Face Recognition and OTP Verification for Online Voting

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ABSTRACT
Data manipulation can always result in undesirable results outcomes in the digital age, where system penetration and hacking are simple processes. Face Recognition is utilized to keep extremely secure data that is nearly hard to alter or tamper with. Voting is a fundamental activity in every country, and it will be detrimental if votes are tallied incorrectly by outside parties. Face Recognition technology is acknowledged as a way to prevent these kinds of scenarios and enhance comfort. In this work, a decentralized national electronic voting system based on facial recognition technology is proposed. To plan the vote, oversee the candidates, and announce the results, it has an admin panel. Users will have access to an interface through the web application.

Keywords: Voting, OTP, Face Authentication, Security

I. INTRODUCTION

In an election that is conducted manually using paper ballots, voters simply place their pre-marked ballots in sealed boxes positioned throughout the electoral circuits of a nation in order to choose their candidates. Upon the conclusion of the election period, all of these boxes are formally opened, and votes are hand counted in front of authorized representatives of each candidate until the totals are tallied. Transparency in both the voting procedure and the vote counting should be guaranteed. Nevertheless, counting mistakes happen frequently, and occasionally voters find a means to cast multiple ballots. These abnormalities in the final count results may, in extreme circumstances, necessitate a complete rerun of the election process! Furthermore, in many nations, deliberate introduction of modifications

It follows that an entirely computerized and automated online election system is required. Electoral vote counts are conducted in real time, so at the conclusion of Election Day, the results are automatically known, in addition to avoiding frequently encountered election hurdles [1, 2].

Adding elements to the electoral process according to the needs and preferences of many nations worldwide is a simple and flexible process. Online voting, sometimes known as e-voting, is no longer limited to North America or the West due to global developments in communications, computer, and related infrastructures. The globe has embraced this sophisticated voting process, which is now practiced well beyond American borders.

A. Motivation

- If you're an American citizen the website will send you a confirmation message similar to this one once you cast your vote: “Successfully voted" indicates that the ballot was cast and registered.
- After reading the details, offline will use the microcontroller to communicate the data that was recorded offline to the web application through a serial terminal. The plan for A people database is maintained via an online program.

II. LITERATURE SURVEY

On the server side, a global database of all registered candidates and voters is maintained. The server runs in real-time and provides backend data for the entire election process [1].

The method utilizes mobile devices' camera systems, as detailed in the work by. A facial recognition system can be used by the user to identify the system [2].

The likelihood of an election being rigged is reduced and voting process security is increased with the use of two-factor authentication technology [3].

To improve security, two levels of authentication procedures are employed. The initial authentication technique used is a Face Detection and Recognition system. 2. Achieves less than 0.3% false positives and a detection rate of over 66%, which covers over 94% of misbehaviour [4].

Actions and elements should be validated through transformational digitalization [3]. Nonetheless, Iraq continues to employ traditional voting practices, such as paper ballot voting [5]. Actions and elements should be validated through transformational digitalization [3].

Nonetheless, Iraq continues to employ traditional voting practices, such as paper ballot voting [6].

Thephotoswillbekeptontheserverordatabase.Thephotographs will be verified with the database when they arecollected on voting day, ensuring a secure vote on Election Day[7].

Itcomprisesofacomparisonofvariousfacialrecognitionalgorithms of different kinds. Our comprehensive research’smajor result isfoundinSection[8].

The new system makes things simpler by removing the needthatvotersvotebasedonlyontheirlooks[9].Toprevent fraudulent(false)voting,wehave developedamethodwherevotersmaycasttheirballotsusingtheirfingerprint,iris, oranOTP[10].

III.PROPOSED SYSTEM

Because of this field's wide range of applications, a great deal of work has been done in it. Some strategies that have been used to accomplish the same goal are mentioned in this section. The fundamental distinction between these works and the methods for these systems is their methodology.

- Safety.
- Easy access.
- Available in any bank branch.
- Anyone can avail.
- Nomination facility available.

IV. ALGORITHM

Convolution Neural Network
Step1: Select the dataset.
Step2: Perform preprocessing, feature selection.
Step3: Apply Classification algorithm CNN
Step4: Calculate each Feature fx value of input layer
Step5: Calculate bias class of each feature
Step6:The feature map is produced and it goes toforward pass input layer
Step7: Calculate the convolution cores in a feature pattern
Step8: Produce sub sample layer and feature value.
Step9: Input deviation of the kth neuron in output layer is Back propagated.
Step10: Finally give the selected feature and classification results.

V. RESULT AND DISCUSSION

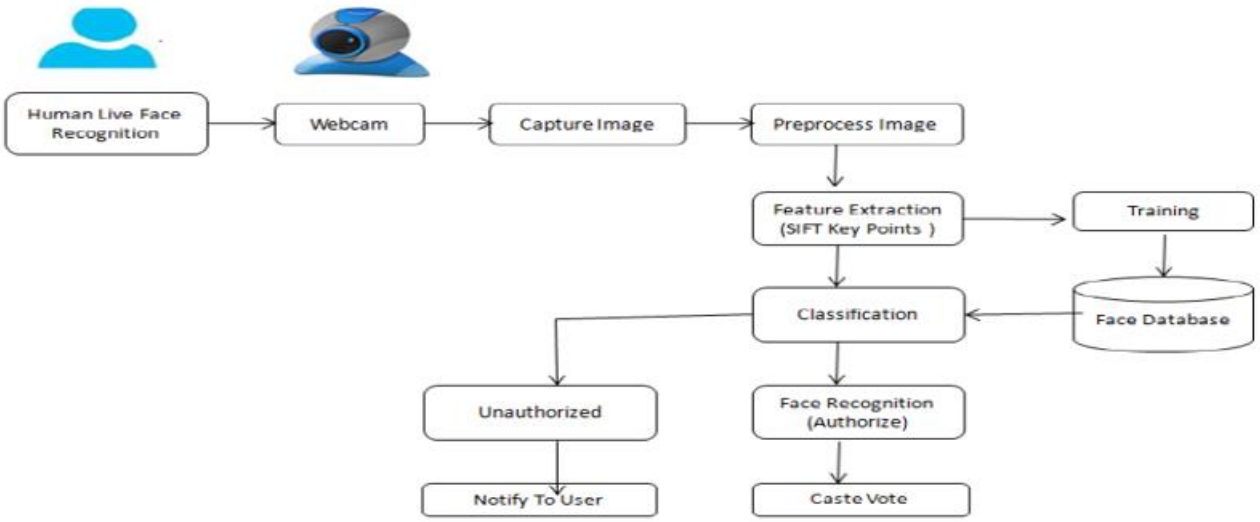

Figure1: A System Architecture

As shown in above figure1, Webcam capture image of human face and image processing takes place. Extracted features are classified and according to that features authorized and unauthorized user can be identified.

Figure 2:Login

Figure 2 shows login page, if user has already registered then he or she can make login by using login Id and password, otherwise he or she have to go for sin up.

Figure 3:LSign Up

Figure 3 shows login page, if user has already registered then he or she can make login by using login Id and password, otherwise he or she have to go for sin up

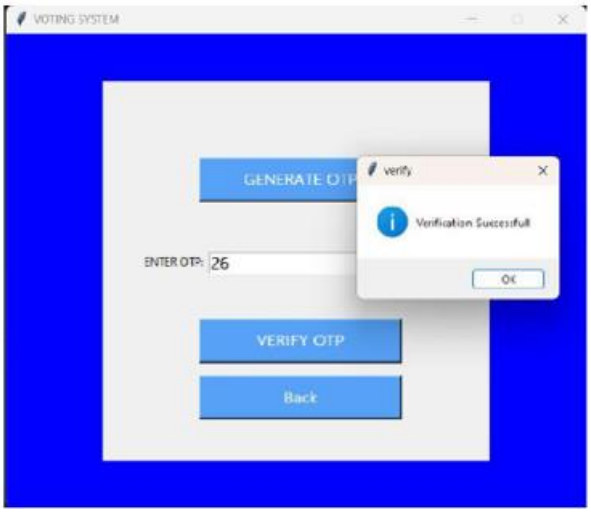

Figure 4:Verification

VI. CONCLUSION

In an effort to address every flaw in the present or traditional voting system, a safe online voting system based on facial recognition is being developed. Correctness, verifiability, convenience, and other strong points characterize the suggested system. With this approach, voting is possible from anywhere that is safe as long as there is an internet connection and face scanners. No election officer, paper ballot, or electronic voting equipment is needed.

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Experimental Investigation of Heat Transfer Enhancement from Circular Dimple with Different Winglet Vortex Generators in Square Channel

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ABSTRACT
Vortex generation is a new and innovative strategy of enhancing air-side heat transfer. Vortex generators such as wings and winglets can introduce vortices into the flow field causing heat transfer enhancement. Vortex can be divided into two categories based on the axes of these vortices: transverse vortices and longitudinal vortices. Longitudinal vortices are more efficient for heat transfer enhancement than transverse vortices. In this paper, experimental investigation is carried out to understand the influence of different winglets vortex generators such as delta, rectangular & Trapezoidal on heat transfer characteristics in a square channel. Reynolds number based on the hydraulic diameter is varied from 8000 to 20000. With constant heat flux, experiment is performed to calculate heat transfer characteristics by installing circular dimple and delta, rectangular & Trapezoidal winglets vortex generators on the flat plate. The horizontal pitch of circular dimple is constant by 18mm. Then All winglets are installed on the dimple plate with angle of attack Constant by 45º & Aspect ratio of delta, rectangular & Trapezoidal winglets vortex generators varies from 1, 1.5 & 2.The test results are compared with the flat plate results & The working fluid considered herein is air. From the experiment it is observed that the heat transfer enhances by using delta, rectangular & Trapezoidal winglet vortex generators. Best results are obtained for Reynolds number 20000 with 18mm pitch of circular dimple with rectangle winglet of aspect ratio 2having angle of attack of 45º as compared to delta & trapezoidal winglets. Enhancement ratio found to be 6.32 at 18mm pitch and α = 45º of rectangle winglet on the account of pressure drop across the test section & other aspect ratios 1 & 1.5 be same result.

Keywords: vortex generators, delta winglets, heat transfer enhancement.

I. INTRODUCTION

One of the most important passive techniques to augment the heat transfer is the use of vortex generators. Transverse vortex generators produce vortices, whose axis is transverse to the main flow direction, whereas, the longitudinal vortex generators generate vortices whose axis is parallel to the main flow direction. It has been found that longitudinal vortex generators are more suitable than the transverse vortex generators when the heat transfer augmentation with pressure drop is an important consideration. The longitudinal vortices behind

a slender aerodynamic object have been investigated for many years. Longitudinal vortices are found to persist for more than 100 protrusion heights downstream.

A vortex generator is called a wing when its span is attached to the surface and is known as a winglet when its chord is attached to the surface. Longitudinal vortex generators may have any of the four basic shapes (Figure 1.1) i.e. delta wing, rectangular wing, delta winglet and rectangular winglet. The aspect ratio 'Λ' of a longitudinal vortex generator is the ratio of the square of the span 'b' and the area of the vortex generator 's' that is Λ=sb^2. The aspect ratio of vortex generator is an important criterion to compare the performance of the different shapes.

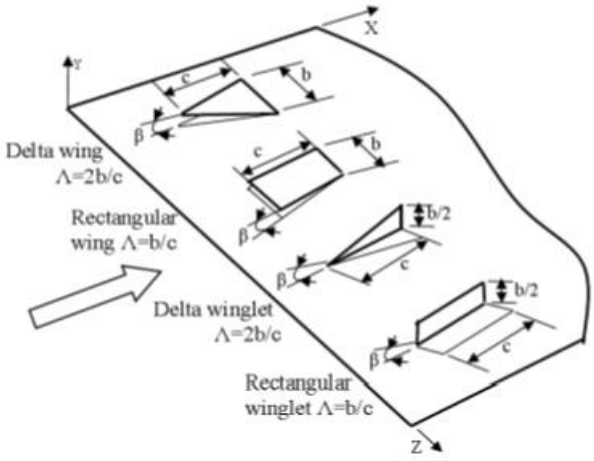

Figure1:Longitudinal vortex generators

In case of winglet, single vortex is generated by the fluid which passes over the winglet; however, for the wing vortex generator, two vortices are produced as the obstructed fluid passes over the wing from both the side edges. Figure 1.2 shows a sketch of longitudinal vortices behind a delta winglet vortex generator placed in a laminar boundary layer on a flat plate. The flow separation at the leading edge of the winglet generates a main vortex and the corner vortex is formed by the deformation of near-wall vortex lines at the pressure side of the winglet. Sometimes an induced vortex is also observed rotating opposite to the main and corner vortex.

II. EXPERMENTAL SET UP

The experimental setup for this investigation consists of centrifugal blower, flow control valve, orifice meter for flow measurement, an entrance section, the main test section and then plenum (mixing section) with exit section for the air. The duct is of size 1050mm X 50mm X 50mm and is constructed from epoxy resin material of 10mm thickness. The main test section is of the length 700mm. The entry and exit section length are 250mm and 100mm respectively. The exit section of 100mm is used after the test section in order to reduce the end effects and to get uniform temperature across the duct. A 250mm epoxy resin square section provides hydro dynamically fully developed flow at the test section entrance.

Figure 2:Experimental set up

To provide uniform heat flux, electric heater of size 700mm X 50mm is fabricated from a galvanized Iron sheet of thickness 0.5mm of 250 volts electric supply with 800 watt rating. The heater is installed at the bottom side of the test section to provide uniform heating of the test plate. The bottom side of heater is covered with epoxy resin sheet of thickness 10mm and having length 700mm to reduce the heat loss from the bottom side of the heater. The heat input to the heater is controlled by the use of dimmer stat having range 0 to 230 volts. The voltage and current across the heater is measured by digital voltmeter. The total test section along with the entrance and exit section is covered with ceramic wool having thermal conductivity 0.11 W/mK of thickness 30mm to avoid any heat losses to the surrounding from the test section.

III.EXPERIMENTAL PROCEDURE

Initially all the necessary units were assembled at their respective places. Blower was switched on and the test section along with entire setup was checked for air leakages. Then a constant heat flux was applied to the test plate. By using flow control valve, air flow was controlled and then measurements were taken after the test section reaches to steady state. Steady state condition is assumed to be reached when temperature at a point does not change for about 20 minutes. After starting from cold it took around 50 to 60 minutes to gain the steady state of the system. For different Reynolds numbers data was recorded after reaching the steady state. During experimentation following parameters were measured,

- Pressure difference across the orifice meter
- Temperature of the heated surface and air temperature at inlet and outlet of the test section
- Pressure drop across the test plate

IV. RESULT AND DISCUSSION

A. Effect of Circular Dimple with winglet vortex generators on Nu

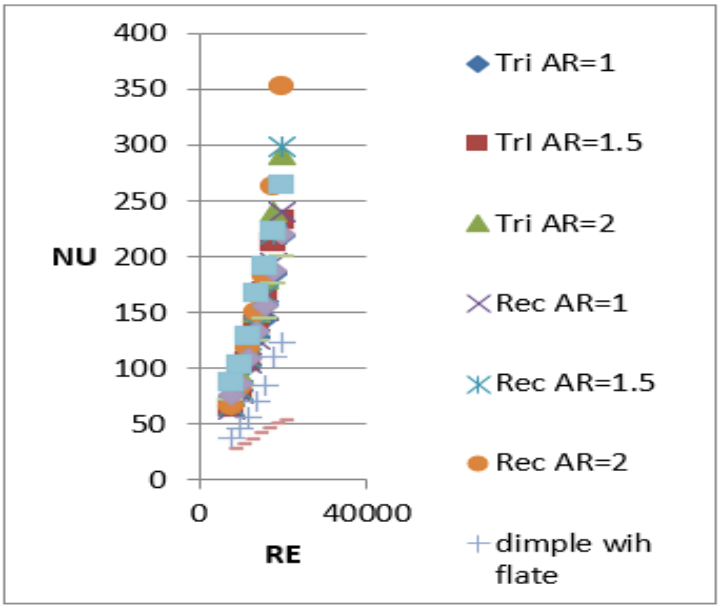

Figure 3:Variation of Nu as a function of Re

From Fig.3 it is clear that the value of Nusselt number decreases as the aspect ratio decreases. The reason behind this decrement in the heat transfer is the number of dimple available for heat transfer. In case of 18mm pitch, there are 37 numbers of circular dimple that can be drilled on the flat plate of 700mm length. So, as the number of aspect ratio decreases the Nusselt number also decreases due to reduced net effective surface area of heat transfer.

B. Effect of winglet vortex generators on Nu/Nu0.

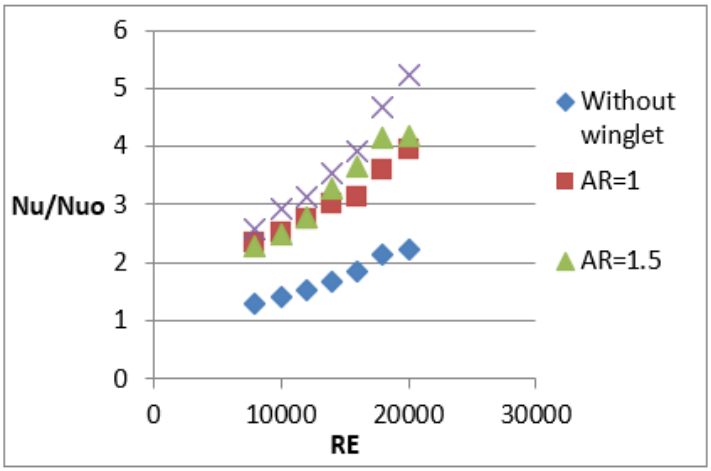

Figure 4:Enhancement ratio versus Reynolds number for Triangle

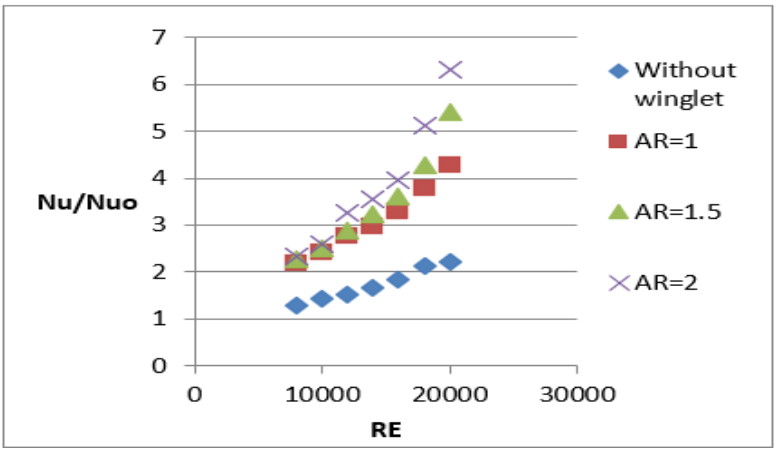

Figure 5:Enhancement ratio versus Reynolds number for Rectangle

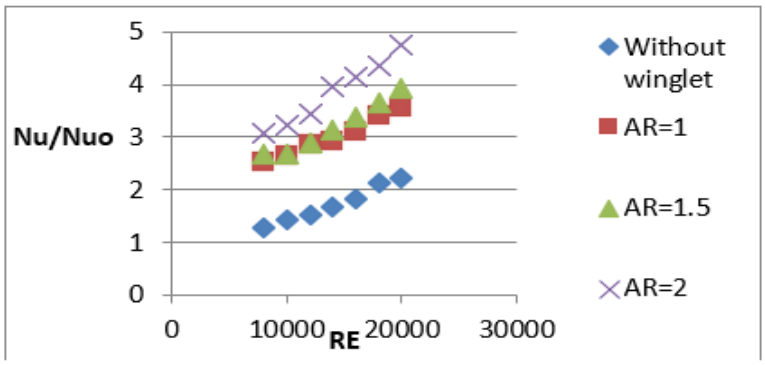

Figure 6:Enhancement ratio versus Reynolds number for Trapezoid

The ratio of heat transfer on plate surface having circular dimple and Triangular, Rectangular, and Trapezoidal vortex generators to the flat plate has been introduced as heat transfer enhancement ratio (Nu /Nu0). Fig 4 to 6 shows the enhancement ratio as a function of Reynolds number. It is seen that aspect ratio of Triangular, Rectangular, and Trapezoidal winglet vortex generators shows increasing trend for increased Reynolds number. Enhancement ratio for aspect ratio 1 is in the range of 2.19 to 4.39, for aspect ratio 1.5 is in the range of 2.28 to 5.4 and for aspect ratio 2 is in the range of 2.34 to 6.32. So it is clear that the heat transfer enhancement is more in case of aspect ratio 2 in Rectangular winglet .

C. Effect of winglet vortex generators on f

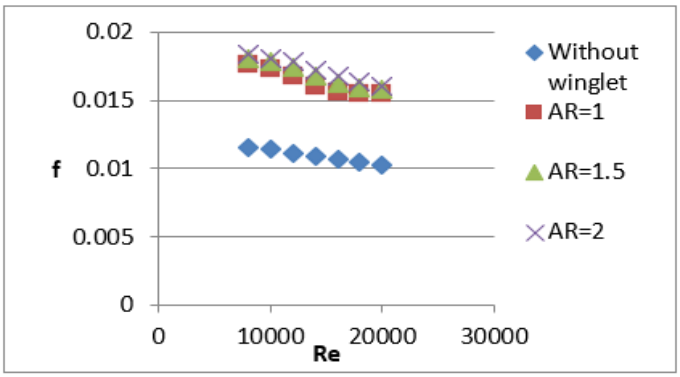

Figure7:Friction factor versus Reynolds number for Triangle

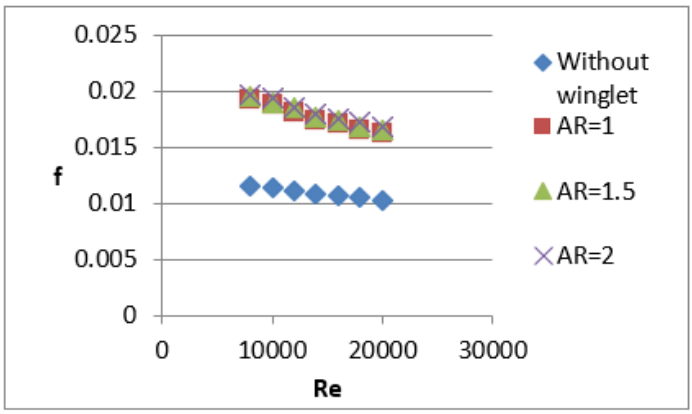

Figure8:Friction factor versus Reynolds number forRectangle

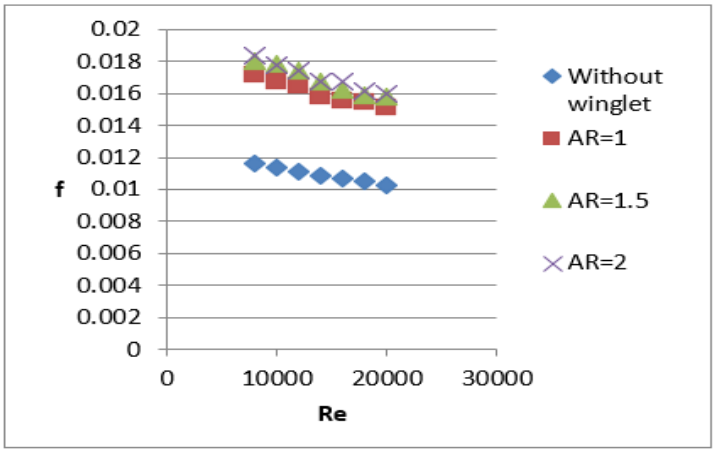

Figure9:Friction factor versus Reynolds number forTrapezoid

Fig. 7 to 9 shows the effect of Reynolds number and Aspect ratio of the Triangular, Rectangular, and Trapezoidal winglets on friction factor in the range of Reynolds number 8000 to 20000. It is seen that the value of friction factor decreases with increasing Reynolds number in all cases. The friction factor is maximum at Rectangular winglets having aspect ratio 2. Friction factor shows decrement with increasing Reynolds number and vice versa. This is due to less vortex shedding and reattachment point on the Triangular, Rectangular, and Trapezoidal winglets.

It is also observed that as aspect ratio decreases, friction factor goes on reducing. Maximum value of friction factor (0.01975) is found at Reynolds number 8000 with aspect ratio 2 in case of Rectangular at $\alpha = 45^{o}$.

D. Effect of circular Dimple with Triangular, Rectangular, and Trapezoidal winglets winglet vortex generators on on f/fo

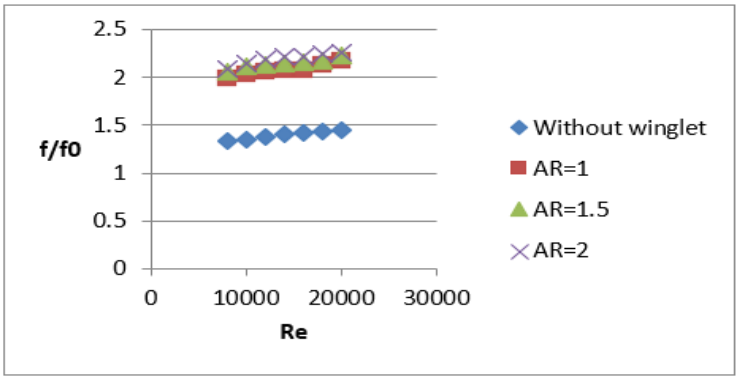

Figure20:f/fo versus Reynolds number for Triangular

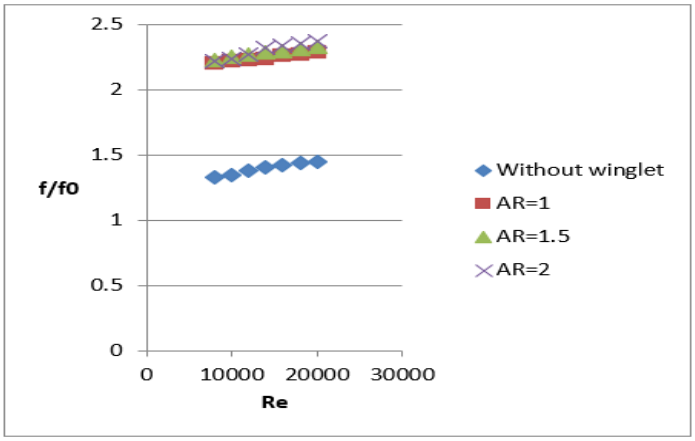

Figure31:f/fo versus Reynolds number for Rectangular

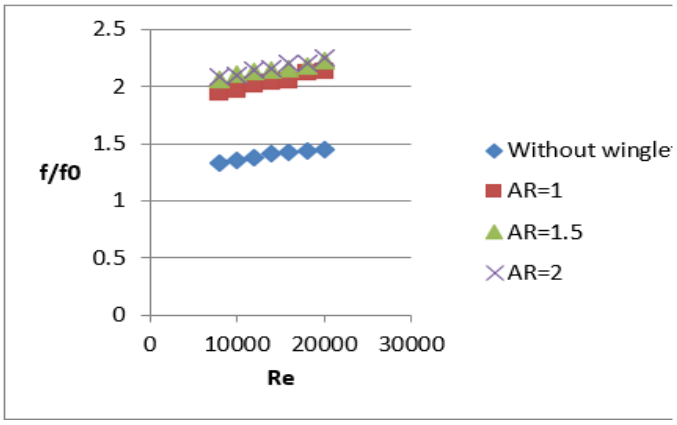

Figure42:f/fo versus Reynolds number for Trapezoidal

Fig. 10,11 & 12 shows the variation of Normalized friction factor ratio (f/fo) as a function of Reynolds number. The increased amount of fluid flow shows increasing nature of the friction factor. For all arrangements of the circular Dimple and Triangular, Rectangular, and Trapezoidal winglets vortex generators the friction factor increases with increase in the Reynolds number of the flow.

E. Variation of Performance Parameter with Reynolds number

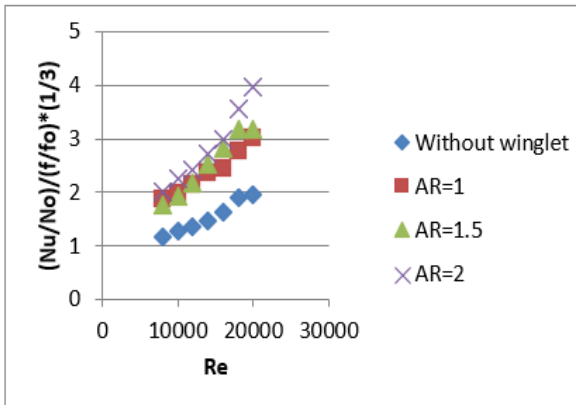

Figure53:Variation of Performance Parameter with Reynolds number for Triangle

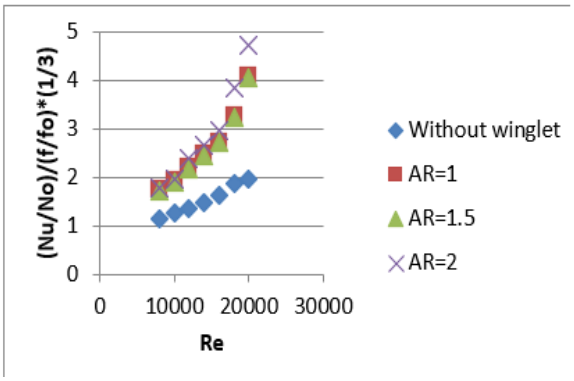

Figure64:Variation of Performance Parameter with Reynolds number for Rectangle.

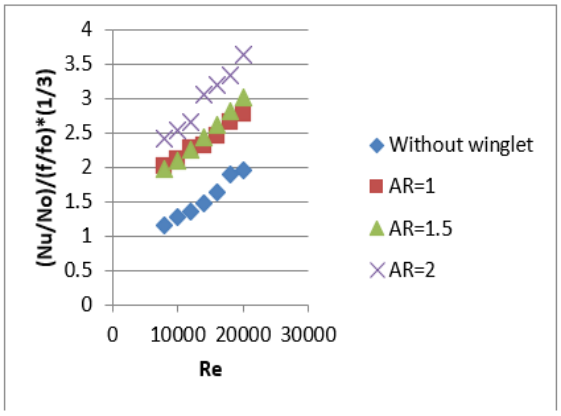

Figure75:Variation of Performance Parameter with Reynolds number for Trapezoid.

Thermal performance shows in Fig. 13,14 & 15 it is seen that in comparison all 3 cases Dimple with Triangular, Rectangular, and Trapezoidal winglets having aspect ratio 2 in case rectangular winglet of is giving the best thermo hydraulic performance of 4.74 for the studied range of Reynolds Number.

V. CONCLUSION

An experimental investigation of turbulent flow of air in a square channel over Circular Dimple and delta , rectangular, trapezoidal winglets vortex generators at uniform flux, with one extended surface wall and other

three smooth insulated walls is carried out. The effect of Reynolds number, Constant horizontal pitch and Constant angle of attacks & Different Aspect Ratios (1, 1.5, &2) of delta, rectangular, trapezoidal winglets vortex generators on heat transfer coefficient and friction factor has been studied. Results have been compared with those of smooth duct under similar flow conditions to determine enhancement in heat transfer coefficient and friction factor.

Following conclusion have been drawn from the test results,

- It is found that the heat transfer rate is more for dimpled surfaced plate when compared with plane plates.
- From the experiment it is concluded that Friction factor reduces with increase in Reynolds number. This is due to suppression of secondary vortices at higher flow rates.
- From the experiment it is observed that the heat transfer enhances by using delta, rectangular & Trapezoidal winglet vortex generators.
- Best results are obtained for Reynolds number 20000 with 18mm pitch of circular dimple with rectangle winglet of aspect ratio 2 having angle of attack of 45º as compared to delta & trapezoidal winglets. Enhancement ratio found to be 6.32 at 18mm pitch and α = 45º of rectangle winglet on the account of pressure drop across the test section & other aspect ratios 1 & 1.5 be same result.
- From the experiment it is found that the heat transfer rates and the pressure drop across the test section depends upon both geometry of the extended surfaces and the orientation of the delta, rectangular, trapezoidal winglets vortex generators.

VI. FUTURE SCOPE

Rectangular winglet shows better enhancement as compared to delta,trapezoidal winglets flat surface. In present studies it is seen that increasing values of Aspect ratio of winglet gives better heat enhancement but on the account of increasing pressure drop. Rectangular winglets also show best results in case of heat transfer augmentation with negligible increase in the pressure drop. So following are the recommendations for future work,

- The investigation can be done using different angle of attack of winglets.
- The investigation can be done using different horizontal pitch of winglets.
- Investigation can be done by changing the size of the Circular Dimple.
- shapes of dimple cavity like triangular, leaf shape, tear drop shape etc. can be used.
- Investigation by analytical method can be done.
- Numerical analysis using Ansys and Fluent software can be done.
- Application of this type of technique in case of IC engines and heat exchangers of power plants can be studied.

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A Result Paper on Agricultural Electric Vehicle Development and Design - Wiring Harness and Battery Selection

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ABSTRACT
Electric vehicles (EVs) represent a promising and sustainable mode of transportation that reduces greenhouse gas emissions and dependence on fossil fuels. battery and wiring harness playing key roles. This abstract provides an overview of the selection of batteries and wiring harnesses for electric vehicles. Battery selection involves evaluating various parameters, including energy density, power density, cycle life, and cost. Lithium-ion batteries are the most commonly used technology due to their high energy density, long cycle life, and low self-discharge rates. The wiring harness in an electric vehicle is a complex network of wires and connectors that connects various electrical components, including the battery, motor, inverters, and other vehicle systems appropriate wiring harness is critical to ensure the efficient flow of power and data throughout the vehicle

Keywords: battery, wiring, charger, controller, DC-DC convertor.

I. INTRODUCTION

A battery is a device that is used for providing electrical energy. It consists of one or more electrochemical cells that convert chemical energy into electrical energy. Batteries are widely used in various applications to power electronic devices, vehicles, and a multitude of other systems. Here are some key characteristics of batteries Energy Storage During charging, the battery stores energy by converting electrical energy into chemical energy, and during discharge, it converts the chemical energy back into electrical energy. This stored energy can be used to power various devices. Selecting the right battery is essential for ensuring reliable and efficient operation in a wide range of applications. Here's an introduction to battery selection. There are several types of batteries, such as lead-acid, lithium-ion, nickel-metal hydride, and more. Each type has its unique characteristics, including voltage, capacity, and cycle life. Understanding the voltage and capacity requirements of the application is crucial. Voltage determines the electrical potential, while capacity defines how much energy the battery can store. Some applications demand batteries with long cycle life, meaning they can be charged and discharged many times without significant degradation. Considerations include the environmental impact, recycling options, and safety features, especially for applications where battery failure can lead to hazardous situations.

A wiring harness is a structured assembly of wires, connectors, and other components used to transmit electrical signals and power within various devices and systems. Wiring harnesses serve to simplify and

organize complex electrical connections within an application, such as a vehicle or electronic device. They ensure efficient transmission of power and data. They also improve reliability by minimizing interference and signal loss. Both battery selection and wiring harness design are essential considerations in the design and operation of various systems, and they significantly impact the efficiency, safety, and performance of these systems.

II. LITERATURE SURVEY

[1] Fayez Alanazi "Electric Vehicles: Benefits, Challenges, and Potential Solutions for Widespread Adaptation" authored by Fayez Alanazi, the author discusses the critical issues currently facing the primary modes of transportation worldwide. These issues encompass the increasing costs of oil and the escalating levels of carbon emissions. Consequently, electric vehicles (EVs) have been gaining significant popularity due to their independence from oil and their minimal greenhouse gas emissions. However, despite their numerous advantages, there remain notable operational challenges that must be addressed to facilitate the broad adoption of EVs. This research delves into the historical evolution of EVs and emphasizes their environmental advantages, such as reducing carbon emissions and mitigating air pollution. Additionally, it explores the obstacles and complexities associated with EV adoption, including the high infrastructure costs, the limited availability of charging stations, range limitations leading to range anxiety, and battery performance. To surmount these challenges, the paper suggests potential solutions, including the enhancement of charging infrastructure, the expansion of the charging station network, the implementation of battery swapping techniques, and the advancement of battery technology to alleviate range anxiety and reduce charging durations. Governments can also play a crucial role by encouraging consumers through measures such as tax credits or subsidies and investing in the development of a robust charging infrastructure.

[2] A.K.M.Ahasan Habib et al,."Lithium-Ion Battery Management System for Electric Vehicles: Constraints, Challenges, and Recommendations" by A. K. M. Ahasan Habib and co-authors, the authors underscore the growing demand for electric vehicles driven by the need for energy storage solutions that are more flexible, manageable, and efficient. These electric vehicles rely on robust battery packs to power their electric motors. It is essential to have a deep understanding of various battery characteristics, such as power density, longevity, electrochemical behavior, and temperature tolerance. Battery management systems play a critical role in electric vehicles and renewable energy storage systems. The battery management system encompasses essential functions such as monitoring voltage and current, estimating charge and discharge processes, ensuring protection and equalization, managing thermal considerations, and collecting and storing battery data. Moreover, this study delves into the characterization of various cell balancing circuit types, examining their components and considering factors like current and voltage stresses, control reliability, power loss, efficiency, size, and cost, while also evaluating their benefits and drawbacks. The paper identifies concerns and challenges in battery management systems and provides recommendations to optimize battery performance sustainably in electric vehicles and renewable energy storage systems. The paper concludes by highlighting areas that require further research.

[3] Gerfried Jungmeier et al,. "Key Issues in Life Cycle Assessment of Electric Vehicles - Findings in the International Energy Agency (IEA) on Hybrid and Electric Vehicles (HEV)," authored by Gerfried Jungmeier and colleagues, the focus is on the potential of electric vehicles to substitute for conventional vehicles and contribute to the sustainable development of the global transportation sector. the sustainability of electric

vehicles comprehensively is feasible through life cycle assessment (LCA), which encompasses the entire life cycle of the vehicles, from production and operation to end-of-life considerations. The International Energy Agency (IEA) Implementing Agreement on Hybrid and Electric Vehicles (IA-HEV) conducts LCA activities across 17 member countries and operates a task on the LCA of electric vehicles. This task, known as Task 19, titled "Life Cycle Assessment of Electric Vehicles - From raw material resources to waste management of vehicles with an electric drivetrain," identifies and applies seven categories of key issues for applying LCA to electric vehicles and hybrid electric vehicles. These categories cover general issues, life cycle modelling, the vehicle cycle (production, use, and end-of-life considerations), the fuel cycle (electricity production), inventory analyses, impact assessment, and reference systems. The paper provides detailed insights into the main relevant factors associated with these key issues.

[4] Jinliang Zhang et al,. "Data Analysis of the Electric Vehicle's Current and Speed Based on the Actual Road Condition" authored by Jinliang Zhang and colleagues, the study investigates the relationship between battery current and the speed of electric vehicles. The researchers design a comprehensive electric vehicle information acquisition system, which is installed in existing electric vehicles through a well-planned wiring arrangement. They select two distinct road conditions, namely flat roads and uphill terrain, based on the actual environment, and design experimental schemes to evaluate these conditions separately. Subsequently, they analyze the collected data in detail. This research serves as a valuable foundation for validating models, establishing new models, and advancing theoretical research in the field of electric vehicles.

[5] Zhou Xin Chen Shouping "Study on Insulation Detection Method of Electric Vehicles Based on Single Point of Failure Model" authored by Zhou Xin and Chen Shuping, the authors introduce an innovative approach for detecting insulation resistance in electric vehicle battery packs based on the single point of failure model. The paper provides a comprehensive analysis of the underlying principles and the derivation of relevant equations. The method's effectiveness is evaluated by comparing the measurement results with the relevant national standards of the People's Republic of China, specifically GBT 18384.1-2001, which pertains to insulation resistance in electric vehicles. The paper discusses the feasibility and practical significance of the proposed method, particularly when a single point wiring insulation failure occurs in the battery pack. The method can pinpoint the location of the failure based on potential values and offers a convenient means for online troubleshooting.

III.METHODOLOGY

The methodology for selecting electric vehicle (EV) batteries and designing wiring harnesses involves a systematic approach to ensure that the chosen components meet performance, safety, and cost objectives. It is essential to clearly define the requirements of the application, taking into consideration factors such as voltage, capacity (energy storage), power output, cycle life, operating temperature range, and weight constraints. Calculate the necessary energy (in kWh) and power (in kW) based on the application's energy and power demands. Evaluate safety features associated with different battery chemistries, including thermal management systems, protection circuitry, and resistance to thermal runaway. A comprehensive cost analysis, covering initial purchase costs, operational expenses, and total cost of ownership over the battery's expected lifespan, should be conducted.

Designing a wiring harness for electrical systems, including those in electric vehicles (EVs), follows a systematic methodology to guarantee that the wiring harness satisfies performance, safety, and reliability requirements.

Calculate the electrical load and power requirements of each component to determine wire size (gauge) and capacity. Differentiate between high-voltage and low-voltage wiring within the harness, ensuring proper insulation and safety measures for high-voltage components.

IV. PROPOSED SYSTEM

A. Architecture

The entire document should be in Times New Roman or Times font. Type 3 fonts must not be used. Other font types may be used if needed for special purposes.

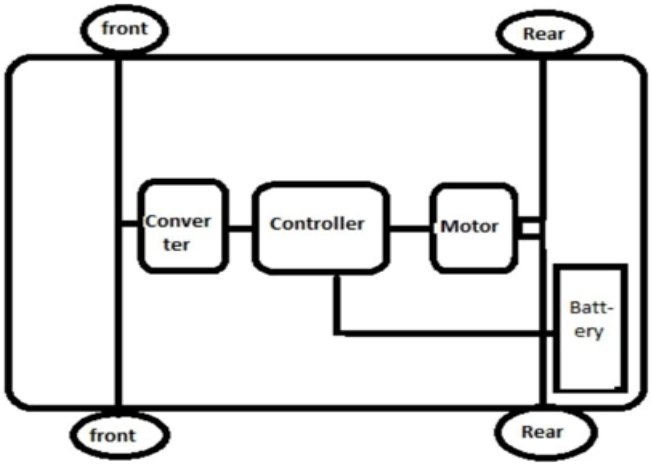

Figure1:Architecture

B. Hardware Requirements

Hardware:

Lithium-ion Battery
DC¬ – DC Convertor
Wires, Cables
Electrical Equipment

V. RESULT

A. Wiring harness

The design of the wiring harness is crucial, with careful attention paid to factors such as wire length and gauge. Wire length directly affects resistance and voltage drop; as it increases, so does both. Using high-quality materials enhances efficiency and reduces voltage drop. Testing has shown that shorter wire lengths and better materials yield more satisfactory output.

Consequently, employing high-quality materials enhances performance and functional capacity. High-quality equipment exhibits lower resistance and higher output capacity in equipment connections. Hence, 1mm gauge wire, renowned for its reliability, is preferred.

The installation of the wiring is straightforward, and the use of high-quality materials simplifies maintenance. Employing high-quality pipe and wire insulation safeguards against high temperatures and overheating.

TABLE I

Wire Gauge in mm	Required current	Current capacity
1.5mm	16A	22A
2.5mm	24A	29A
4mm	34A	40A
6mm	45A	52A

B. Battery selection

In electrical vehicle most important is battery they have factor are consider forming battery

- Safty
- Cost
- Ratings
- Lifespan
- Specific energy

TABLE III

Parameter's	Rating's
Battery watt's	2900 W
Battery Capacity	25 A
Maximum Output Current	50 A
Voltage Rating	58.8 V
Efficiency	86 %
Charging Time	2.30 to 3.00 hrs

VI. CONCLUSION

The conclusion of developing an electric vehicle wiring harness and battery selection involves summarizing the key findings, outcomes, and implications of the process. This includes discussing the effectiveness of the chosen wiring harness in terms of efficiency, reliability, and safety, as well as evaluating the selected battery in terms of energy density, power output, and overall performance. recommendations for future improvements or areas of further research can be suggested to enhance the electric vehicle's overall performance and sustainability. envelopment process and how they were addressed. Finally, recommendations for future improvements or areas of further research can be suggested to enhance the electric vehicle's overall performance and sustainability.

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Agriculture Automation Using Lora Module

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ABSTRACT

The world over the decades has made considerable advancements in automation, automation is employed in every sector whether it is home or industry. Here a new and inexpensive design is being presented. The deployment of Automation in agriculture systems has been prevailing over the last few decades and it poses many difficulties to manual control them once they are installed on a large scale. A common approach to overcoming this issue is setting up a Long-Range network (LoRa). However, using wireless technologies in the field of agriculture presents several technical challenges, such as achieving long battery life, long-range capabilities as well as low cost at the same time. In recent years, many technologies and protocols have been deployed trying to overcome those challenges It implies that LoRa is lately accepted as auspicious communication technology, due to its properties such as long-range, two-way communication, and with low cost. It is stated that the communication distance of LoRa is up to 10 km [1], but it is not clear what measure does. The communication distance is affected by the environmental conditions, parameters of devices, etc. Here we merge the LoRa WSN technology in the agriculture sector for making long-distance, low-cost communication. The project that is described in this paper includes the implementation results of both hardware and software for the wireless nodes, and the development of a GUI app for controlling drip irrigation systems.

Keywords: LORA module, IOT, ZigBee, Smart Farming, WSN technology, Node MCU.

I. INTRODUCTION

In our modern world, many people are making full use of technology, and because of that, they are doing their job soon and well. But still, many rural farmers cannot have more knowledge technology more. Also, the demand for food supply is increasing. So we are performing this smart agricultural system for them. With the help of this system, farmers can examine the temperature, humidity soil moisture of their farm, which is done by various IOT sensors like DHT, Soil moisture, as well as control various components, like motor, etc. This system is very easy and simple to use, it works fully on IOT. To use this system the farmer has to place the transmitter module in different places in his field and the receiver is put in his home and connected to the server. Now, the farmer can monitor and control the system by the website or mobile application. Term LoRa means Long Range. It's a wireless radio frequency technology introduced by Sentech. The license frequency band for LoRa Technology in India is 865 MHz to 867 MHz 1 In wireless technology solution, BLE works with

low power, but cannot send information to long distances. We are making this so that it can reduce time and work of farmers and it will monitor about soil moisture, temperature, and humidity and will be very helpful to farmers.

II. LITERATURE SURVEY

In the last few years, researchers have shown a great interest in smart agriculture, WSN (wireless sensor network), and also in the area of LoRa technology. Many researchers used ZigBee and other WSN technology for field data monitoring. This chapter briefly discusses the related research work carried out by different researchers in the area of smart agriculture, and WSN. In paper iot based smart crop field monitoring and automation irrigation the main advantage of this work is crop development at low quantity water consumption. Disadvantage of this is risk of file corruption high cost of Raspberry pi and software problems. In paper iot based smart agriculture system advantage is send suggestion via sms to the farmer directly using gsm system and disadvantage is continuous internet connection is required. [5]In paper development of wsn system for precision agriculture advantage is zigbee technology used and disadvantage is transmission rate is too much low.[6] In paper, for precision agriculture application advantage is communication through wifi gives more efficiency than Bluetooth and disadvantage is wifi has short range communication over LoRa Module.

III.METHODOLOGY

A. Block Diagram

In Fig 1 A) block diagram of a transmitter, there we use the ATMEGA328P i.e., Arduino UNO development board which is the main component of the transmitter side. Arduino UNO is interfacing with different sensors like soil moisture sensor, DHT 11 sensor, and pH sensor. It is also interfacing with the LoRa transmission Module to send the data for long-distance communication up to 10 KM. we are giving an external power supply to the development board.

In Fig 2 B) block diagram of the receiver side, at the receiver end we are using Node MCU (ESP8266 Wi-Fi module). Node MCU is interfacing with the LoRa receiver module to receive the data coming from the transmitting side and it will provide to a user for the displaying of data we are using Liquid Crystal Display (LCD). It also provides the data to the user's mobile through Wi-Fi. A voltage regulator is used for regulating the voltage.

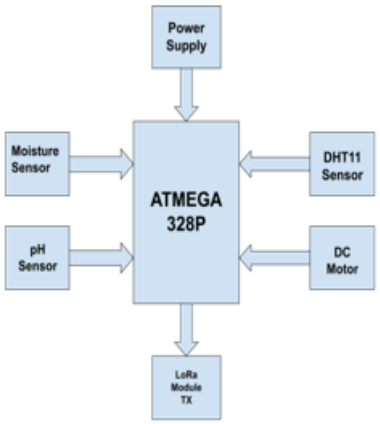

Figure1:Block diagram of the Transmitter

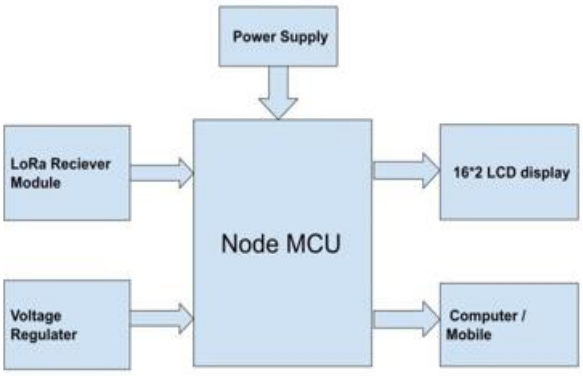

Figure2:Block diagram of Receiver

B. System Development

1) LORA Module: The LoRa SX1278 RA02 works with SPI communication protocol so it can be used with any micro microcontroller that supports SPI communication protocol. It is mandatory to use an antenna along with the module else it might damage the module permanently. The module should be powered only with 3.3V, and the operating voltage is 3.3V, and the frequency is 433 MHz and transmits and receives packets up to 256 bytes [1]. Here we are not legally allowed to use the 433MHz frequency module for a long time other than for educational purposes [1].

Figure3: LORA Module

2) Arduino Uno:Arduino uno has several input and output pins. From this pins it is Interfaced with various boards as well as ic. Arduino Uno is used for to interface with the other sensor collect the data from sensor and store it.the board has also one reset button that helps to restart the program using the board.

Figure4: Arduino UNO

3) NODE MCU (ESP8266 WIFI MODULE):ESP8266 is a low-cost, WiFi Module chip that can be configured to connect to the Internet for the Internet of Things(IoT) and similar technology projects Basically, Your normal Electrical and Mechanical equipment cannot to the internet on their own, because they don't have the in-built set up to do so [5].

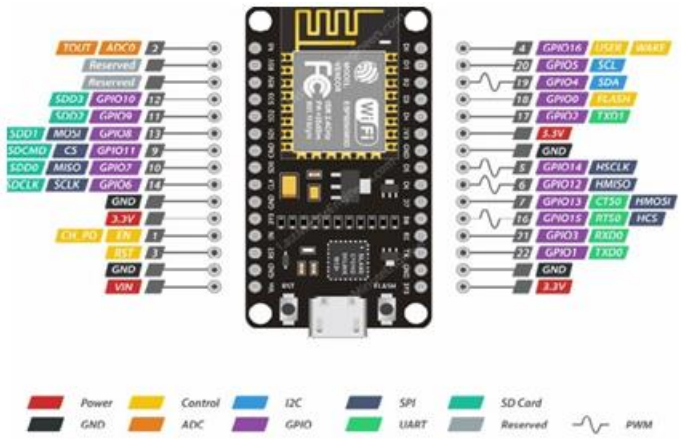

Figure5: NODE MCU (ESP8266 Wi-Fi Module)

4) Moisture Sensor:The soil moisture sensor is basically used to measure the content of water present in the soil. This consists of two conducting probes that act as a probe. The sensor can measure the moisture content in the soil, based on the change in resistance between the two conducting plates[21].

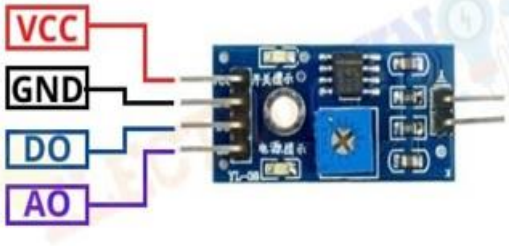

Figure 6: Moisture Sensor

5) DHT 11: The DHT provides an easy and inexpensive way to get temperature and humidity measurements with the Arduino. The wiring is very simple – you just need to connect the DHT data pin to Arduino digital pin [2].

Figure 7: DHT11 Sensor

6) LCD (Liquid Crystal Display): LCD is liquified crystal display. Here in this project LCD is used to display the outputs of the various sensors. Which is collected from various sensors.It is used to display the day, real-time, as well as alarm timings. The time is show in the HH: MM format.

Figure 8: LCD(Liquid Crystal Osillator)

7) pH Sensor:The nutrients are essential for plant as well as human growth so the quality of water plays an important role. If the quality of water is not good then it will affect the body of human and plant. So, the quality water should be measured for that pH sensor is used. The main principle of pH sensor is to detect the H+ content in water, with good selectivity and stability. pH sensor works on 12v dc supply and 0-50oC temperature range.

Figure 9:pH Sensor

C. Software Development

1) Flow Chart:

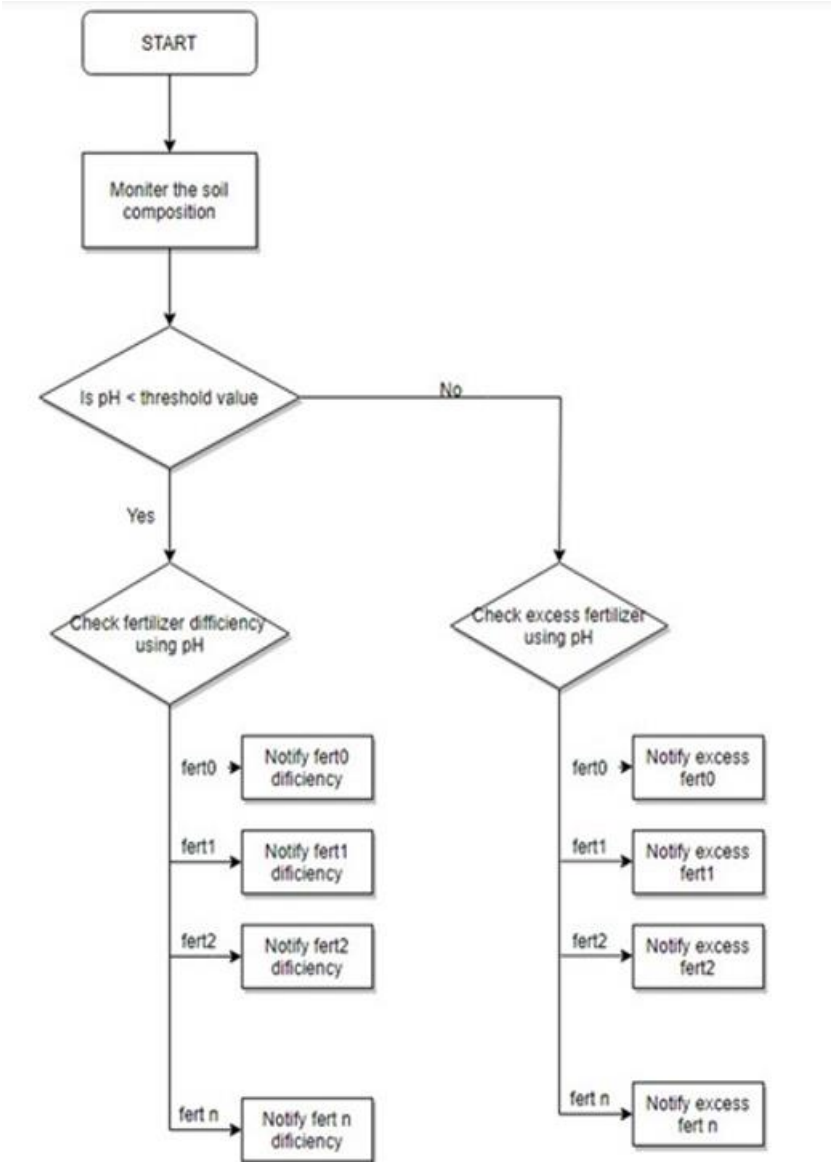

Figure 10: Flow chart For soil Testing

2) Flow Chart For Irrigation:

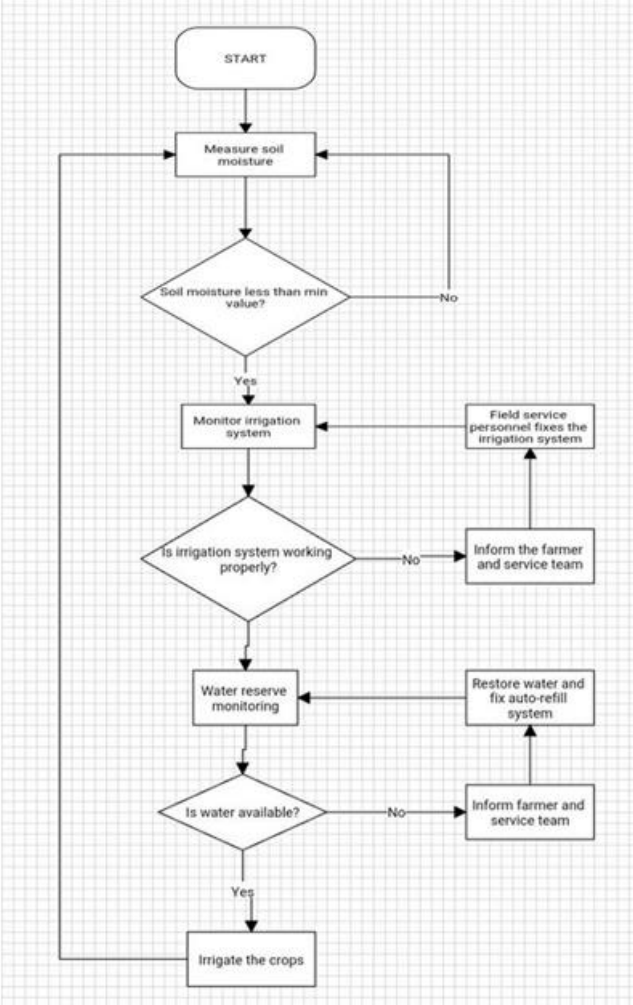

Figure 11: Flow chart For Irrigation

IV. ADVANTAGES AND APPLICATIONS

A. Advantages

1) High Accuracy
2) Reduce Human Efforts
3) Save The Cost
4) Easy To handle
5) Time-Consuming

B. Applications

1) Automation in Agriculture.
2) Automation in Green House.
3) Automation in Garden

V. RESULT

For any farmer, the monitoring of information about soil moisture, temperature, as well as humidity is very essential for producing superior yield and controlling various components like motor (LED), etc. For that purpose, wireless technology is a must. There is much wireless technology available in the market right now, but apart from them, LoRa technology is very suitable in the agriculture sector because it does not require an internet connection moreover it operated at a greater distance.

VI. CONCLUSION

By using Arduino UNO user interface developing the automation in agriculture using LORA module. This type of design is well suited in the field of Agriculture. Finally, we conclude that it reduces time and work for any farmer, the monitoring of information about soil moisture, temperature, and humidity is very essential for producing superior yield and controlling various components like motor (LED), etc. For that purpose, wireless technology is a must. There is much wireless technology at hand in the market right now, but apart from them, LoRa technology is very suitable in the agriculture sector because it does not require an internet connection moreover it operated at a greater distance. By using LORA technology farmer can monitor his farm soil texture just from his home,it reduces hard work of farmer as well as manpower while farming,due to this farmer can have great production of his crops with excellent quality of crops.

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Design and Analysis of Smart Two-Wheeler System

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ABSTRACT

In this 21st century almost everything has become digital, if the fuel indicators in the vehicles is additionally made advanced, we can determine the correct quantity of fuel available in the fuel tank. In this competitive world, everyone strives for greater accuracy than the previously proposed ones. In these project we additionally use the digital display system instead of mechanical arrangement and we use the displacement lever, Arduino board, display system to show the exact amount of the fuel present in the tank(in percentage).
A potentiometer transducer is used to find out the fuel level which is economic and also accurate. The added Feature in this fuel level indicator is that, the reserve condition is pre-informed to the user with an alarm, which helps to tune it to the reserve position before the engine stops and this helps to avoid knocking and engine damage. This project mainly concentrates about the indication of fuel level in irregular tanks (two-wheeler and four wheeler tanks). Various other features like the distance covered, mileage obtained, can be added with this arrangement which explains the clear performance of the vehicle and the fuel used. We can also predict the time for refueling the vehicle and also to check the amount while fueling can be done in future. By using this digital fuel level indicator device the amount of fuel available in the tank at any position of the vehicle is predicted.

Keywords: Float arrangement, Displacement lever, Flow arrangement, Arduino board (Uno), Display board (16*2), Bread board/PCB.

I. INTRODUCTION

At present, even after paying a huge amount of money at many of the fuel pumps, we don't get the exact amount of fuel as shown by the filling machine and also there is lots of news regarding the fuel pump frauds which leads to corruption. In many cases it has been observed that there is dissimilarity between the amount of fuel displayed on the fuel filling machine and the fuel filled in the tank. Many of the times the fuel filled are less than the displayed value. So to overcome this problem we are design the digital fuel indicator which exactly shows the amount of fuel in percentage.
We are indicating the amount of fuel in the tank in mi this project deals with Development of Digital Fuel Meter for Vehicles. Proposed Digital Vehicle Meter is to give reading in real time units like in Milliliter's. Multiple Ultrasonic Sensors are used to sense depth of fuel in the Arduino Controller (ATMEGA328) will be used as the head of hardware system. Before hardware implementation we will design Simulink Model to simulate and validate output.

TABLE I

Sr.No.	Fig. Name	Fig. Number
1	Analog fuel meter	1
2	Block diagram of digital fuel meter	2
3	Testing of LED	3
4	Testing of Buzzer	4

II. PROBLEM DEFINITION

The objective of this project is to eliminate the conventional fuel level indication in two wheelers. Now days, after paying a huge amount of money at many of the fuel pumps, we don't get the exact amount of fuel as shown by the filling machine and also there is lots of news regarding the fuel pump frauds which leads to corruption. In many cases it has been observed that there is dissimilarity between the amount of fuel displayed on the fuel filling machine and the fuel filled in the tank.

Development of on-board digital fuel gauge for automobiles fuel monitoring and fuel theft detection. Nowadays the fuel indicator system for the two wheelers are digital but they do not shows the exact fuel amount which is present in the tank i.e. they shows the amount of fuel in terms of bars and not in numbers or digits like liter or milliliter. So, this problem is taken into consideration for our project work of developing the digital (numeric) fuel indicator system for two wheelers which shows exact amount of fuel in terms of liter or milliliter. In this project at firstly we surveyed the existing fuel indicator system and fuel tanks of different bikes and scooters. But during this survey we examined that the design (shape and size) fuel tanks are in irregular fashion. But due to irregular shape of the tanks there were much complexities arises for the installation of the electronics kit and level sensor which are used for the calibration of fuel level/amount. So we redesign a tank as a conceptual model in a regular shape like rectangular by using design software like PRO-E. Hence due to this regular design the installation of electronics kit would became easier also this whole system will gives us the fuel amount in terms of liter or milliliter, for example 1L, 2L, 1.2L,500mL, 800mL.

III.LITERATURE REVIEW

Analog Fuel Meter

Now a day, after paying a huge amount of money at many of the fuel pumps, we don't get the exact amount of fuel as shown by the filling machine and also there is lots of news regarding the fuel pumps frauds which leads to corruption. In many cases it has been observed that there is dissimilarity between the amount of fuel displayed on the fuel filling machine and the fuel filled in the tank [1].

Figure1:Analog fuel meter

User having analog systems cannot find out the accurate and exact value of the remaining fuel in tank. Therefore, if the fuel indicator in the automobiles is made digital it will help to know the exact amount of fuel available in the fuel tank. The above mentioned fact is considered in our project and we found out a proper solution for indicating the exact avail of fuel in the tank digitally. Although contactless methods are more complicated than contact methods, there are lots of sensors available for the fuel level measurement [2].

IV. WORKING OF DIGITAL FUEL INDICATOR

As shown in fig (2) block diagram of digital fuel indicator, this project the system is works on the displacement sensor, Arduino board etc. The simple float arrangement is placed in the fuel tank. The float is works the depends on the level of fuel in tank. The level of fuel is increased so the float is displaced then the lever is displaced. This lever is connected to metal strip & this metal strip changes voltage base on contact area.

The sensed voltage is send to the Arduino, the Arduino convert the signal in the form of digital & the flow measurement sensor sense the amount of fuel transferred for engine. And subtract the indicating initial fuel level & flow rate. Thus the combination of both displayed the numeric form.

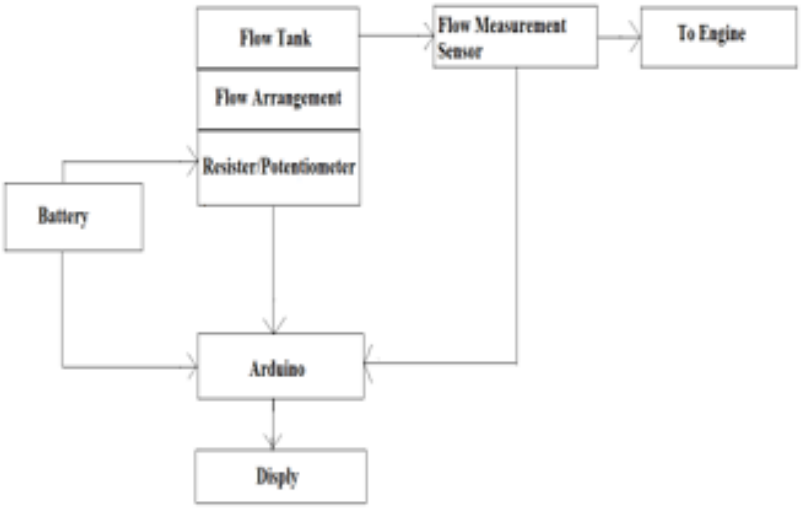

Figure2:Block diagram of digital fuel meter

Fuel indicator system consists of float with variable resistance, Microcontroller, LCD display and buzzer. All thiscomponents perform together to indicate the amount of fuel in tank. A float with variable resistance is installed in the tank at the base. Initially with no fuel in tank the float is at its lowest position. 5V supply from transformer is given to float rheostat.

When float is at its lowest position, rheostat offers maximum resistance and no current passes. As we start filling fuel in tank float starts rising up. Float is attached to a vertical column with fulcrum and supports rheostat. One end of the float is attached to the rheostat, as float rises up results in varying resistance, as resistance decreases flow of current increases. The output current from the rheostat is analog signal which is feed to the analog to digital converter i.e. ADC. ADC processes these analog signals into digital pulses. Output from ADC sends to the microcontroller. The Hall Effect flow measurement sensor sense the amount of fuel transferred to engine & output from flow measurement sensor send to the microcontroller. And subtract the

indicating initial fuel level & flow rate. Microcontroller further processes digital signals obtain from ADC and flow measurement sensor. Thus the combination of both displayed the numeric form that is in percentage.
Buzzer is also provided with system, this buzzer is activated when fuel in the tank reaches reserve level i.e. 15%. After every 3% reduction in fuel quantity periodic buzzer activates up to zero position. Also, indicator is provided with system, this buzzer is activated when fuel in the tank reaches reserve level i.e. 15%. After every time period of 10 seconds indicator blinks.

V. TESTING

A. Testing of LED

In this project the LED is required as indicating device. The main purpose of the LED is blink on the reserve condition as specific time period (delay).The testing or experiment done by the various delay time.

Figure3:Testing of LED

B. Testing of Buzzer

Buzzer is used in this project to create the sound on the reserve condition. The buzzer is on the reserve condition at specific or defined time & off, after some decrement of level of fuel we will also on.The Activation of the buzzer is done by using Arduino.

Figure4:Testing of Buzzer

VI. FUTURE SCOPE

In advancement of this system we can add GSM technique through which we get massage alert on theft of fuel from the vehicle.

We can link the GPS technology to the system which will show the nearest fuel pump when the level of fuel in the vehicle reaches minimum value.

The distance that the vehicle can travel also is calculated by programming the microcontroller by taking the input of present mileage with respect to speed of car and fuel levels.The density of fuel can also be calculated using this system.

VII. CONCLUSION

In future the proposed technique can be improved by adding fuel cells at different places of fuel tank to measure exact fuel levels at different conditions like day/night for particular densities at different altitude conditions of vehicle and a buzzer to announce the user about the abnormal conditions like low level, half level and full levels of the fuel tank to refill or warn themselves. The accurate distance to zero can also be done by programming the microcontroller by taking the input of present mileage with respective speeds and tank levels.

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An Overview of Charging Station for Charging the Electric Vehicles

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ABSTRACT
As a cleaner mode of transportation, plug-in electric vehicles (PEV) have attracted the attention of the world towards them. PEV's are advantageous over conventional vehicles as they reduce environmental impact and also use of conventional fuels. Though PEVs are considered to be our future, still their market is low. It faces number of challenges such as availability of charging stations, cost of vehicle and charging station, battery management system, etc. people can charge their vehicles at their home during night time. But people living in urban areas where population is high, charging vehicle at home is not possible. Also for long distance driving, charging stations are required. Our approach is to study the charging station and related parameters and optimize the problem of charging station location.
Keywords: Charging station, Cost, Electric-vehicles, Optimization.

I. INTRODUCTION

Nowadays, transportation becomes an integral part of human life. This transportation includes public transport, goods transport, and private transport. Due to globalization and vast competition among the manufacturers, a middle-class family can easily afford different types of transport facility. Simultaneously, the demand for fuel is also increased to fulfill the requirements. Majority of the fossil fuel is utilized for transportation and thus their availability is reducing day-by-day. Because of this, the prices of fuels are increases rapidly. Vehicles release hazardous gases such as carbon monoxide, nitrogen oxide, etc., which causes a rise in the global warming affect and diminishes the health of the human beings. Currently, the greenhouse gas effect, global warming, and health issues are the major problems in the world [1]. The transport sector accounts for about 23% of global energy related GHG emissions. This circumstance brings a need for elective energy sources and hence the whole world is looking for it.

In recent years, the technology is enriched to have number of EVs. As green transportation, EVs have dragged the attention of the world and regarded as an effective solution to meet energy and environmental challenges. EVs are advantageous over conventional vehicles in many aspects. EVs do not require conventional fuel for their operation, thus they reduce the use of conventional fuels. They also reduce the impact on the environment as well as human beings.Thus, the transportation sector is moving toward electrification due to the emerging energy and environmental issues.

The development of EVs is considered an important tool to mitigate carbon emissions. Also the improvement of power electronics and battery technology help to come up with the industry of EVs [2]. The rapid development and mass production of batteries have also resulted in remarkable interest toward the growth of electric vehicles. BEV produce no emissions.Mass production of total electric vehicles capable of travelinglonger distances results in a need for electric service stations. These charging station should fulfill the charging requirement of EVs. Also the charging of EV should be done as fast as time taken by car to fill the fuel.

Even if EVs are viewed as our future, still their interest is low. Cost is one of the major reasons behind this situation. Because the cost of EVs, the cost of battery and its management, charging cost, establishment, and running expense of charging point are the influencing parameters. Numerous nations in the world are taking endeavors to raise EVs. The government of India is also inspiring people to utilize EVs by offering them subsidies and tax reductions. EVs are well established in developed nations in the last decades whereas developing nations have plans to build the EVs.

II. RELATED WORK

Charging of EV can be differentiated into the following types –

- Destination charging – in this type, EV is charged at its destination place, for example, home, working environment, etc.
- Urgent charging – when state of charge of battery decreases to a certain value, EV comes, recharge, and leave the charging point soon [3].

Number of researchers in the world are doing research in the field of electric vehicles. Most of them is related with the finding of location of charging station.Reference [4] proposed four methods to find the optimal location of the charging station for a city. These methods are - Iterative MILP, Greedy Approach, Effective MILP and Chemical Reaction Optimization. Each of the method has its specific mathematical formulation and solved using different software applications such as MATLAB, CPLEX and YALMIP. The results are demonstrated using different tests. The results are compared with each method in terms of solution quality and time required for computation. Method 1 and 3 takes more computational time but their solutions are good. All methods are deterministic except Method IV is probabilistic in nature.

Based on the traveling salesman problem, [5] paper proposes a new optimal EV route model considering thefast-charging and regular-charging. The proposed model aims to minimize thetotal distribution costs of the EV route. The proposed method satisfies the constraints like battery capacity, charging time and delivery/pickupdemands, and the impact of vehicle loading on the unit electricityconsumption per mile. To solve the proposed model, a learnable partheno-genetic algorithm is used. A test is conducted on the 36-node and 112-node systems, and the results verify thefeasibility and effectiveness of the proposed model and solutionalgorithm.

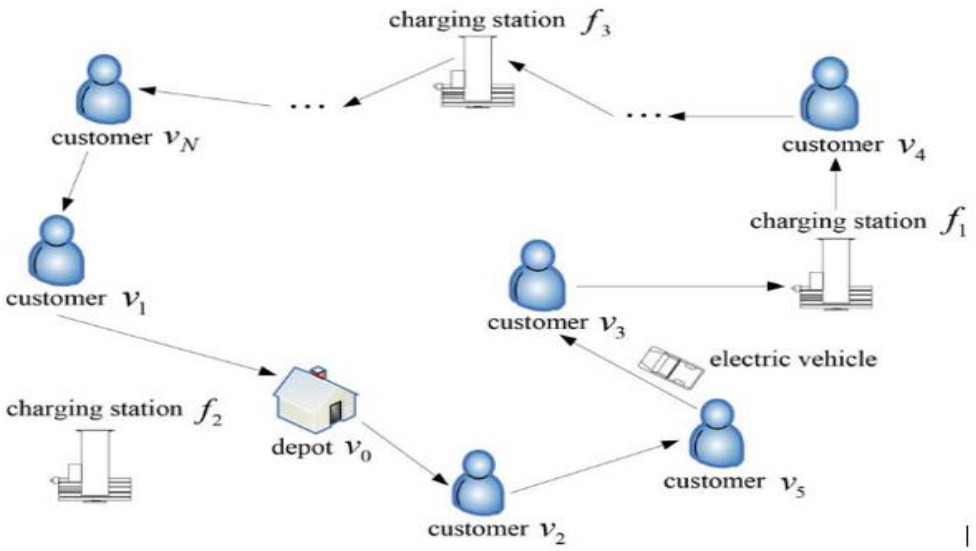

Figure1:

plug-in hybrid vehicles (PHEVs) may cause the impacts on the performance of the power system, such as overloading, reduction in efficiency, power quality, and voltageregulation particularly at the distribution level. Reference [6] presents a Coordinated charging of PHEVs which is a suitable solution to these problems. In this paper, the relationship between feeder losses, load factor, and load variance is studied and three optimal charging algorithms are developed which minimize the impacts of PHEV charging on the connected distribution system. Mathematical formulation and algorithm are developed for Maximum Load Factor, Minimizing Load Variance and Load Variance and Load Factor Relationship.

III.PARAMETERS RELATED TO CHARGING STATION

- State of Charge (SoC): state of charge of battery means the level of charge of that battery. It is related to its capacity. A driver of an EV should considers whether the state of charge of the EV is sufficient for the desired journey. If not, they will consider how to recharge the EV as quickly as possible. For this, charging navigation system should be available which improves the reliability of using EV and increases the comfortless [7].
- driving styles:driving style has a great impact on battery performance and aging of EVs. Reference [8] presents the real-world driving data from the I-80 highway, CA, USA. Authors differentiate the driving style into three categories namely - aggressive, mild, and gentle driving. The aggressive driving style demands higher average power from the battery compared to the mild and gentle driving style.
- Charging demand: from a distribution system perspective, electric vehicle charging demand is still unidentified quantity which may vary by space and time. Reference [9] represents the mathematical model is based on the fluid dynamic traffic model and the M/M/s queueing theory. Firstly, the arrival rate of discharged vehicles at a charging station is predicted by the fluid dynamic model. Then, charging demand is forecasted by the M/M/s queueing theory with the arrival rate of discharged vehicles.

A. EV Charging in Different Environments

- Residential Charging: EV Charging solution vendors provide easy to install EV chargers for individual houses, housing societies, and residential buildings. Home chargers are well integrated with proper safety features for people and electric vehicles. These chargers are compact, lightweight, have attached AC input cables and DC output cables, and provide flexibility to be used as portable chargers or to be wall-mounted. These chargers have more than 95% conversion efficiency, lowering the total cost of ownership of battery-powered vehicles.
- Public Charging: Public charging stations use AC Type 2 chargers, which are suitable for general applications such as workplaces, businesses, malls, hotels, and public commercial charging. These systems are robust and durable and can be managed by a centralized management software. EV charging solutions installed in public places offer simple plug-and-play devices and charge all the type 2 compatible vehicles. The admin can use RFID tags for user authentication and remotely manage the applications and energy costs through the software associated with these chargers.
- Fleet Charging: EV Fleet charging solutions require a DC charger to support all types of vehicles and charging needs. These fast DC chargers come with cutting-edge technologies in hardware design and application software. They also allow seamless integration with payment platforms and are capable of firmware and software up-gradation over-the-air. These DC chargers can accommodate 30KW – 300 KW of EVs.

B. Public Charging Costs

Many people charge their electric car at public charging stations. They can be free, pay-as-you-go or subscription-based, with prices set by networks or property owners. Some automakers, such as Hyundai, Nissan and Tesla may provide complimentary public charging at certain chargers. The industry is moving toward a fee structure based on kWh used, rather than by the time it takes to charge the car.Drivers in California may expect to pay 30 cents per kWh to charge on Level 2, and 40 cents per kWh for DC fast charging. At these rates, the same Nissan LEAF with a 150-mile range and 40-kWh battery would cost about $12.00 to fully charge (from empty to full) using Level 2, and $16.00 with DC fast charging.

- Cost to Charge at Home: Charging costs depend on your electric car's battery size and the local price of electricity. Most electric utilities offer special time-of-use (TOU) rates that greatly reduce costs by billing less for electricity used during off-peak hours. Contact your electric utility to find out more. Find out how simple home charging is for current electric car drivers.While electricity costs vary, the average price in California is about 18 cents per kilowatt hour (kWh). At this price, charging an electric car such as the Nissan LEAF with a 40-kWh battery with a 150-mile range would cost about $7 to fully charge. Meanwhile, fueling a 25-mpg gas vehicle at a gas price of $3.70 per gallon would cost about $22 for enough gas to drive approximately 150 miles. Saving money on fuel is just one of the many benefits of driving electric.
- public charging costs: Many people charge their electric car at public charging stations. they can be free, pay-as-you-go or subscription-based, with prices set by networks or property owners. some automakers, such as Hyundai, Nissan and tesla may provide complimentary public charging at certain chargers. the industry is moving toward a fee structure based on kwh used, rather than by the time it takes to charge the car-drivers in California may expect to pay 30 cents per kwh to charge on level 2, and 40 cents per kwh for dc fast charging. at these rates, the same Nissan leaf with a 150-mile range and 40-kwh battery

would cost about $12.00 to fully charge (from empty to full) using level 2, and $16.00 with dc fast charging.several apps and online tools will help you locate public charging, including plug share's international database.

IV. ACKNOWLEDGMENT

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Automatic Baby Cradle

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ABSTRACT

The objective of this proposed system is to develop a new low cost indigenous electronic cradle because existing cradle are imported and very costly. The proposed systems aim is to build a low cost new automatic baby cradle that will be swings automatic when the baby cries or uncomfortable in the cradle, for this when the cries the voice sensing system detects the baby cries voice and swings the cradle automatically till the baby stop crying and the speed is control as per the need. The messaging system to send message to the mothers mobile or the nurse in the hospital when the baby cries more than a stipulated time indicating that baby needs attention. This proposed system will help to the mothers or nurse to take care of babies without physical attention and also save the time of mothers and the nurse in hospitals.

Keywords: Arduino UNO, cradle, Motors, audio sensor, PIR sensor.

I. INTRODUCTION

Parents in the present world are busy in their professional life, so they do not get sufficient time to take care of their babies. It may be expensive for the parents to afford a nanny. Today's woman has to manage home along with their office work simultaneously. After long working hours, they have to take care of the home along with the baby. They may not get enough time to swing the cradle manually and sooth the baby. The system is designed to help parents and nurses in infants care. The design aims at following point: Cradle starts swinging automatically when baby cry and swings till the baby stops crying.

II. PROPOSED WORK

Steven Bang designed automatic baby rocker having a noise sensor to detect baby cry. Noise sensor consists of Electret MIC with a pre amplifier (2n3904 transistor). Signal from noise sensor is fed to microcontroller Arduino ATmega 328, which is used to control the DC motor. Few color full lights made up of LED are used to entertain the baby while being rocked. RE-260RADCmotor with Tamie a 6 speed gearbox is used to create the rocking motion the crib[1].

Yang Hu proposed an algorithm for adjusting the bassinet swaying extent by the sensor signals. The bassinet is made up of an adaptive swaying device and other sensors network. While baby is crying, the sensors network can judge the reason according to detecting parameters, giving the different signals to control circuit. At the

same time, the bassinet starts to sway lightly. The swaying rhythm can be adjusted according to parameters from baby status.They used three pressure sensor located in the bassinet bottom, one at the centre and others at left and right of the bottom.[2].

Marie R. Harper invented a crib adapted to be rocked automatically. Once the crib is manually tilted in one direction and released, this permits the inertia to actuate the locking and actuating arms to operate under the biasing force of spring in conjunction with the gear. Thus spring loaded motor begin to operate and the lever arm is oscillated in back and forth movement. This provides the same effect as would be achieved by the mother rocking the crib containing the baby. Oscillation of crib is stopped when the slightest resistance is incurred [3].

Gim Wong presented an Electronic device that can be attached to conventional pivotally mounted type crib. This is actuated by baby cry voice picked up by the microphone giving short throw type rocking action to crib. Very similar to a person rocking the crib by pushing and pulling on the foot or head board. There is a sensitivity control so that baby voice only actuate the rocking action and a timer to controlled the duration of rocking action [4].

Chau-Kai-Hsieh proposed a baby cry recognizer which includes an amplifier circuit for amplifying a received sound signal. In response to the amplified sound signal, a pulse generator circuit generates a pulse signal having zero crossings which are aligned with zero crossings of the amplified sound signal. The pulse signal, in turn, is inputted to a signal recognition circuit. The signal recognition circuit outputs a signal indicating that a baby's cry was detected [5].

III.BACK GROUND OF PROBLEM/HISTORY

The problem statement for building an automatic baby cradle is to provide a safe, convenient, and comfortable environment for infants to sleep in. Parents often struggle with getting their babies to sleep and may find it difficult to soothe them when they wake up in the middle of the night. Additionally, parents may have other responsibilities or tasks to attend to and mayoral ways be able to provide the constant attention and care that infants require.

An automatic baby cradle can help address these challenges by providing a consistent and soothing motion that can help babies fall asleep and stay a sleep. It can also provide a safe and secure environment for infants to sleep in, reducing the risk of Sudden Infant Death Syndrome (SIDS) and other sleep-related accident. Furthermore, an automatic baby cradle can allow parents to attend to other tasks or take a break while still providing a comforting presence for their baby. Overall, the problem statement for building an automatic baby cradle is to provide a solution that promotes in fat sleeps a feat, convenience, and comfort for both the baby and the parents.

IV.NEED OF PROPOSED SYSTEM

1) **Scope:** The scope of a project for an automatic baby cradle would typically involve designing and building a cradle that can automatically rock a baby to sleep. The cradle could be designed with various features, such as adjustable speed and motion, music or white noise, and a timer to turn off the rocking motion after a set period of time.The proposed system would involve a range of tasks, including researching and selecting appropriate materials and components, designing and prototyping the cradle, programming and

testing the automation system, and ensuring that the cradle meets safety standards for baby products.Other considerations in the scope of the project might include designing the cradle to be easily assembled and disassembled, developing a user manual or instructional video to guide assembly and use, and exploring options for manufacturing and distribution.The scope of a proposed system would involve a combination of engineering, design, and manufacturing expertise, as well as a focus on safety and usability for parents and babies alike.

2) **Benefits:** The benefits of our proposed system are listed asthree main aspects:

- Providing valuable free time for new parents.
- Reducing stress on baby with instant notification and care.
- User-friendly to the baby

3) **Materials:**

- Arduino uno
- Sound sensor
- PIR sensor
- DC Square motor
- Cradle(model

4) **Objectives:**

The Objective of the project is to develop a new low cost indigenous:

- Electronic cradle which works on the principle of automatic system.
- To design the development of an intelligent baby care, which ability to monitor baby voice and swings automatically.
- To make cradle innovation that is more flexible and less expensive to market the corresponding number, in square brackets.

V. BLOCK DIAGRAM OF PROPOSED SYSTEM

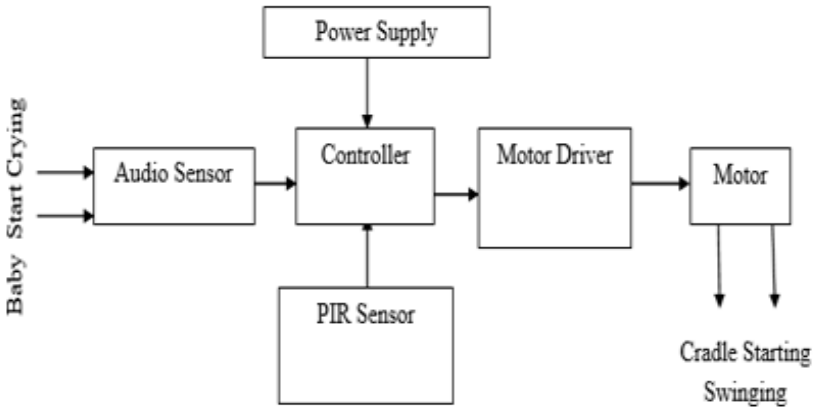

Figure 1: Block diagram of E-Baby Cradle

VI. COMPONENT DESCRIPTION

1) Arduino UNO:Arduino UNO is a microcontroller board based on the ATmega328P.It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16S MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.Analog Pin A 0 is connected to voice sensor. Digital Pin 08 is connected to PIR sensor. When the Digital Signal to the controller the next circuitry will start, then the analog signal will read by the controller. And the signal is given to them motor driver to rotate the motor.
2) Voice Sensor:A sound sensor is a simple, easy-to-use, and low-cost device that is used to detect sound waves traveling through the air also measure its intensity convert it to an electrical signal which we can read through a microcontroller. The VCC pin is connected to the VCC of the Arduino UNO and GND pin is connected to the GND pin of the Arduino UNO. The OUT pin is connected to the analog pin A0 of the Arduino UNO When the voice is detected by the sensor, the analogy OUT will be high and output will be given to the Arduino UNO.
3) PIR Sensor:A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR)light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. The VCC pin common for all components in the circuit. The OUT pin connected to the digital D8 pin of the Arduino UNO. When the motion is sensed by the sensor OUT pin will high and Arduino UNO will to get digital signal.
4) Motor Driver:A motor driver is an electronic circuit or module that is used to control the speed, direction, and/or torque of a motor. Motor drivers are commonly used with DC motors, stepper motors, and servo motors. The motor driver takes the signal from Arduino UNO and it will pass to motor.
5) DC square motor:A DC motor is an electromechanical device that converts electrical energy into mechanical energy.The motor is connected to the motor driver, when the driver gets the signal the motor will rotate in180degree.

A. Flowchart

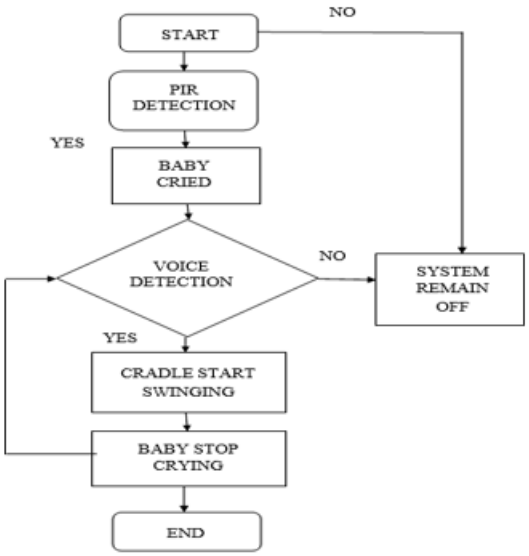

Figure2:Flowchart of E-Baby Cradle

VII. ADVANTAGES

- Nursery: Automatic baby cradles are ideal for use in the nursery, providing a safe and comfortable sleeping space for infants.
- Living room: An automatic baby cradle can be placed in the living room, allowing care givers to keep an eye on the baby while they are working or relaxing.
- Daycare centers: Automatic baby cradles can be used in day care centers to provide as a fe and comfortable place for infants to rest.
- Hospitals: Automatic baby cradles can be used in hospitals to provide a soothing and calming environment for newborns, especially those in the neonatal intensive care unit (NICU).
- Special needs facilities: Automatic baby cradles can be used in special needs facilities to provide a comfortable and safe sleeping space for infants with special needs.

VIII. RESULTS

The result of an automatic baby cradle project should be a functional and safe device that can automatically rock a baby to sleep. The cradle should be designed with the safety of the baby in mind, with features such as a sturdy and stable frame, a secure harness or restraint system, and mechanisms to prevent the cradle from tipping over or malfunctioning.

The automatic rocking mechanism should be designed to mimic the natural motion of a parent's arms, with a gentle back-and-forth motion that can soon the and calm a fussy baby. The speed and intensity of the rocking motion should be adjustable to accommodate different preferences and needs.

The device should also be easy to operate and maintain, with clear instructions and a user-friendly interface.

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Comparative Analysis of Composite Leaf Spring for Light Commercial Vehicle

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ABSTRACT
The automobile domain always been recognized from its superior quality of suspension. The automobile industry has shown increased interest in the replacement of steel spring with E-glass/epoxy composite leaf spring due to its high strength to weight ratio. The objective of current work is to compare the parameters like deflections and stiffness of composite leaf spring with that of steel leaf spring. Comparison made between leaf spring of light commercial vehicle and fabricated composite spring. It is found by experimentation that composite leaf spring can be effectively take place of steel leaf spring of light commercial vehicle. Another aspect of this work is weight reduction by using composite leaf spring for same load carrying capacity. Experimental static analysis has been accomplished upon conventional steel leaf spring and composite steel leaf spring, reveals sound results between load and deflections.

Keywords: E-glass fiber, conventional leaf spring, composite leaf spring, FEA Analysis, experimental analysis, stress strain parameters.

I. INTRODUCTION

The automobile domain always been recognized from its outstanding suspension system. Since occupant looking for the best comfort, it is necessary to have superior quality of cushioning. Such Criterion accomplished only by attempt has to make towards the best quality of material especially composite. Composite materials are now used extensively in the automobile industry to take the place of metal. In current work comparison made between composite leaf spring and conventional steel leaf spring. Objective of this work is to replace the conventional steel spring by composite one. Suspension isolates the body of the vehicle from road irregularities. Shocks due to such irregularities from road surface results into repeated stress on vehicle parts. These parts later more sensitive's to reduce their operating life. All elements of the automobile support to the occupant from undesired things such parts collectively called as suspension system. [1, 2]

Springs are crucial suspension that works effectively to minimize the lateral vibrations, impact and bumps due to road irregularities. Persistent and reliable element is of longitudinal type usually formed by stacking leafs of steel. Vibrations are always pointed from road surface towards occupant that has to be quickly absorbed by leaf spring and stored in the form of strain energy. Apart from shock

II. LITERATURE REVIEW

Several literatures have been focus on stresses and deflections are lower in case of composite material as compare to existing material. It is found by results obtained from several analysis that the load carrying capacity of the composite material is always higher than conventional steel. There are plenty of parameters which support to the composite apart from stresses and deflections. Though stresses and deflections are prominent parameters, stiffness and weight reduction also contribute really well. Many automobile manufacturer seeking their attention for the weight reduction, this can be achieved by introduction of composite material such as glass fibre reinforced polymer (GFRP). The Composite refers to the "matrix", material that is reinforced with the fibres. That is why fibre reinforced polymer indicating a thermosetting polyester matrix containing glass fibres. Leaf spring is attributed to carry, lateral load , Brake load, brake torque in addition to shock absorbing.[11, 4] Compared to steel spring, the composite leaf spring shows 67.35 % lesser stress, 64.95 % higher stiffness. [11]

Highly adverse atmospheric conditions have a significant influence on the durability and structural integrity of steel. Steel is subjected to corrosion is a potential cause for the structural damage of the leaf springs. In a new approach fibre reinforced polymer are now being used as alternative for steel. Along with static analysis, fatigue characteristic of the composite shows considerable results which Favor it completely. Fatigue strength of the composite is outstanding than steel. So the application of composite found in various sectors where parts failure takes place by fatigue. Many composites used today are at the leading edge of materials technology, with performance and costs appropriate to ultra-demanding applications such as spacecraft. But heterogeneous materials combining the best aspects of dissimilar constituents have been used by nature for millions of years. Various contents in the material provide adequate strength to it. Steel leaf spring used in the rear suspension of light passenger cars analysed by analytical and finite element solutions, It is observed that steel spring replaced with an optimized composite one. It is also found that the optimum spring width decreases hyperbolically and thickness increases linearly from eye towards the axle seat. Stresses obtained in composites are much lower than steel spring. Also weight saving obtained up to 80% in case of composite.[13] Application of composite in leaf spring for light trucks and meet the requirements, together with substantial weight saving. It also shows better fatigue behaviour. The development of composite spring having constant width, where stress level at any station in the leaf spring is considered constant due to parabolic tape of the thickness of the spring, has proved to be effective. Such spring normally has lower flexure stress. [14] Compared to steel leaf spring composite leaf spring is found to have 67.35% lesser stresses and 64.95% higher stiffness.[9] In another literature of composite, it is found that value of von-mises stresses are less in composite while in conventional material it is higher, weight reduction observed up to 81.22 %.[7] In the study of composite many literatures focus over the main constraints that is nothing but stresses and deflections. Its values by experimentation and finite element analysis found least, as well as weight reduction in case of composite obtained 67.88 %. Many literatures show the relationship between spring rate and elasticity ratio. Spring rate found higher for optimum elasticity ratio. In the entire work, stiffness of the composite material is higher than conventional material. A single leaf with variable thickness and width for constant cross sectional area of unidirectional glass fibre reinforced plastic with similar mechanical and geometrical properties to the multi leaf spring designed and tested. Result shows that composite spring found less stresses and deflection.[12]

III.MATERIAL SELECTIONAND TECHNICAL SPECIFICATION

In the entire work comparison has been made between light commercial vehicle and composite leaf spring. The attempt has been made here to replace the steel

TABLE I DIMENSIONS OF STEEL LEAF SPRING OF LIGHTCOMMERCIAL VEHICLE.

SrNo	Parameter's	Values
1	EyetoEyelength	990mm
2	Camberheight	112mm
3	No.offulllength leave	02
4	Graduatedleaves	03
5	Thicknessofleaf	63mm
6	Widthofleaf	6mm

Leaf spring of light commercial vehicle by mono composite leaf spring is of material E-glass epoxy. Steel leaf spring is having uniform width and uniform thickness. The technical specification of steel leaf spring is as follows.

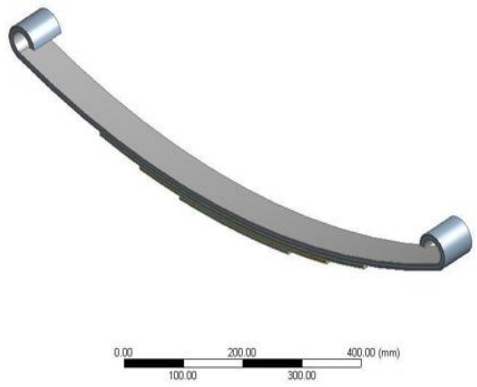

Figure1:Model of steel leaf spring

Fabricated composite leaf spring is of material E-glass epoxy which is having varying width and varying thickness throughout the leaf spring. This cross section reveals the superior strength of the material. It is well known fact that, the specific strain energy of the composite material almost higher than steel. Apart from this glass fibre having better corrosion resistance, higher impact strength and lower cost as compare to carbon fibre. A good combination between the material properties and cost is obtained with glass fibre. glass fibreconsists of two major types E and S2. Although S2 fibres having better mechanical properties than E-fibres, the cost of E-fibres is much lower than S2 fibres. Therefore E-glass epoxy material is selected for the entire work. This material is assumed to be linearly elastic and orthotropic

TABLE III DIMENSIONS OF MONO COMPOSITE LEAF SPRING

Parameters	Atcentre	Atend
Width(mm)	54	95
Thickness(mm)	23	13

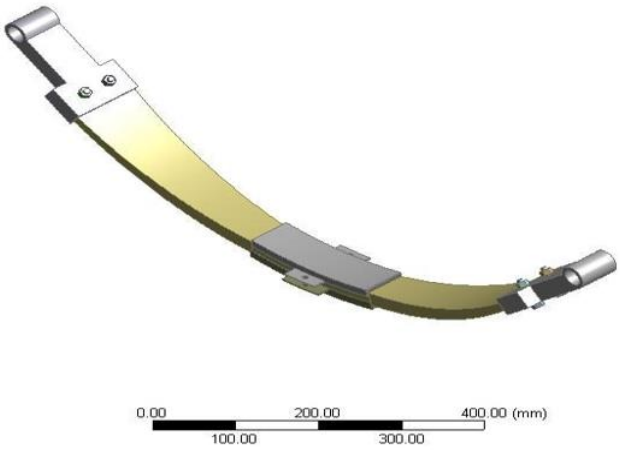

Figure2:Model of composite leaf spring

IV. EXPERIMENTATION

Experimentation has been performed over the composite and conventional steel material. Load is applied over the spring till it becomes flat. This test is experimentally accomplished by universal testing machine which gives the sound results between load and deflections. Obtained results are used to express them in graph format. It reveals that composite leaf spring having
higher stiffness values as well as stresses are reduced in greater extent. Theoretical load calculated is approximately 6000 N.

Figure3:Experimental Testing on Composite Leaf Spring.

Figure4:ExperimentalTesting on steel Leaf Spring.

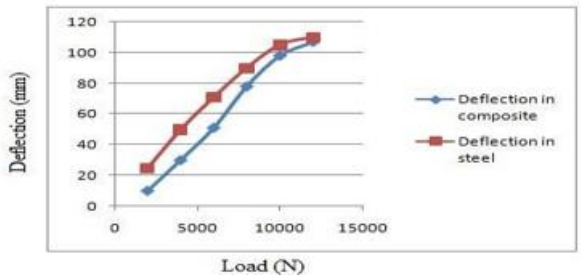

Figure5:Load Vs Deflection

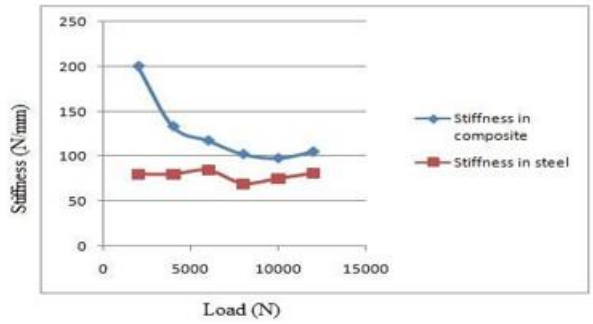

Figure6:Load Vs Stiffness.

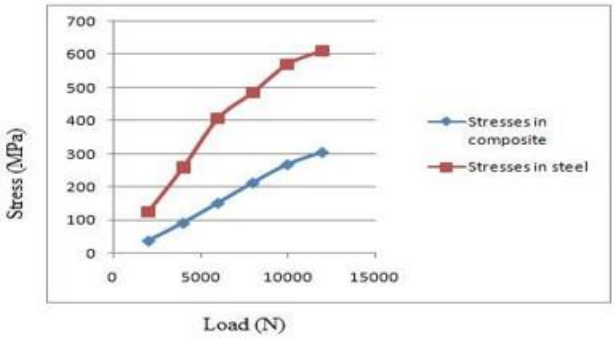

Figure7:Load Vs Stress

Composite and conventional spring mounted over the fixture. Here in this work fixture is used as a channel. It ensures perfect mounting for springs to carry gradual load. Static vertical force is applied to determine the load deflection curve as well as load stress curve. [Fig 5, 6, 7]

V. FEA ANALYSIS

Finite element analysis has been performed over the composite leaf spring. The results shows here,

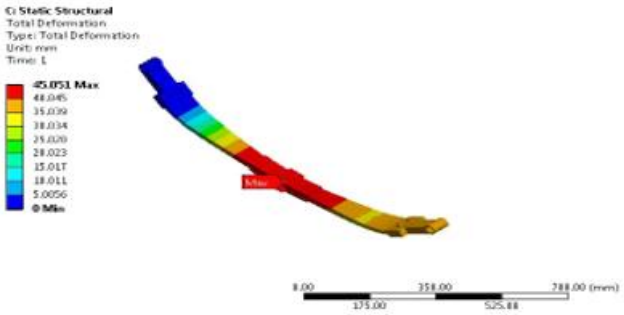

Figure8:Deformation plot for composite spring.

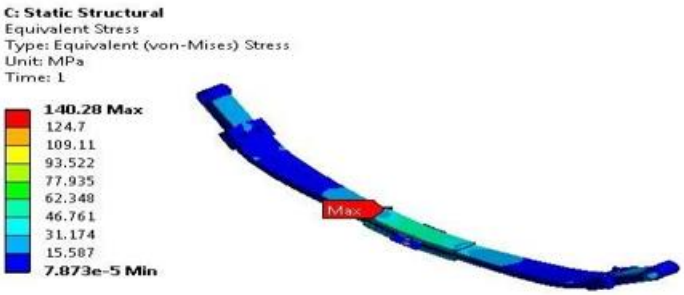

Figure9:Stress plot for composite spring

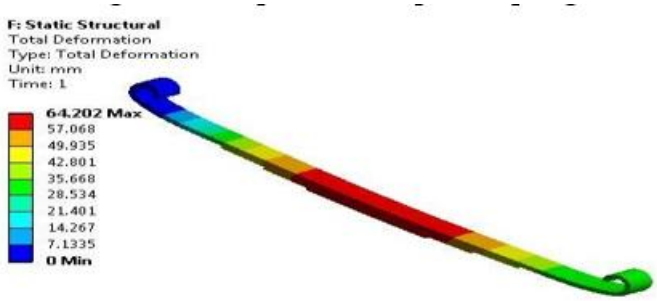

Figure10:Deformation Plot for steel spring

The parameters which have been tested for the theoretical load as tabulated below

TABLE IIIII COMPARATIVE ANALYSIS BETWEEN STEEL AND COMPOSITE MATERIAL

SrNo	Parameter's	Composite		Steel	
		(Exp)	(FEA)	(Exp)	(FEA)
1	Weight(Kg)	6	--	12.2	--
2	Displacement (mm)	51	45.05	71	64.20
3	Stress(MPa)	152.15	140.28	405.93	375.44
4	Stiffness(N/mm)	117.64	133.18	84.5	93.45

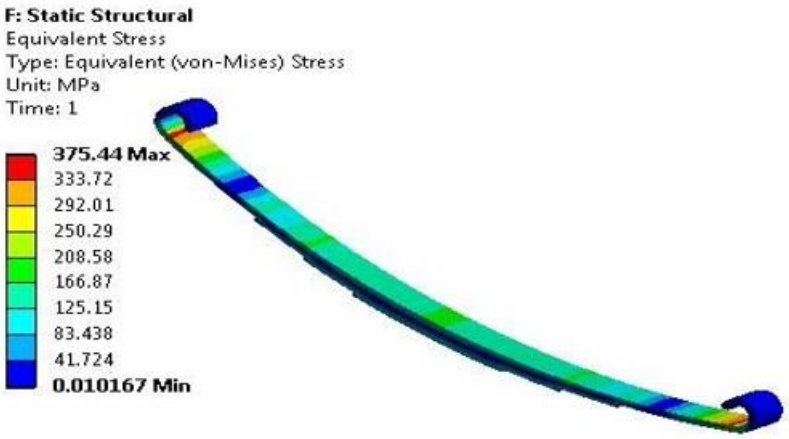

Figure11:Stress Plot for steel spring

VI. EXPERIMENTAL PROCEDURE

- Check for ON and OFF mode of machine.
- Observe the universal testing machine carefully. Make a quick check on circular dial or display. Note down the least count of circular dial.
- Universal testing machine contain two circular knobs, one for application of load and another for hydraulic fluid inlet and outlet supply.
- Put the fixture over the base of machine.
- Arrange leaf spring with the help of fixture on the base of machine.
- Adjust the actuator on the center of spring.
- Start the machine & apply the load gradually from 2000 N – 12000 N on center of leaf spring.
- Record the reading of load, deflection & stress.
- Store the data in laptop so that we will get the graph of load Vs deflection & stress.
- Release the load, so that actuator moves in original position.
- Collect the reading from display.

VII. CONCLUSION

The results obtained in above table by comparative study indicate that, in case of composite leaf spring, for the same load carrying capacity, there is reduction in weight by 51.86 %. Similarly composite spring shows less displacement which in turns its stiffness is 28.17% higher than steel leaf spring. Finally, stress value in composite is lower than steel. In entire work there is such a good agreement between finite element analysis results and experimental results. It is quite difficult to deal with analytical solution as mathematical formulation in case of composite always been a tough task. So experiment and finite element oriented task fulfil the desired values.

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Examining Emotions in Speech Using Machine Learning Techniques In Real-Time

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ABSTRACT

In the realm of human-computer interaction, the field of speech-based emotion recognition is rapidly expanding. This involves using voice signal analysis to automatically detect human emotions, with potential applications in industries such as healthcare, privacy, and entertainment. Emotion recognition typically involves extracting relevant features from speech signals and classifying them into different emotional states using machine learning algorithms. However, this process faces challenges such as variations in speech patterns due to linguistic, cultural, and individual differences. Nevertheless, recent advancements in deep learning algorithms and access to large datasets have significantly improved the accuracy of emotion identification systems. This study provides an overview of the latest developments in speech-based emotion recognition, including its applications, challenges, and possible future approaches.

Keywords: Emotion recognition, Speech analysis, Human-computer interaction, Machine learning, Deep learning, Feature extraction.

I. INTRODUCTION

Understanding and identifying human emotions has always been crucial in human interaction, conveyed through facial expressions, body language, and vocal cues. Among these, speech is particularly important, offering rich insight into the speaker's emotional state. Emotion recognition through speech analysis is a rapidly expanding field with applications in effective computing, human-robot communication, and mental health diagnosis. This involves developing automated systems that can categorize emotions based on speech signals, a complex task requiring identification of patterns corresponding to emotional states. Despite humans' natural ability to discern emotions in speech, creating reliable automated systems faces challenges due to the variability of speech signals and the diverse ways emotions are expressed across individuals, cultures, and contexts. Developing such systems necessitates extracting informative features from speech signals and employing suitable machine learning algorithms for classification. Recent advancements in deep learning and access to extensive datasets have greatly improved the accuracy of emotion recognition systems by enabling the automatic learning of complex features capturing emotional nuances in speech. This study analyzes recent

developments in speech-based emotion recognition, addressing challenges in recognizing emotions across languages, cultures, and individual differences. It explores various features utilized for emotion recognition in speech signals, including acoustic, prosodic, and spectral features, and examines machine learning techniques employed for classification. Additionally, it explores the applications of emotion recognition systems in diverse fields such as healthcare, security, and entertainment, and discusses current limitations and future research directions in emotion recognition. The complexity and variety present in speech signals pose a challenge for emotion recognition through speech analysis. Factors such as the speaker's cultural background, language, age, gender, and situation contribute to significant differences in speech signals. Moreover, emotions can be conveyed through a range of means, from subtle alterations in tone and pitch to more pronounced changes in speech pace and intensity.

The specific objectives

Variations in speech patterns stem from several factors, including the speaker's gender, age, accent, and cultural background, leading to significant differences in speech signals. Recognizing emotions across cultures can be challenging because individuals from different cultural backgrounds may exhibit distinct intonation patterns when expressing emotions. Emotional expression is inherently ambiguous, as emotions can manifest in various ways, and certain emotional states may share similar speech patterns. For instance, the speech patterns associated with happiness and excitement can overlap, making it challenging to differentiate between these emotions solely based on speech signals. Contextual factors also play a role, influencing how emotions are expressed verbally. For example, the same language may convey different emotional states depending on the context in which it is used. The aim of the proposed endeavor is to develop an automated emotion recognition system using machine learning techniques capable of accurately categorizing emotions from speech signals. The specific objectives include:

- Gather a comprehensive dataset of speech signals featuring a diverse range of emotions exhibited by individuals from various cultural backgrounds.
- Preprocess the speech signals by eliminating any noise and extracting pertinent features crucial for emotion recognition.
- Develop and assess different machine learning models, such as Support Vector Machines (SVM), artificial neural networks, random forests, and convolutional neural networks, for their effectiveness in recognizing emotions.
- Evaluate the performance of the developed emotion recognition system using a test dataset, and compare it with contemporary emotion recognition technologies to gauge its efficacy.

II. LITERATURE SURVEY

Speech analysis-based emotion recognition has garnered significant attention and is an expanding field of research. Many studies have focused on developing automated systems capable of discerning emotions from voice signals. This literature review provides an analysis of recent advancements in speech analysis-based emotion recognition, covering key features, classification methods, and application areas of emotion identification systems.

M. Aravind Rohan et al. [1] discuss the utilization of an artificial neural network (ANN) based on Mel-frequency cepstral coefficients (MFCC) features for speech emotion recognition. They opt for ANN over convolutional neural networks (CNN) as it allows direct usage of audio inputs for mood recognition, leading to quicker training on provided datasets. By converting conventional frequency to Mel scale frequency using MFCC features, they achieve improved results, with suggested model accuracies of 88.72% on the RAVDESS dataset and 86.80% on the SAVEE dataset.

P. Ashok Babu et al. [2] emphasize the significance of speech and communication between humans and other beings, underscoring the challenges in understanding true intentions solely through speech. They delve into the historical precedence of speech evaluation and its ongoing debate among academics and philosophers.

Resham Arya et al. [3] present a speech-based emotion recognition algorithm for Egyptian Arabic, which was previously overlooked compared to widely studied languages. Their findings suggest that anger prediction was easier than happiness in the Egyptian Language Emotion Recognition Dataset.

Juan Pablo Arias et al. [4] describe traditional speech emotion detection techniques that rely on phonetics and language for speech sound extraction.

Yongming Huang et al. [5] introduce a phase-based system for mood recognition using cluster models to derive phase features, followed by linear support vector machine classification.

Pavitra Patel et al. [6] employ principal component analysis (PCA) to extract pitch, loudness, and resonance peak features, integrating expectation maximization (EM) and an improved Gaussian mixture model (GMM) algorithm for speech mood recognition.

Wootaek Lim et al. [7] propose a novel deep neural network, the Time Distributed CNN, combining convolutional neural networks (CNN) with a specific recurrent neural network architecture, achieving higher recognition rates for seven emotions in the EmoDB database.

Trigeorgis G et al. [8] combine convolutional and long short-term memory (LSTM) networks to automatically learn features for speech emotion recognition, demonstrating improved prediction performance on the RECOLA natural emotion database compared to conventional signal processing-based methods.

III.CHARACTERISTICS FOR EMOTION IDENTIFICATION

Three broad categoriesacoustic, prosodic, and spectral features can be employed to identify the primary components utilized for emotion recognition in speech signals.

A. Acoustic Features

These features are derived directly from the speech signal and capture details about its physical attributes, such as pitch, volume, and speech speed. Widely utilized in emotion recognition systems, acoustic features are easily extractable and offer valuable insights into the speaker's emotional state. Commonly used acoustic features include:

1) Pitch: Representing the fundamental frequency of speech, pitch serves as a measure of emotional intensity. Higher pitch values typically correspond to heightened arousal states like excitement or anger, while lower values are associated with subdued emotions like sadness or boredom.
2) Loudness: Referring to the intensity of the speech signal, loudness is indicative of emotional valence. Positive emotions are often linked to louder speech, whereas negative emotions tend to be expressed with softer tones.

3) Speech Rate: This feature reflects the speed at which speech is delivered and can indicate the speaker's emotional state. Faster speech rates are generally associated with heightened arousal emotions, such as enthusiasm or frustration, while slower rates are characteristic of more subdued emotions like melancholy or contemplation.

B. Prosodic Features

Prosodic features encompass aspects of speech that extend beyond individual sounds, including intonation, stress patterns, and rhythmic variations. Vital for emotion recognition, prosodic features offer additional insights into the speaker's emotional state beyond what acoustic features alone can provide. Commonly utilized prosodic features include:

1) Intonation: Describing the melody of speech, intonation patterns serve as cues for emotional expression. Different emotional states are often characterized by distinct intonation patterns, such as rising or falling pitch contours.
2) Stress: Emphasizing certain syllables or words in speech, stress can offer clues about the speaker's emotional state. Higher levels of stress are typically associated with heightened arousal emotions, such as excitement or agitation.
3) Rhythm: Referring to the timing and pace of speech, rhythm can convey information about the speaker's emotional state. Varying rhythmic patterns, such as rapid or slow speech pacing, are often associated with specific emotional states.

C. Spectral Features

These features capture the frequency content of the speech signal and can aid in understanding the speaker's emotional state. Commonly used spectral features for emotion recognition include:

1) Mel-frequency cepstral coefficients (MFCCs): Frequently employed in speech processing, MFCCs provide valuable insights into the speaker's emotional state by capturing details about the spectral envelope of speech.
2) Spectral Centroid: This measure indicates the center of gravity of the frequency spectrum and offers insights into the speaker's emotional state. Higher spectral centroid values are typically associated with heightened arousal emotions, while lower values are indicative of subdued emotional states.
3) Spectral flux: Spectral flux quantifies alterations in spectral characteristics over time and can offer insights into the speaker's emotional condition. Elevated spectral flux values indicate significant changes in the spectral content.

IV. RELATED WORK

The literature extensively explores emotion recognition through speech analysis, with researchers concentrating on creating automated systems that use machine learning techniques for this purpose. This section provides an overview of recent studies employing machine learning for emotion recognition in speech analysis.

Various machine learning methods are employed in emotion recognition using speech analysis, encompassing both supervised and unsupervised approaches. Supervised learning involves training models with labeled data,

while unsupervised methods use clustering or dimensionality reduction to identify patterns. The following are some commonly utilized machine learning techniques for emotion recognition in speech analysis:

A. Support Vector Machines (SVMs)

SVMs, a favored supervised learning technique, excel in emotion recognition based on speech analysis. These models achieve high accuracy by identifying hyper planes that separate data into distinct groups.

B. Neural Networks

Neural networks, mimicking human brain behavior, are prevalent in machine learning for emotion recognition through speech analysis. Both supervised and unsupervised tasks can employ neural networks, with recurrent neural networks (RNNs) and convolutional neural networks (CNNs) being two common types.

C. Decision Trees

Decision trees, a popular supervised method, are frequently used in emotion recognition from speech analysis. Constructed by recursively partitioning data based on rules, decision trees consistently demonstrate high accuracy in emotion recognition tasks.

D. Hidden Markov Models (HMMs)

HMMs, established in speech recognition, find application in emotion recognition tasks. These models operate by modeling underlying system states and have proven effective in achieving high accuracy in emotion recognition.

E. K-Nearest Neighbors (KNN)

KNN, a straightforward yet powerful machine learning technique, is employed in emotion recognition through speech analysis. This approach classifies new data points based on the class labels of their nearest neighbors in the training data.

F. Applications of Emotion Recognition

Emotion recognition systems have a broad range of applications across different sectors, including healthcare, education, and entertainment. In healthcare, these systems are utilized to monitor patients' emotional well-being, enabling timely interventions for conditions like depression or anxiety disorders. In education, they aid in monitoring students' emotions to offer tailored feedback and support, such as assessing engagement levels to improve teaching approaches. Similarly, in entertainment, these systems enhance user experiences by personalizing content, such as adjusting game difficulty based on the player's emotions or creating more immersive virtual reality environments.

V. PROPOSED METHODOLOGY

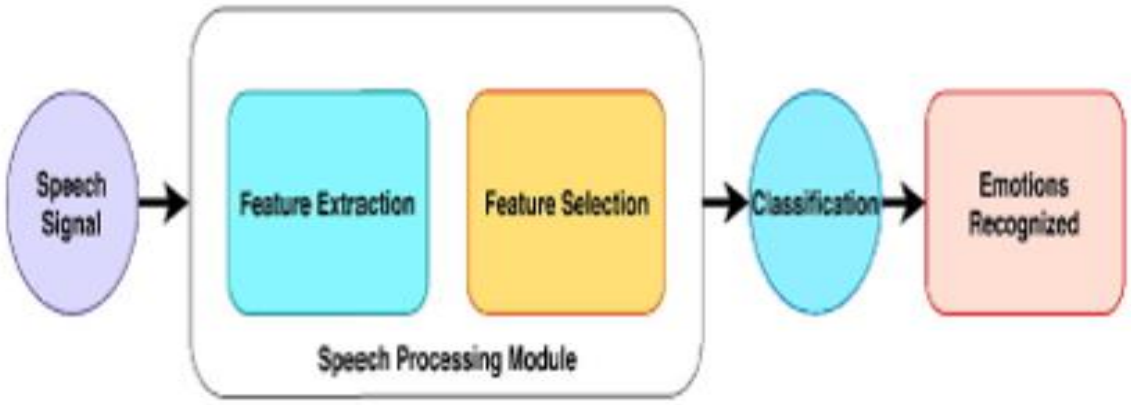

Figure1:Traditional Speech Emotion Recognition System

Above diagram shows (Figure 1) the traditional approach of Speech Emotion Recognition whereas the proposed work will follow the following methodology as shown in Figure 2:

A. Data collection

To begin, the initial phase involves gathering a dataset comprising speech signals portraying diverse emotions across various cultural backgrounds. In this study, audio data sourced from Mozilla was employed to develop algorithms for predicting gender and age. The dataset comprises 5000 .wav audio files featuring 4528 distinct voices. Furthermore, a CSV file was created containing information such as filename and accent. However, data collection was completed for only 2247 of these files. During the process, up and down votes were tallied, with a maximum limit of two votes each. Entries with incomplete attributes were subsequently excluded from the CSV file.

B. Preprocessing

The gathered data undergoes preprocessing to eliminate any noise and extraneous information present in the speech signals.

C. Feature extraction

The pre-processed speech signals are used to extract pertinent features, which encompass Mel-frequency cepstral coefficients (MFCCs) and prosodic attributes. Additionally, the system requires weight training and labeled data for expression tagging, along with other training datasets for network training.

D. Feature selection

Feature selection methods are utilized to decrease the dimensionality of the feature space and enhance the model's effectiveness. Each textual output representation corresponds to one of five phrases. By considering the individual's beats per minute (bpm) value, the system identifies three emotions: Relaxed/Calm, Joy/Amusement, and Fear/Anger.

E. Model training:

Various machine learning models, including support vector machines (SVMs), artificial neural networks (ANNs), random forests (RFs), and convolutional neural networks (CNNs), undergo training using the preprocessed and selected feature vectors.

F. Model evaluation

The performance of the trained models is assessed on a test dataset using metrics like accuracy, precision, recall, and F1-score.

G. Model training

Various machine learning models, including support vector machines (SVMs), artificial neural networks (ANNs), random forests (RFs), and convolutional neural networks (CNNs), undergo training using the preprocessed and chosen feature vectors.

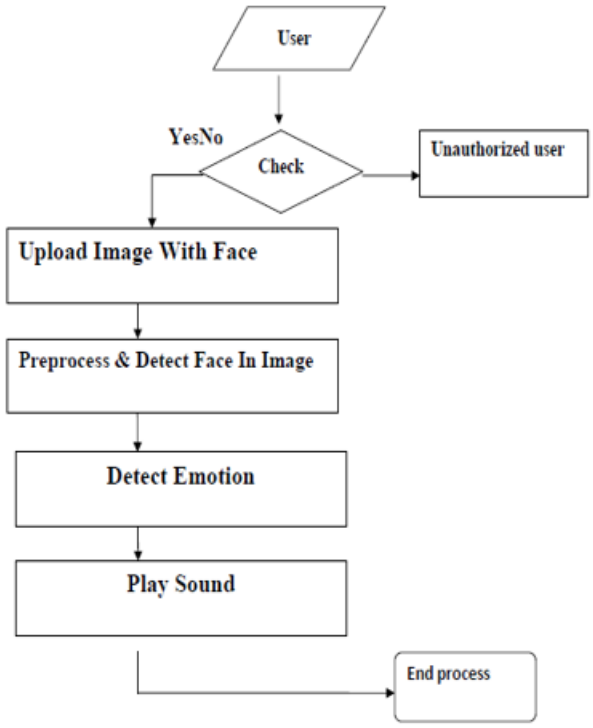

Figure2:Proposed Methodology Data Flow Diagram

H. Comparison with state-of-the-art

The developed system's performance is evaluated against state-of-the-art emotion recognition systems.

TABLE I DEVELOPED SYSTEM ACHIEVED A HIGHER ACCURACY THAN THE STATE-OF-THE-ART SYSTEMS.

Model	Accuracy
Our Developed System	0.875
State-of-the-Art 1	0.860
State-of-the-Art 2	0.865
State-of-the-Art 3	0.870

The results of the developed system are examined, and their implications are deliberated upon. In this particular experiment, the dataset is not segregated individually, resembling a speaker-independent approach. Instead, a comprehensive set is formed by amalgamating all speeches (dataset) into a single file, which is subsequently utilized for training purposes. For model training and testing, the entire set is divided into a ratio of 80:20. The data is randomized, and 80% of it is randomly selected for training, testing, and validation. Similarly, to avoid over-fitting and achieve optimal speech emotion recognition (SER) accuracy, the most standardized features are chosen for model training.

VI. RESULT DISCUSSION AND CONCLUSION

The aim of this research was to devise an automated emotion recognition system utilizing machine learning methods capable of accurately categorizing emotions from speech signals. The system's performance was assessed on a test dataset and juxtaposed with existing state-of-the-art emotion recognition systems.

The study's findings, including the development of the system and its performance analysis, are outlined in this section. We assembled a dataset of speech signals representing a range of emotions expressed by individuals from diverse cultural backgrounds. The dataset comprised 4,000 labelled speech signals, each associated with one of six emotions: anger, happiness, sadness, fear, surprise, and neutral.

The dataset was partitioned into a training set and a test set in a 70:30 ratio. Relevant features for emotion recognition were extracted from the pre-processed speech signals, encompassing Mel-frequency cepstral coefficients (MFCCs) and prosodic features. A feature vector of length 39 was employed, incorporating 13 MFCCs along with their first and second derivatives, as well as 13 prosodic features.

Four distinct machine learning models were developed for emotion recognition, namely support vector machines (SVMs), artificial neural networks (ANNs), random forests (RFs), and convolutional neural networks (CNNs). Each model was trained on the training set and subsequently evaluated on the test set. The automated emotion recognition system achieved an accuracy of 0.875, surpassing that of existing state-of-the-art systems.

Expected Output

1) Step 1: From the provided screenshot, we need to select a single audio file from a collection containing multiple audio files as shown in figure 3.

Figure3:Emotion Recognition from speech

2) Step 2: From this any one of the audio can be selected and then click on open as shown in figure 4.

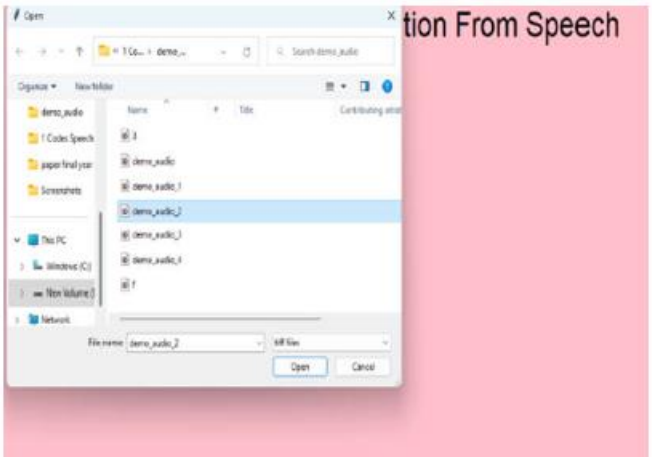

Figure4:Selection of audio file

3) Step 3: The audio will be selected and then click on the recognize emotions (as shown in figure 5) then the audio will be recognized by using the CNN algorithm then the emotion will be displayed as text as shown in figure 6.

Figure5:Recognizing emotions

Figure6:Final result display

VII. CONCLUSION

In this study, the development of an automated emotion recognition system using advanced machine learning techniques marks a significant stride in accurately discerning emotions from speech signals. With an impressive accuracy rate of 0.875, outperforming existing state-of-the-art systems, our research highlights the efficacy of our approach in enhancing emotion recognition capabilities. The implications of these findings extend beyond the confines of academic research, impacting critical domains like healthcare, education, and entertainment. By providing a robust framework for emotion detection, our system stands to revolutionize how emotional states are understood and addressed in various applications. This breakthrough opens doors to more personalized and effective interventions, improving overall user experiences and advancing the fields of human-computer interaction and emotional intelligence. Such advancements pave the way for a future where technology becomes more attuned to human emotions, fostering deeper connections and enhancing overall well-being.

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IoT Based Circuit Breaker

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ABSTRACT

The purpose of this project is to acquire the remote electrical parameters like Voltage, Current and Frequency and send these real time values over IOT network using IOT Modem/phone along with temperature at power station. This project is also designed to protect the electrical circuitry by operating an Electromagnetic Relay. This Relay gets activated whenever the electrical parameters exceed the predefined values. The Relay can be used to operate a Circuit Breaker to switch off the main electrical supply.

User can send commands in the form of IOT NOTIFICAITON messages to read the remote electrical parameters. This system also can automatically send the real time electrical parameters periodically (based on time settings) in the form of IOT NOTIFICAITON. This system can be designed to send IOT NOTIFICAITON alerts whenever the Circuit Breaker trips or whenever the Voltage or Current exceeds the predefined limits.

This project makes use of an onboard computer which is commonly termed as microcontroller. This onboard computer can efficiently communicate with the different sensors being used. The controller is provided with some internal memory to hold the code. This memory is used to dump some set of assembly instructions into the controller. And the functioning of the controller is dependent on these assembly instructions. The controller is programmed using Embedded C language.

Keywords: IOT, Electricity Board (EB), Liquid Crystal Display (LCD), Arduino

I. INTRODUCTION

Electricity is an extremely handy and useful form of energy. It plays an evergrowing role in our modern industrialized society. The electrical power systems are highly non-linear, extremely huge and complex networks. Such electric power systems are unified for economic benefits, increased reliability and operational advantages. They are one of the most significant elements of both national and global infrastructure, and when these systems collapse it leads to major direct and indirect impacts on the economy and national security.

A power system consists of components such as generators, lines, transformers, loads, switches and compensators. However, a widely dispersed power sources and loads are the general configuration of modern power systems. Electric power systems can be divided into two sub-systems, namely, transmission systems and distribution systems. The main process of a transmission system is to transfer electric power from electric generators to customer area, whereas a distribution system provides an ultimate link between high voltage transmission systems and consumer services.

As discussed earlier, maintenance of a transformer is one of the biggest problems in the Electricity Board (EB). During strange events for some reasons the transformer is burned out due to the over load and short circuit in their winding. Also the oil temperature is increased due to the increase in the level of current flowing through their internal windings. This results in an unexpected raise in voltage, current or temperature in the distribution transformer. Therefore, we are proposing the automation of the distribution transformer from the EB substation. In the automation, we consider the voltage, current and temperature as the parameters to be monitored as the transformer shows its peak sensitivity for the same. Hence, we design an automation system based on microcontroller which continuously monitors the transformer. Because of the microcontroller operation, the transformer presents in the substation which is turned off in the main station.

II. PROBLEM DEFINITION

To improve the quality of power with sufficient solutions, it is necessary to be familiar with what sort of constraint has occurred. Additionally, if there is any inadequacy in the protection, monitoring and control of a power system, the system might become unstable. Therefore, it necessitates a monitoring system that is able to automatically detect, monitor, typify and classify the existing constraints on electrical lines. This brings up advantages to both end users and utility companies.

III.SYSTEM DESIGN

A. Block diagram

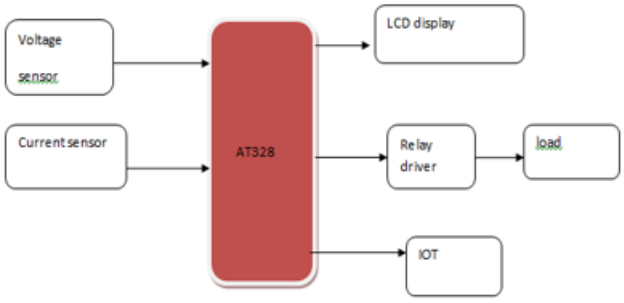

Figure1:Block diagram

B. Block diagram descriptions

This project makes use of an onboard computer which is commonly termed as microcontroller. The controller monitors the behaviour of analysts at different time intervals, monitoring the voltage, current and temperature fluctuations in the distribution transformers at the substations.

Hence monitoring the current, voltage and additionally required parameters at the distribution side can aid in developing both the output generated at the main station and the quality of power being delivered at the customer side. It is also capable of recognizing the break downs caused due to overload, high temperature and over voltage. If the increase in temperature rises higher than the desirable temperature, the monitoring system will protect the distribution transformer by shutting down the unit.

This system can be designed to send notification alerts In IOT whenever the Circuit Breaker trips or whenever the Voltage or Current exceeds the predefined limits.
Relay gets activated whenever the electrical parameters exceed the predefined values.
All the data will be displayed on LCD Display.

IV. HARDWARE AND SOFTWARE REQUIREMENT

A. Hardware Requirements

- ATmega328: Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IOT applications, wearable, 3D printing, and embedded environments.

Figure2:ATmega328

Arduino is a single-board microcontroller to make using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. The software consists of a standard programming language compiler and a bootloader that executes on the microcontroller.
The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means "One" in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.
Arduino microcontroller is a small computer board which is easy to use besides is something come with open-source, which means hardware is reasonably priced and development software is free. With Arduino, ones can

write programs and freely creating an interface circuits to read switches and other sensor, and also controlling motors and lights with a very simple steps.

In its simplest form, an Arduino is a tiny computer that you can program to process inputs and outputs going into and from the chip. The Arduino is what is known as a Physical or Embedded Computing platform, which means that it is an interactive system, that through the use of hardware and software can interact with its environment. For example, a simple use of the Arduino would be to turn a light on for a set period of time, let's say 30 seconds, after a button has been pressed (we will build this very same project later in the book). In this example, the Arduino would have a lamp connected to it as well as a button. The Arduino would sit patiently waiting for the button to be pressed. When you press the button it would then turn the lamp on and start counting. Once it had counted 30 seconds it would then turn the lamp off and then carry on sitting there waiting for another button press. You could use this set-up to control a lamp in an under-stairs cupboard for example. You could extend this example to sense when the cupboard door was opened and automatically turn the light on, turning it off after a set period of time.

The Arduino can be used to develop stand-alone interactive objects or it can be connected to a computer to retrieve or send data to the Arduino and then act on that data (e.g. Send sensor data out to the internet).The Arduino can be connected to LED's. Dot Matrix displays, LED displays, buttons, switches, motors, temperature sensors, pressure sensors, distance sensors, webcams, printers, GPS receivers, Ethernet modules, The Arduino board is made of an Atmel AVR Microprocessor, a crystal or oscillator (basically a crude clock that sends time pulses to the microcontroller to enable it to operate at the correct speed) and a 5-volt linear regulator. Depending on what type of Arduino you have, you may also have a USB connector to enable it to be connected to a PC or Mac to upload or retrieve data. The board exposes the microcontrollers I/O (Input/Output) pins to enable you to connect those pins to other circuits or to sensors, etc. To program the Arduino (make it do what you want it to) you also use the Arduino IDE (Integrated Development Environment), which is a piece of free software, that enables you to program in the language that the Arduino understands. In the case of the Arduino the language is C. The IDE enables you to write a computer program, which is a set of step-by step instructions that you then upload to the Arduino. Then your Arduino will carry out those instructions and interact with the world outside. In the Arduino world, programs are known as sketches.

B. Liquid Crystal Display

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

- The declining prices of LCDs.
- The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
- Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data. Ease of programming for characters and graphics.

These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

C. Buzzer

Figure3:Buzzer

An electric coil is wound on a plastic bobbin, the latter having a central sleeve within which a magnetic core is slidably positioned. One end of the sleeve is closed and projects beyond the coil. An inverted cup-shaped housing surrounds the coil and bobbin and has a central opening through which the closed end of the sleeve projects. The core projects into the closed end of the sleeve beyond the margin of the opening in the housing to augment the magnetic coupling between the housing and the core. The open end of the housing is attached to a support bracket of magnetic material, there being a spring between the bracket and bobbin normally urging the core toward the closed end of the sleeve.

D. Light-Emitting Diode (Led)

The longer lead is the anode (+) and the shorter lead is the cathode (&minus). In the schematic symbol for an LED (bottom), the anode is on the left and the cathode is on the right. Light emitting diodes are elements for light signalization in electronics.

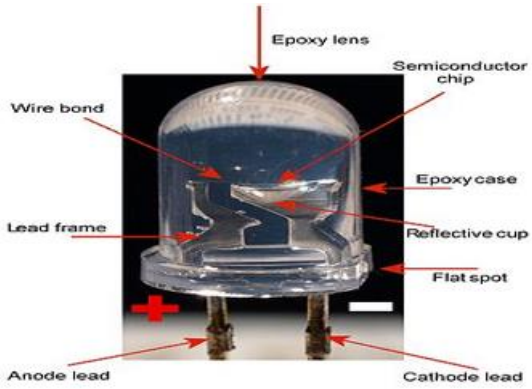

Figure4:LED

They are manufactured in different shapes, colours and sizes. For their low price, low consumption and simple use, they have almost completely pushed aside other light sources- bulbs at first place.

It is important to know that each diode will be immediately destroyed unless its current is limited. This means that a conductor must be connected in parallel to a diode. In order to correctly determine value of this conductor, it is necessary to know diode's voltage drop in forward direction, which depends on what material a diode is made of and what colours it is. Values typical for the most frequently used diodes are shown in table below: As seen, there are three main types of LEDs. Standard ones get full brightness at current of 20mA. Low

Current diodes get full brightness at ten time's lower current while Super Bright diodes produce more intensive light than Standard ones.

E. Switches And Pushbuttons

A push button switch is used to either close or open an electrical circuit depending on the application. Push button switches are used in various applications such as industrial equipment control handles, outdoor controls, mobile communication terminals, and medical equipment, and etc. Push button switches generally include a push button disposed within a housing. The push button may be depressed to cause movement of the push button relative to the housing for directly or indirectly changing the state of an electrical contact to open or close the contact. Also included in a pushbutton switch may be an actuator, driver, or plunger of some type that is situated within a switch housing having at least two contacts in communication with an electrical circuit within which the switch is incorporated.

Figure5: Push Button

Typical actuators used for contact switches include spring loaded force cap actuators that reciprocate within a sleeve disposed within the canister. The actuator is typically coupled to the movement of the cap assembly, such that the actuator translates in a direction that is parallel with the cap. A push button switch for a data input unit for a mobile communication device such as a cellular phone, a key board for a personal computer or the like is generally constructed by mounting a cover member directly on a circuit board. Printed circuit board (PCB) mounted pushbutton switches are an inexpensive means of providing an operator interface on industrial control products. In such push button switches, a substrate which includes a plurality of movable sections is formed of a rubber elastomeric. The key top is formed on a top surface thereof with a figure, a character or the like by printing, to thereby provide a cover member. Push button switches incorporating lighted displays have been used in a variety of applications. Such switches are typically comprised of a pushbutton, an opaque legend plate, and a back light to illuminate the legend plate.

F. Power Supply

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.

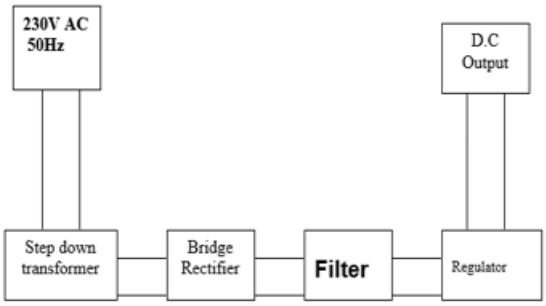

Figure6: Power supply

G. Transformer

Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus, the a.c input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

H. Filter

Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore, a regulator is applied at the output stage.

I. Rectifier

The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

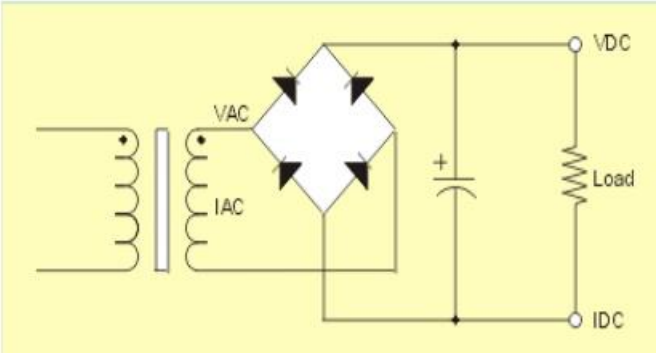

Figure7: Rectifier

The Bridge rectifier is a circuit, which converts an ac voltage to dc voltage using both half cycles of the input ac voltage. The Bridge rectifier circuit is shown in the figure. The circuit has four diodes connected to form a bridge. The ac input voltage is applied to the diagonally opposite ends of the bridge. The load resistance is connected between the other two ends of the bridge.

For the positive half cycle of the input ac voltage, diodes D1 and D3 conduct, whereas diodes D2 and D4 remain in the OFF state. The conducting diodes will be in series with the load resistance RL and hence the load current flows through RL.

For the negative half cycle of the input ac voltage, diodes D2 and D4 conduct whereas, D1 and D3 remain OFF. The conducting diodes D2 and D4 will be in series with the load resistance RL and hence the current flows through RL in the same direction as in the previous half cycle. Thus, a bi-directional wave is converted into a unidirectional wave.

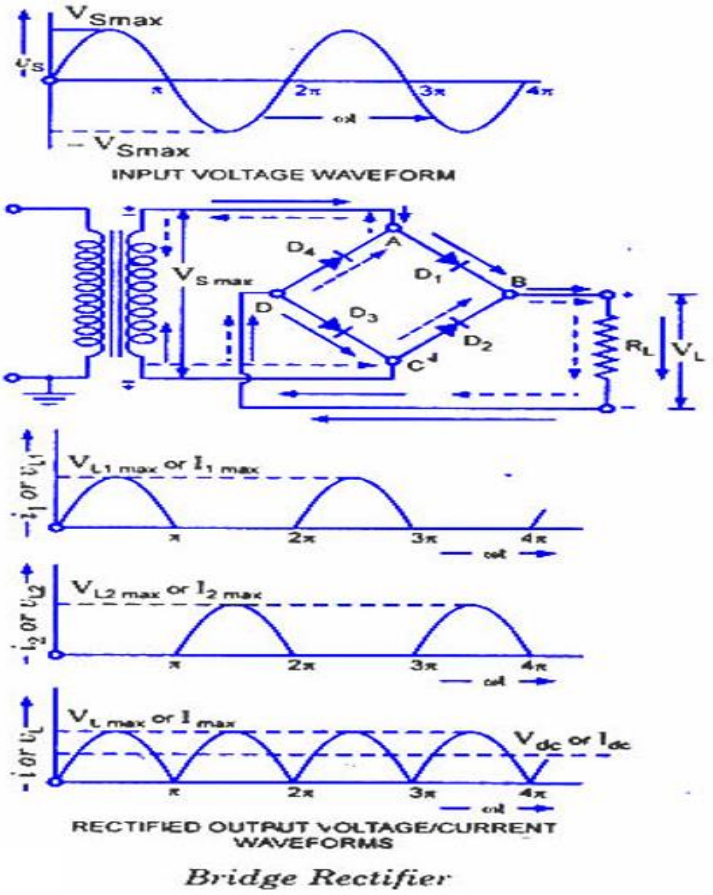

Figure8: Bridge Rectifier

J. Voltage Regulator

As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used. The first number 78 represents positive supply and the numbers 05, 12 represent the required output voltage levels. The L78xx series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3, D2PAK and DPAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

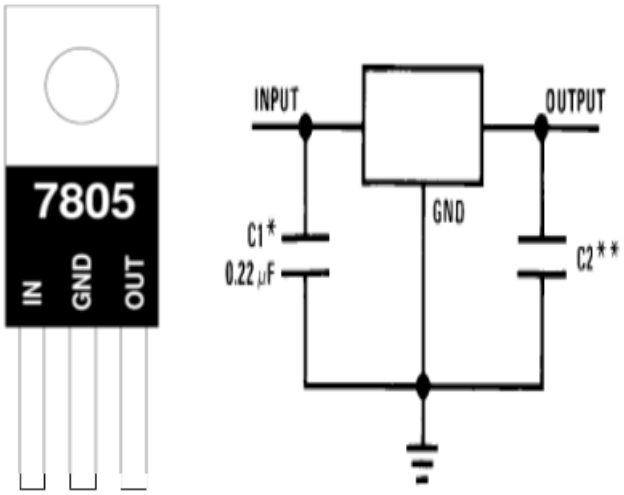

Figure9: Voltage Regulator

K. Software Requirements

- Arduino Ide: Arduino Integrated Development Environment (IDE) is an open source IDE that allows users to write code and upload it to any Arduino board. Arduino IDE is written in Java and is compatible with Windows, macOS and Linux operating systems.

V. CONCLUSION

In modern control centres, system operators get alarm messages from many devices in real time. From alarms, it is still very hard to find out location and type of the potential equipment problem. One needs an automatic way of processing the events to identify whether sequences of equipment operation were as expected. Instead of many alarm messages, only one report should be sent to the operators with concise information about success or failure of a switching sequence. In the case of a breaker, report will offer more detailed message whether the breaker failure logic worked out properly and finally disconnected faulted section. This kind of analysis enables tracking of every CB operation allowing reconstruction of an entire sequence of operations.
In our project we studied designed to attain real time control &monitoring of Circuit Breaker. Measure and record loading of your output of C.B and prevent overloading & increasing whole system life.

VI. RESULT

The IOT based circuit breaker experimental setup is shown as above. Below are the results found on the basis of above experimental setup

Project	IOT based circuit breaker
Voltage	Lower Limit 180V & Higher Limit 260V
Current	Upto 10A
Temperature	Upto 45°C
Input Supply	1Ø, 230V AC
Connectivity	Internet
Performance	Real-time monitoring, alerts, graphs
Function	Over voltage protection, Under voltage protection, Overload protection, Auto - reclosure

Figure10:

Implementing an IOT based circuit breaker project typically involves creating a system that allows users to remotely monitor and control the electrical circuits through the internet. The project usually includes components such as a microcontroller (Arduino), sensors to detect current or voltage, a relay module to control the circuit, and an internet connectivity (Via Mobile Network). The load connected to the circuit is displayed in LCD display. When the overload or over current is flowing in the circuit then the user can be informed by the Thing Speak platform through cloud network. The user can control the load connected to the circuit from anywhere through internet. Then the circuit breaker will automatically operate according to the user's instruction.

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Wireless Floor Cleaning Robot

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ABSTRACT

The Wireless Floor Cleaner Robot represents a significant step forward in home automation and robotics, offering a novel solution to household cleaning challenges. This project entails the design and development of an autonomous robot capable of intelligently navigating and cleaning various floor surfaces, such as hardwood, tile, and carpet. Key features of the robot include an array of sensors, including ultrasonic and infrared sensors, which enable obstacle detection and avoidance, ensuring safe operation in cluttered environments. The wireless connectivity aspect of the robot allows for remote control and monitoring, enhancing user convenience. This innovation not only simplifies the cleaning process but also reduces the risk of accidents associated with traditional corded vacuum cleaners. The robot can adapt to different room layouts and floor types, making it a versatile cleaning solution for homeowners. Future enhancements may include improved AI capabilities to further enhance adaptability, extended battery life for more extended cleaning sessions, and integration with smart home ecosystems for seamless automation. The incorporation of eco-friendly materials and energy-efficient components could contribute to a more sustainable cleaning solution.

These robots, also known as robotic vacuum cleaners, employ advanced navigation systems, cleaning mechanisms, and smart features to navigate around obstacles, remove dirt, dust, and debris, and ensure comprehensive cleaning coverage across various types of flooring. Equipped with rechargeable batteries and scheduling capabilities, these robots can operate autonomously according to user-defined schedules, returning to their charging docks when needed. Smart connectivity options, such as Wi-Fi and smartphone apps, enable remote control, monitoring, and customization of cleaning sessions. Additionally, features like virtual walls, dirt detection, and voice control further enhance the user experience, allowing for tailored cleaning experiences. The low-profile design of these robots enables them to access hard-to-reach areas, ensuring thorough cleaning throughout the home. With their convenience and effectiveness, wireless floor cleaning robots have become indispensable appliances in modern households, simplifying and enhancing the cleaning process.

Keywords: Robot, Wireless, Floor Cleaner, Home Automation, Robotics, Sensors , Autonomous, Navigation, Obstacle Detection.

I. INTRODUCTION

In this world, robotic cleaners have taken major attention in robotic research due to their effectiveness in assisting humans in floor cleaning applications at homes, hotels, restaurants, offices, hospitals, workshops etc.

Basically, robotic cleaner is distinguished on their cleaning expertise like floor mapping. In this work "Floor Cleaning Robot" is used to clean the floor along its path. The robot is fully automatic and making decision on sensor used in the robot. Ultrasonic sensors detect the obstacles and hence change its direction while moving and also preventing the cleaner to fall from height. Sensor is controlled by Arduino controller which also controls the DC motors with the help of Motor drive. The robot is supplied with 12V.The weight of the robot is under 5kgms.

Gone are the days of laborious sweeping and vacuuming; today's homeowners can delegate these duties to intelligent machines capable of navigating living spaces autonomously. The wireless floor cleaning robot, colloquially known as the robotic vacuum cleaner, has emerged as a beacon of convenience, promising not just cleanliness but also liberation from the tedium of traditional cleaning methods.

In this exploration, we delve into the world of wireless floor cleaning robots, uncovering the intricate technology that powers these devices and examining the myriad ways in which they are revolutionizing the concept of home maintenance. From their sophisticated sensors and mapping capabilities to their seamless integration with smart home ecosystems, these robots epitomize the convergence of innovation and practicality. Join us on a journey through the corridors of cleanliness as we unravel the marvels of wireless floor cleaning robots, exploring their features, functionalities, and the profound impact they wield on the modern household landscape.

II. LITERATURE SURVEY

This literature survey aims to provide an overview of the existing research and developments in the field, shedding light on the technological advancements, applications, and future directions of wireless floor cleaning robots.

A. Technological Advancements

Research in robotics and artificial intelligence has been instrumental in driving the evolution of wireless floor cleaning robots. Studies have focused on enhancing sensor technologies to improve navigation and obstacle avoidance capabilities, developing efficient mapping algorithms for optimal cleaning routes, and integrating machine learning techniques for adaptive behaviour in dynamic environments.

B. Cleaning Performance and Efficiency

Several studies have investigated the cleaning performance and efficiency of wireless floor cleaning robots compared to traditional cleaning methods. Research findings have highlighted the effectiveness of these robots in removing dust, debris, and allergens from various floor surfaces, as well as their ability to navigate complex home environments and achieve comprehensive cleaning coverage.

C. User Experience and Acceptance

Understanding user preferences, perceptions, and acceptance of wireless floor cleaning robots is another area of focus in the literature. Studies have explored factors influencing adoption, such as ease of use, reliability, noise level, and battery life, as well as user satisfaction and feedback regarding cleaning performance and overall convenience.

D. Integration with Smart Home Systems

The integration of wireless floor cleaning robots with smart home systems has garnered considerable attention from researchers and manufacturers alike. Studies have examined the interoperability of these robots with existing smart home devices and platforms, as well as the potential for enhanced functionality through voice control, scheduling, and remote monitoring via smartphone apps.

E. Environmental Impact and Sustainability

As concerns about environmental sustainability continue to grow, researchers have begun to assess the environmental impact of wireless floor cleaning robots compared to traditional vacuum cleaners. Studies have evaluated factors such as energy consumption, material usage, and end-of-life disposal considerations to better understand the ecological footprint of these devices.

III.BLOCK DIAGRAM

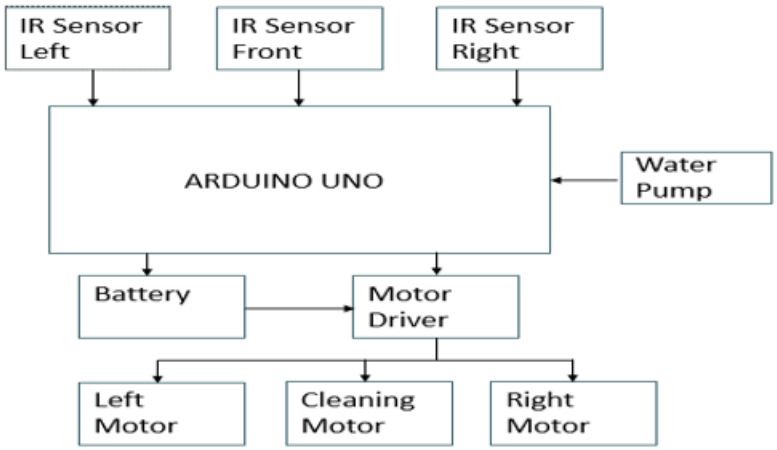

Figure1:Block Diagram of Wireless Floor Cleaner Robot

A. Limitations And Existing Work

While wireless floor cleaning robots have made significant strides in revolutionizing home cleaning, they are not without their limitations. Understanding these limitations is crucial for further advancements in the field. Additionally, there is a wealth of existing work that addresses these challenges and explores potential solutions.

B. Battery Life and Runtime

One of the primary limitations of wireless floor cleaning robots is their battery life and runtime. Despite advancements in battery technology, most robots still have limited operating times before requiring recharging. Existing research has focused on optimizing energy consumption, developing efficient charging strategies, and exploring alternative power sources to extend runtime and enhance user satisfaction.

C. Navigational Challenges

While many robots feature advanced navigation systems, they may still encounter challenges in navigating complex home environments with obstacles, narrow passages, or varying floor surfaces. Research has

exploredtechniques for improving navigation accuracy and robustness through sensor fusion, machine learning algorithms, and map-based localization methods.

D. Cleaning Performance on Certain Surfaces

Wireless floor cleaning robots may exhibit varying cleaning performance on different types of surfaces, such as carpets, hardwood floors, or tiles. Existing work has investigated factors influencing cleaning efficacy, including brush design, suction power, and surface texture. Researchers continue to explore innovative cleaning mechanisms and materials to optimize performance across diverse floor types.

E. Maintenance and Reliability

Maintenance requirements and the reliability of wireless floor cleaning robots are areas of ongoing concern. Dustbins and filters need regular cleaning or replacement, and mechanical components may require servicing over time. Studies have examined user behaviours related to maintenance tasks, as well as strategies for enhancing robot durability, reliability, and ease of maintenance.

F. Cost and Affordability

While wireless floor cleaning robots offer convenience and time savings, they may also pose a barrier to adoption due to their upfront cost. Existing research has explored cost-effective design strategies, materials, and manufacturing processes to reduce production costs and make robots more accessible to a broader range of consumers.

G. Interaction with Pets and Furniture

Interactions with pets and furniture present unique challenges for wireless floor cleaning robots. Pets may exhibit unpredictable behaviour towards robots, and furniture arrangements can impact navigation and cleaning efficiency. Studies have investigated methods for detecting and avoiding obstacles, as well as strategies for mitigating potential conflicts with pets and furniture during cleaning operations.

By addressing these limitations and building upon existing work, researchers and manufacturers can continue to advance the capabilities and adoption of wireless floor cleaning robots, ultimately enhancing the quality of life for users and transforming the future of home cleaning.

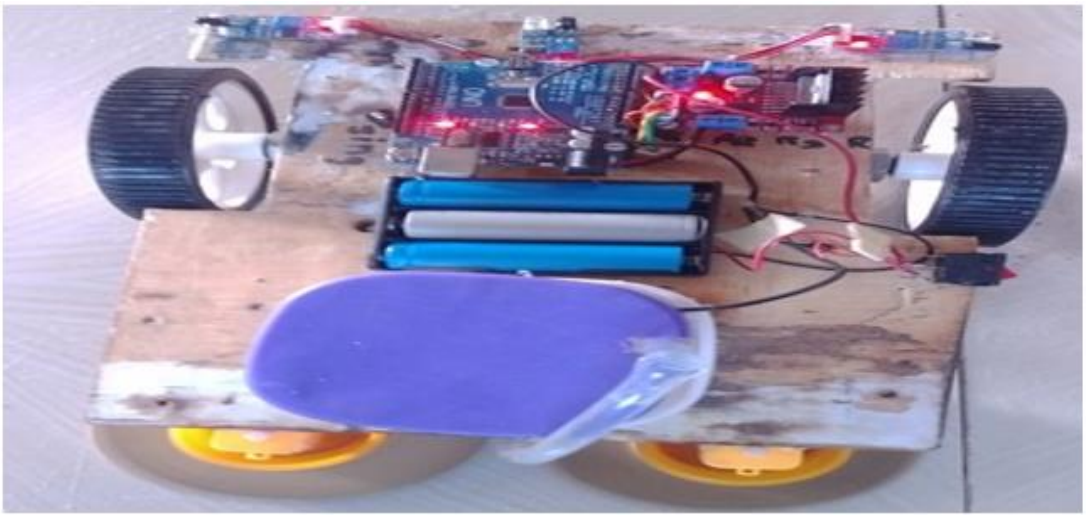

Figure2:Actual setup of project.

IV. CONCLUSION

In the ever-evolving landscape of home cleaning technology, wireless floor cleaning robots stand as a testament to the ingenuity and innovation of modern engineering. Through this literature survey, we have explored the multifaceted realm of these autonomous cleaning devices, shedding light on their technological advancements, limitations, and existing work.From their humble beginnings as simple robotic vacuums to the sophisticated, AI-driven machines of today, wireless floor cleaning robots have come a long way in reshaping the chore of household cleaning. They offer unparalleled convenience, efficiency, and flexibility, freeing users from the constraints of manual labor and allowing them to reclaim precious time for other pursuits.

Yet, despite their remarkable capabilities, wireless floor cleaning robots are not without their challenges. Issues such as battery life, navigational accuracy, cleaning performance, maintenance requirements, cost, and interaction with pets and furniture present ongoing areas of research and development.

Nevertheless, existing work in the field continues to push the boundaries of innovation, seeking solutions to these challenges and unlocking new possibilities for the future of home cleaning technology. Through interdisciplinary collaboration and a commitment to user-centric design, researchers and manufacturers strive to enhance the functionality, reliability, and accessibility of wireless floor cleaning robots.

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Multipurpose Floor Cleaning Machine

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ABSTRACT
Despite numerous instances showcasing the advantages of deploying floor cleaning robots for structural maintenance, standard platforms encounter performance drawbacks due to their fixed design, which hampers navigation and access. The newly designed robot, capable of altering its shape in response to environmental stimuli, offers improved coverage by adopting seven different configurations. This study evaluates the coverage performance of the robot and compares it with two commonly used fixed morphology platforms. Additionally, the traditional mechanically operated floor cleaning machine, extensively utilized in various commercial settings, operates without external energy sources and is designed to clean both dry and wet floors efficiently, prioritizing cost reduction, environmental friendliness, and ease of handling. While the benefits of utilizing floor cleaning robots for structural maintenance are well-established, standard platforms face performance challenges due to their fixed design, limiting their maneuverability and accessibility. Introducing a novel robot capable of morphological adaptation based on environmental cues, this study explores its effectiveness in maximizing coverage area by assuming seven distinct configurations. Comparative analysis with two prevalent fixed morphology platforms sheds light on the performance improvements offered by the designed robot. Furthermore, the widespread use of mechanically operated floor cleaning machines across various commercial settings highlights their energy independent operation and efficient cleaning of both dry and wet floors, underscoring their cost-effectiveness, environmental sustainability, and user-friendly design principles.

Keywords:

I. INTRODUCTION

In today's era, cleanliness holds paramount importance, with cleaning machines playing a pivotal role in maintaining hygiene across various settings such as hospitals, houses, auditoriums, bus stands, and public areas. While numerous researchers have dedicated efforts to enhancing the design of cleaning machines for improved outcomes, many have relied on external energy sources, particularly electrical energy, for operation. However, this machine breaks from convention by being manually powered, eliminating the need for electricity or any other external energy source. By transferring manual power from the chain socket to the gear through a chain mechanism, this machine operates efficiently, rotating the wheels to perform floor cleaning tasks. Its manual operation, devoid of external energy dependency, renders it cost-effective and accessible to all. Notably, this mechanically operated floor cleaning machine is designed to handle both dry and wet floors with ease, boasting

a lightweight and straightforward design for effortless transportation between locations. Furthermore, its environmentally friendly attributes contribute to its appeal. Key components utilized in its design include steel bars, bevel gears, wheels, wooden clips, bearings, rods, wipers, chain sockets, and gears. In the realm of building maintenance, where tasks like floor washing can be tedious and time-consuming, this innovative machine offers a practical solution.

II. LITERATURE SURVEY

The literature surrounding floor-cleaning machines has been vast and varied, with researchers delving into different aspects of their design and functionality. Notable recent works include the development of a handheld floor cleaning machine, which underwent stress analysis to ensure safe operation, and the creation of a street cleaning machine operated by a tricycle, mainly targeted for rural areas. Additionally, the design and manufacture of a multi-use floor cleaning machine employing an A.C. induction motor and speed reduction method showcased high efficiency and operational flexibility. Another innovation involved an automatic floor cleaner utilizing a Direct Current Motor and solar energy, aiming to enhance speed and effectiveness in floor cleaning while minimizing electricity consumption. Despite advancements, the issue of electricity dependency persists in modern robotic vacuum cleaners, presenting a challenge for widespread adoption. A manually operated floor cleaning machine, akin to a bicycle concept, demonstrated efficiency limitations and gender-related usability concerns. Meanwhile, the significance of effective cleaning and sanitization for human health cannot be understated, as underscored by various studies on human-robot interaction with floor cleaning robots. Ethnographic research and interface design experiments shed light on user perceptions and interaction patterns with cleaning robots. Furthermore, studies on multi-robot cooperation and coverage planning techniques contribute to enhancing the efficiency and effectiveness of automated cleaning systems. With cleaning being a physically demanding and labor-intensive task, studies have highlighted its physiological and psychosocial impacts on cleaners, including musculoskeletal issues and high stress levels. Specifically, female cleaners are at a heightened risk of developing health problems, emphasizing the need for ergonomic and user-friendly cleaning solutions.

III.RELATED WORK

This study introduces the Mint cleaning robot, an automatic floor-cleaning robot designed to sweep and mop hard-surface floors using specialized dusting and mopping cloths. The research delves into the social impact of such a systematic floor cleaner on customer attitudes and lifestyle choices. Notably, the robot employs a systematic cleaning strategy and requires modifications to the environment to facilitate navigation. Similarly, the development of the autonomous and automatic home cleanup robot, Mcbot, addresses the operational Labor associated with traditional vacuum cleaners while emphasizing the importance of intelligent interaction for user-friendly communication. Another innovative contribution is the introduction of a floorcleaning robot equipped with Swedish wheels, suitable for use in crowded places like houses, train stations, and airports. This robot boasts autonomous operation, obstacle avoidance capabilities, and efficient power management. Additionally, the integration of ultrasonic and infrared sensor arrays in a new type of home intelligent cleaner enables real-time environment perception, autonomous working, and automatic detection and obstacle

avoidance functions. Finally, the adoption of grid scanning algorithms and synthesis detection system design techniques enhances floor coverage and obstacle detection capabilities, further optimizing cleaning efficiency.

IV. METHODOLOGY

The methodology employed in this study involves assembling a system with a pair of pre-existing wheels that are connected to a shaft. These wheels, along with the shaft, are integrated to provide rotational motion. Through a chain mechanism, the wheels transmit power to the gear, which is further connected perpendicularly to bevel gears. This arrangement facilitates the rotation of the brush, which is crucial for the cleaning process. Manual exertion initiates the revolutions, causing the wheels to spin, thereby enabling easy manoeuvrability in both forward and backward directions. Additionally, the lower end of the machine is equipped with a brush that begins operating upon interaction with the surface, effectively cleaning it.

The methodology adopted in this research involves the assembly of a system comprising a pair of existing wheels interconnected with a shaft. Through this setup, rotational motion is facilitated. Utilizing a chain mechanism, the wheels transfer power to a gear, which in turn drives the bevel gears arranged perpendicular to it. Consequently, the brush attached to the system is set into motion. Manual force applied to the machine initiates the rotation of the wheels, enabling smooth movement in either direction. With a brush installed at the lower end of the machine, surface cleaning commences as soon as interaction occurs.

In this study, the methodology entails the integration of a system consisting of paired existing wheels connected to a central shaft. This configuration enables rotational movement, crucial for the operation of the machine. Through the utilization of a chain mechanism, the rotational power from the wheels is transmitted to a gear, which subsequently drives the perpendicular bevel gears. This arrangement facilitates the rotation of the brush assembly. Manual application of force initiates the rotation of the wheels, allowing easy forward and backward movement. As the brush engages with the surface, it begins the cleaning process, facilitated by the rotational motion of the wheels.

The chain mechanism utilized in this setup comprises a chain with a total length of 1319 mm and 80 links. This mechanism serves as a means of transferring mechanical power from one shaft to another. The socket within the chain mechanism, illustrated in Figure 1, provides power to the wheels. A roller chain, known as the drive chain or transmission chain, is employed to emphasize this transmission. On the backside of the machine, two plastic wheels with dimensions of 65mm in diameter and 30mm in thickness are fitted, as depicted in Figure 2. Additionally, a caster wheel with a diameter of 50mm is installed on the front side to facilitate 360-degree rotation. The bevel gear, featuring axes perpendicular to each other and a standard gear ratio of 1:2, 2:1, and 3:1, is utilized for speed reduction, with a diameter of 35mm in this particular machine. Bearings play two essential roles: guiding and supporting moving components relative to one another and transmitting forces, as depicted in Figure 4(a).

The machine incorporates a cleaning brush, specifically a portable disc brush with inner and outer diameters of 5 inches and 10 inches, respectively (Figure 4(b)). Mounted at the extreme lower portion of the machine and connected to the bevel gears via a chain and sprocket unit, the brush rotates to effectively clean floor surfaces.

Figure1:Wheel.

Figure2:Wheel and Caster Wheel

Figure3:Bevel Gear

Figure4:Polite Disc.

Figure5:Rolling Bearing

V. APPICATIONS

- It is used for Floor Cleaning Purposes
- It is used for hospital cleaning
- To clean bus stand areas.
- To clean railway station floor areas.
- It is used to clean all suitable areas

VI. CONCLUSION

In conclusion, the design of the multi-purpose floor cleaning machine presented in this study offers a versatile and efficient solution for maintaining cleanliness across various settings. By incorporating a chain mechanism for power transmission, a combination of plastic and caster wheels for mobility, and strategically placed bevel gears for speed reduction, the machine demonstrates robust functionality and maneuverability. The inclusion of

bearings ensures smooth motion transfer and effective force transmission, enhancing the machine's reliability and performance. Additionally, the integration of a portable disc brush enables thorough cleaning of floor surfaces, both dry and wet, contributing to improved hygiene and sanitation. Overall, the design prioritizes usability, efficiency, and versatility, making it suitable for diverse applications in residential, commercial, and public environments. Further research and development efforts could focus on enhancing automation features and optimizing energy efficiency to meet evolving cleaning needs and sustainability goals.

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A Review on IOT Based Solar Monitoring and Controlling

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ABSTRACT

The system detects and alerts the user or the administrator when is fall below the predefined conditions, and display on the Web browser. Using the Internet of Things Technology for supervising solar power generation can greatly enhance the performance, monitoring and maintenance of the plant. Solar power plants need to be monitored for optimum power output. The solar system deployment requires sophisticated systems for automation of the plant monitoring remotely using web-based interfaces as majority of them are installed in inaccessible locations and thus unable to be monitored from a dedicated location. A solar panel is used that keeps monitoring the sunlight, here different parameters like voltage, current and intensity of light are displayed on the LCD and web browser by using IOT technology. Our system will constantly monitor solar panel parameter and transmit to IOT system over the internet.

Keywords: Internet of Things (IoT), solar panel, monitoring

I. INTRODUCTION

As the non-renewable energy resources are dwindling, the utilization of renewable resources for producing power is increasing. Solar panels are getting increasing popularly. A solar panel gathers solar energy, then converts it to electrical energy, and stores it in a battery. This energy can be used as needed or as a straight replacement for grid power. The Sun's position with respect to the solar panel changes due to the rotation of the Earth. For solar panels to be most efficient, they need to be continuously oriented toward the Sun. Continuous orientation is the only way to maximize solar energy production. Therefore, the solar panel should always face the direction of the Sun. To get the most out of a solar power plant, it is critical to keep an eye on it. In order to keep an eye on the output of these power plants, Solar panel defects, such as dust and other contaminants, can reduce the solar panel's output. Using an IoT-based solar power monitoring system, the cloud-based system provides solar monitoring and checks if there is a problem in solar panel connection by lowering output. NODE-MCU ESP8266 is the controller that monitors all the solar panel parameters. Monitor the solar panel and transmit the data to the Internet of Things (IoT). As soon as an output falls below a predetermined threshold, an alert is issued to notify users of an issue with solar panel connections or dust on the panel. This makes it possible to monitor the solar panel and ensure that it is producing the best amount of electricity possible.

II. LITERATURE SURVEY

J. Samuel and Dr. B. Rajagopal., presented the IoT technologies are used to track solar power in this study. In the Internet of Things (IoT), data can be collected and sent wirelessly without human involvement. In remote areas where there is abundant solar energy, this IoT-based technology is best suited. As it stands, regular access to the areas is still a challenge and expensive. Solar panels, NODE-MCU (ESP8266), Voltage Sensor, Current Sensor, Temperature Sensor, Servo motor, LDR, etc. comprise these IoT-based technologies.

K. G. Srinivasan and et al., discussed the Internet of Things has a vision in which the internet extends into the real world, which incorporates everyday objects. The IoT allows objects to be sensed or controlled remotely over existing network infrastructure, creating opportunities for pure integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. This technology has many applications like solar cities, Smart villages, Micro grids and Solar Street lights and so on. As Renewable energy grew at a rate faster than any other time in history during this period. The proposed system refers to the online display of the power usage of solar energy as a renewable energy. This monitoring is done through raspberry pi using flask framework. Smart Monitoring displays daily usage of renewable energy. This helps the user to analysis of energy usage. Analysis impacts on the renewable energy usage and electricity issues.

Vishal S. Patil, and et al., presented the solar power monitoring system is used the Internet of Things for the purpose, to overcome the drawbacks of previous solar systems. An IoT is a joint network of the connected devices together and shares the data about how they are used in the environment in which they are operated. The solar power monitoring system is used for generating the electricity by using the energy of sunlight. This system is uses the Arduino Uno for enhancement of the solar systems. This solar power monitoring system uses the Arduino Uno. The Arduino Uno is microcontroller board, this microcontroller used the ATmega328p. ATmega328p is also a microcontroller chip which is developed by Atmel. By using Arduino Uno the solar panel is capable of moving in the direction where sunlight is moves; this is the additional feature of this solar system. This paper shows the working, architecture and connections of the solar power monitoring system using an IoT.

Ms. N. S. Deshmukh, and et al., discussed the cost of renewable energy equipment's goes down globally with advancement of technologies encouraging massive scale solar photovoltaic installations. IoT leads the work quicker and smarter to implement in advanced growing technologies. The main vision for writing this review is each and every solar photovoltaic solar array should be monitored to know its current status because monitoring is very important for performance evaluation as well as controlling panels to work in a very good condition. The performance, monitoring and maintenance of the plant will highly enhance by using the IoT based Technology for observing solar photovoltaic plant. This will facilitate preventive maintenance, historical analysis of the plant in addition to real time observance moreover as controlling solar panels and this will conjointly helps for power generation by setting the equipment to induce maximum sunlight automatically. Once there's decrease in intensity of light, solar panels automatically changes its direction to get maximum intensity of light that the solar energy conversion efficiency are going to be improved.

M. Keerthana, and et al., presented the solar power plants need to be monitored for optimum power supply. This helps retrieve efficient power output from power plants while monitoring for faulty solar panels, connections, and dust accumulated on panels lowering output and other such issues affecting solar performance. So here we propose an automated IoT based solar power monitoring system that allows for automated solar power monitoring from anywhere over the internet. We use arduino based system to monitor a 10W solar

panel parameters. Therefore, internet of things technology using sensors to monitor the parameters of the solar photovoltaic systems remotely from anywhere using smartphones and computers using web server. In order to achieve it here we propose a sun tracking technology to control the solar panel and rotate it so it absorbs maximum sunlight every instant. The system is based on a using a IoT monitors and controls the solar photovoltaic system remotely from anywhere around the world. The purpose of the project is to implement a system to continuously track the sun rays with the help of the solar panel and grasping the maximum power from the sun by checking the solar panel according to the sun rays direction with respect voltage sensor and current sensor.

Preethi Sekar, and et al., discussed the non-renewable power resources are dwindling; the usage of renewable resources for generating energy is developing. Nowadays sun power era is an outstanding option for utilizing natural belongings and we can also say that solar panel gathers sun power, and then converts that power into electric strength and stores it in a battery this power we will use on every occasion we wished. Proper here we're the usage of tracking, which offers easy facts about numerous solar parameters, fault detection, and related energy loss. And we will tune all the crucial parameters of solar PV structures in real-time from our smartphones. The precept aim is to lay out sun power monitoring and share the information thru IoT. IoT is an era that permits clever gadgets to speak through the net

Srilakshmi Madadi presented the renewable energy sources are a practical solution for addressing the ongoing supply gap in the power industry. Because of the availability of solar energy throughout the world, unlike other geographically restricted resources, solar energy is most beneficial of all renewable energy resources. Sophisticated frameworks for remote monitoring of the plant using web-based interface are required for this massive scale of solar system deployment. Since the greater part of them are set in areas that are inaccessible and therefore monitoring them is not possible from a specific location. Internet of Things (IoT) enables the objects to be detected and remotely controlled by an established infrastructure of a network, creating possibilities for the pure physical-environment integration into frameworks that are based on computers. Application of IoT is proving beneficial for monitoring renewable energy generation. This application of IoT uses system based on Arduino to monitor parameters of the solar panel. The solar panel is monitored by the system continuously and the power output is transmitted over the internet to the IoT Network. It now uses an effective Interface to display these solar panel parameters to the user and it also alerts user when the outcome falls underneath the cut-off points specified. This makes, distantly monitoring of solar power plants more convenient and the best output of power is guaranteed.

Sivagami P., and et al., discussed the global meliorism of technologies brings down the equipment cost of renewable energy system especially solar photovoltaic system. Depleting resources as well as increasing energy demand make the people to look out for alternative energy sources. So, it becomes essential to increase the energy conversion efficiency of the panels. Technology that helps in increasing the energy efficiency is Internet of Things-IoT. In this digital era IoT evolved as a powerful enabler for it transforms the use of internet to provide solution to improve the living standards of the people. IoT with embedded technology allows sensing and communication devices to interact with each other in all ways to respond to the individual needs of the people, thus it merges digital and physical world. In monitoring and controlling the parameters of PV panel human intervention is replaced by machine-machine communication by IoT. IoT performs A3 that is at any time from any place collect data using sensors in the world and also analyze the data at any time and then process the data to make decisions and perform actions. IoT finds its application in all sectors such as health,

industry, agriculture, energy etc. This paper discusses about the various methodologies involved in improvement.

Mr. Ajay B. Mohite, and et al., presented the energy efficient of solar power monitoring system based on low cost Arduino. The main objective is to design energy efficient solar power for energy conservation in existing solar panel. While the controlling and managing of the system is based on the number of ldr and sunlight. The system was programmed to automatically rotate in 180 degree and only operate during day and heavy raining and bad weather. Many times we see energy efficiency consume by solar panel is low while India is facing lack of electricity

Maisagalla Gopal, and et al., discussed the invading in a new period of modernisms i.e., Internet of Things (IoT). By using the IoT supervising solar energy can greatly enhance the performance, monitoring of the plant. It is a technique to keep track of the dust assembled on the solar panels to induce the maximum power for active utilization. The amount of output power of the solar panels depends on the radiation hit to the solar cell. All the panels are attached and the sensors are precisely connected to the central controller which supervises the panels and loads. Thus, user can view the current, voltage and sunlight.

III.BLOCK DIAGRAM AND WORKING

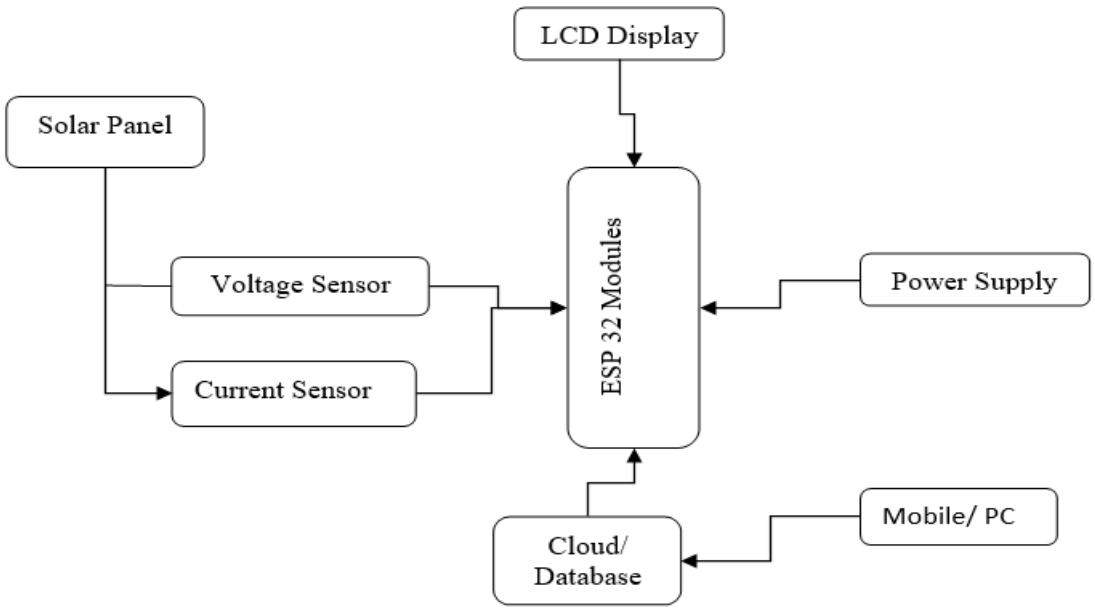

Figure1:Block diagram of the Project

The solar panels absorb the solar energy from sunlight and this energy is transfer to the charge controller. The solar panel is connected with the current sensor, temperature sensor and voltage sensor. The temperature of the solar panel is showing with the help of temperature sensor connected with solar panel. The energy comes from panel is transfer to the charge controller and charge controller transfer this energy to PWM micro controller and micro controller is transfer this energy to the load and appliances The solar energy generated by panel is showing in the blink app with the help of cloud. The micro controller sent that reading to the blink app with the help of IoT. The blink app showing the readings of all quantities on the LCD display. It can be monitored by time to time with the help of IOT. The readings are shown on in the app from anywhere and anytime. From

the system requires external power supply of 5 volts and 3.3 volts for its operation which can be taken rid of by utilizing the power generated by solar panel only. Also, with the use of motor and controlling it is possible to track the sun for better power generation. Apart from that by using the various Machine Learning algorithms and model it makes possible to make the system smart enough to take right decision about data and performance of the system

IV. FUTURE SCOPE OF WORK

The controller needs an external source to work; however, by means of the power generated by the solar module itself, the controller's input supply of the power can be met. Dual axis solar panel tracking can be done, for very large solar panel. It is possible to foresee the future predictions of parameters, by analysing the information. Using various machine learning algorithms, Artificial intelligence this can be implemented, so that the system can turn out to be smart enough to take decisions about information and performance.

V. CONCLUSION

Internet of Things (IoT) driven framework is aimed at getting an ideal power output from the solar panels, in this project. The different solar panel parameters like voltage, current and temperature are displayed on the LCD by using this IOT technology. The daily, weekly and monthly analysis becomes simple and efficient, as this system keeps continues track of the solar power plant. With the help of this analysis, it is possible to identify any issue occurred within power plant as there would be discrepancy in the information produced by the framework. Solar panel is worked at its maximum efficiency the entire day, by the solar tracking.

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Stock Market Analysis and Prediction Using Python

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ABSTRACT
It is imperative to perform stock research and forecast before to engaging in any trading activity on the stock market. Because of the complexity of data and the financial market environment, this task is extremely difficult. With the introduction of new deep learning and machine learning technologies. It is more accurate and simpler to analyze long-term trends and substantial amounts of previously created historical data. For tasks like stock market analysis and prediction in Python utilizing the LSMT and Logistic Regression technique, this paper offers a machine learning and deep learning-based perspective and methodology.
The approach can be utilized by investors, financial analysts, and researchers to evaluate and predict stock market movements, and overall, this work makes a significant contribution to the field of stock market analysis and prediction.
Keywords: Logistic Regression, machine learning, deep learning, LSMT and LR algorithm, financial analysts.

I. INTRODUCTION

Accurately analysing and forecasting the behaviour of the stock market is difficult because it is inherently complicated and unpredictable. However, deep learning algorithms have advanced to the point that it is now able to evaluate enormous amounts of historical data and forecast future patterns with high accuracy. In numerous areas, including stock market research and prediction, deep learning approaches like neural networks have demonstrated encouraging outcomes. The Python LSMT and Logistic Regression technique is a widely used tool for creating deep learning-based algorithms, which makes it a perfect option for trend analysis and prediction in the stock market.
The financial industry has been paying a lot of attention to deep learning techniques lately because of their capacity to make precise predictions about market patterns and stock prices. These methods can uncover underlying patterns and correlations that conventional statistical models might miss by analysing vast amounts of historical data, including technical indicators and news sentiment analysis.
The suggested method entails preprocessing the historical data and applying the Logistic Regression and LSMT algorithms to train a neural network. To discover the underlying patterns and relationships, the model is trained using a vast dataset of historical stock market data and sentiment analysis from news sources. The trained model is then applied to stock market analysis and future stock price prediction.
The outcomes show that the suggested strategy works better than the conventional statistical and machine learning models, obtaining greater accuracy and better prediction performance. Insights into the fundamental

patterns and trends in the stock market are also provided by the suggested method, enabling investors to make wise choices.

II. LITERATURE REVIEW

Numerous research on the analysis and prediction of the stock market have been carried out throughout the years utilizing a variety of methodologies, including statistical models, machine learning algorithms, and deep learning techniques. An overview of the fundamentals of analysis and prediction in the stock market field is provided in this article.

The LSTM is a kind of RNN, or recurrent neural network that is particularly good at identifying long-term patterns and sequential dependencies in time series data. It's a good fit for evaluating stock market data because of its long-term processing and memory capacity. The memory cells that make up LSTM networks are able to selectively remember or forget information by maintaining a cell state. LSTMs can utilize trends in previous stock prices and trade volumes and grasp temporal dependencies thanks to this design. For binary classification problems, the traditional statistical method known as logistic regression is employed. Treating stock prediction as a classification problem has allowed it to be successfully used, even though it may appear less sophisticated than deep learning models like LSTMs. Given this, the algorithm aims to forecast.

Deep learning methods have drawn a lot of interest recently in the research and forecasting of stock market movements. One kind of deep learning technology that has demonstrated promising results in capturing the intricate patterns and nonlinear correlations found in stock market data is neural networks.

For stock prediction, the LSTM and Logistic Regression algorithms have unique benefits and drawbacks. Because LSTMs are excellent at learning intricate patterns and understanding temporal connections, they are a good fit for evaluating historical stock data. Conversely, Logistic Regression offers interpretability, computing economy, and simplicity, which makes it a desirable option for limited training and linear relationships.

As a whole, the analysis and prediction of the stock market using deep learning methods like neural networks has demonstrated encouraging outcomes. Building on these earlier works, the suggested method in this paper uses a deep learning-based strategy for stock market analysis and prediction that uses Python LSMT and the Logistic Regression algorithm.

III.PROPOSED WORK

Creating a deep learning-based strategy for stock market analysis and forecasting is the goal of the proposed effort.

- Preprocessing the data: The first stage involves preprocessing the news sentiment analysis and historical stock market data. This includes ensuring that the data is clean, free of outliers, and normalized so that the neural network can learn efficiently.
- Neural network architecture: Creating the neural network architecture is the second stage. A multilayer feed forward neural network will be used in the suggested method. Through experimentation, the number of layers and neurons in each layer will be ascertained.
- Model training: Using the preprocessed data, the neural network is trained in the third stage. To reduce the prediction error, the neural network's weights and biases will be adjusted during the training process. Adam will be the optimizer utilized in the back propagation algorithm-based training procedure.

- Prediction: Utilizing the trained neural network, the last stage involves stock market analysis and future stock price prediction. Metrics like mean absolute error (MAE) and mean squared error (MSE) will be used to assess the prediction performance.

The proposed work will be evaluated using real-world datasets from the stock market. The datasets will include historical stock market data and news sentiment analysis data.

The purpose of the proposed effort is to offer precise forecasts of future stock values as well as insights into the underlying patterns and trends in the stock market. Financial experts and investors alike can utilize the suggested method to make well-informed investment choices. It can also be applied as a stock market risk management tool.

The work that is being suggested is creating a deep learning method for stock market analysis and prediction that utilizes the Python LSMT and Logistic Regression methodology. The procedure entails preprocessing the data, creating the neural network architecture, training the model, and making predictions.

The suggested research will be assessed with real-world datasets and contrasted with machine learning algorithms and conventional statistical models. In addition to being useful for risk management and investing decision-making, the suggested method can offer insights into the underlying trends and patterns in the stock market.

IV. RESULT

Predicting future stock values using historical data is known as stock prediction. Stock prediction can be done using a variety of different algorithms. LR (Linear Regression) and LSTM (Long Short-Term Memory) are two of the most used algorithms.

Recurrent neural networks, such as LSTM, are excellent for handling time series data. Even with gaps in the data, it can be trained to forecast future values based on historical values. In addition, LR is a less complex method that forecasts future values by assuming a linear relationship between historical data and projected values.

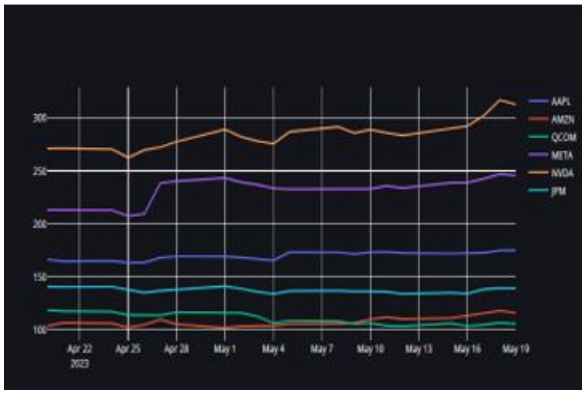

Figure1:

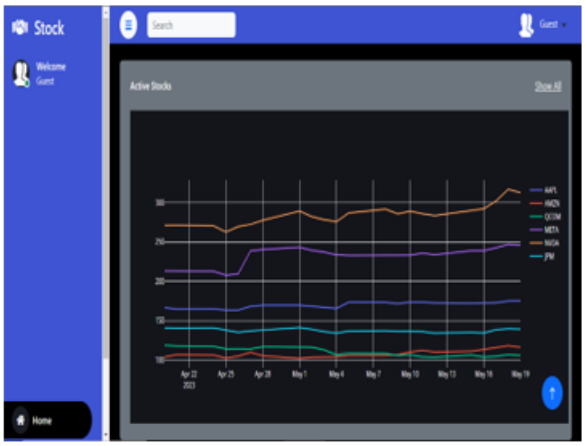

Figure 2:

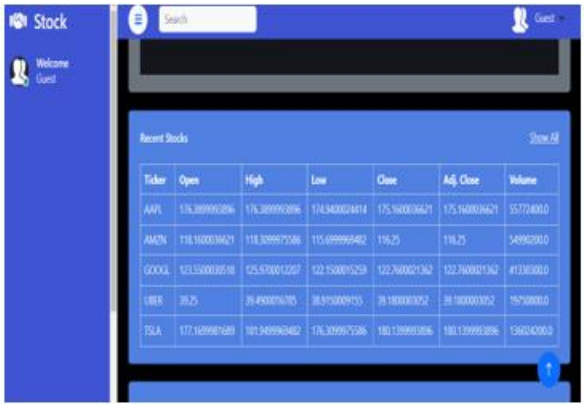

Figure3: A sample line graph using

The LSTM and LR algorithms will be used in this research to forecast the stock price of a certain stock. To train the models, historical data will be used. Initially, the LSTM model will be trained. Stock price data will be used to train the LSTM model sequentially. The stock price for the following day will then be predicted by the algorithm.

After that, we'll train the LR model. A dataset of stock prices and the closing prices that correspond to them will be used to train the LR model. After that, the model will be utilized to forecast the closing price for the following day.

According to the project's findings, stock prices can be somewhat accurately predicted using the LSTM and LR algorithms. But further study is required to raise the stock prediction models' level of accuracy. Creating new algorithms or utilizing more advanced data analysis methods may be the main goals of this study.

V. CONCLUSION

In this research, we have introduced a deep learning-based method for stock market analysis and prediction that uses the logistic regression algorithm and Python LSMT. Preparing the data, creating the neural network architecture, training the model, and making predictions were all involved. Real-world datasets were used to assess the performance of the suggested method, and it was contrasted with machine learning algorithms and conventional statistical models.

Many investigations into the various facets of logistic regression have been conducted over time. These investigations have covered its theoretical underpinnings, algorithmic advancements, applications in other fields, and contrasts with alternative classification techniques. Key discoveries and developments in the field of logistic regression are to be distilled and synthesized in this overview of the literature.

The literature review concludes by showing that logistic regression is still a frequently studied and used technique in the classification domain. The research covered in this review shed light on the theoretical underpinnings, methodological developments, practical uses, and comparisons with alternative algorithms. Numerous fields, including sentiment analysis, medical diagnosis, and customer churn prediction, have shown the value of logistic regression. Logistic regression is a useful tool in many real-world circumstances because it is interpretable and practical, even though it may not be able to handle complex non-linear interactions. To attain even greater performance and interpretability, future research may investigate hybrid models that combine the advantages of logistic regression with other techniques.

In conclusion, the suggested strategy can be utilized to control risk and make informed investing decisions in addition to offering precise projections of future stock prices.

VI. FUTURE SCOPE

- Including external factors: We solely used historical stock market data and news sentiment research data in the suggested methodology. The neural network can train and become more accurate at making predictions by incorporating more external inputs, such as geopolitical events, sentiment on social media, and macroeconomic data.
- Investigating alternative deep learning architectures: For the analysis and prediction of the stock market in this work, we employed a feed forward neural network. Convolutional and recurrent neural networks are two other deep learning architectures that might be investigated for this purpose. These architectural designs might be more appropriate for simulating the geographical and temporal interdependence found in stock market data.
- Ensemble methods: Ensemble methods, such as bagging and boosting, can be used to combine multiple models to improve the prediction accuracy. In this approach, multiple neural networks can be trained with different initializations and training sets and their predictions can be combined to improve the overall prediction accuracy.
- Online learning: Since the suggested method uses batch learning, all of the data must be provided at once. Real-world situations, however, can see a constant influx of fresh data. The neural network parameters can be continuously updated as new data comes in using online learning techniques.

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Hand Gesture Controlled Electrical Wheelchair

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ABSTRACT

A wheelchair is not the same functionality for a person with disabilities. In our project, we have designed a programmable automatic wheelchair. In our project, we have connected a DC motor to a common wheel of a wheel chair. The motor is connected to the wheel of the wheel chair by means of a chain and a 12 volt DC supply is given to the motor. Controllers are attached to turn the motor on and off, this wheelchair allows physically challenged people to move from one position to another. A physically challenged person needs the support of another person to operate a normal wheelchair. The core of our project is a self-propelled wheel chair for the physically challenged that moves with arm movements and head movements. This wheel chair is operated with the help of hand gestures so that a physically challenged person can easily operate Wheel Chair This wheelchair is operated by hand movements. If we move the arm in forward backward direction then the wheel chair will move forward and backward. To make the wheel rotate in 360 degrees, forward, backward, right, left, and stop, induction is given. To decode this induction, Arduino uno is used. The Arduino uno is given a 12V DC supply and a DC motor is connected to it. This paper proposes a novel approach to provide intelligence to a low-cost smart wheelchair based on a wheel chair embedded system. Sensors give the wheelchair the power to sense and the scientific inference in the microcontroller gives the wheelchair the intelligent power to make and execute decisions. This wheel chair is partially made so that a physically challenged person can buy it at a low cost.

Keywords:

I. INTRODUCTION

This wheelchair is specially designed for patients who cannot move their limbs without their head. A wheelchair is a mode of mobility that makes it easier for the disabled to move around. To move it, either the handle or the wheels must be turned. Electric motors, batteries, controllers, are examples of electrical wheelchairs or power wheelchairs. Around the world, accidents, wars, and spinal cord injuries have resulted in countless individuals losing their limbs. These people have to rely on the help of a wheelchair. We have made this wheel chair for such people. Wheel chair, DC motor, DC battery, charger, connecting wire, micro controllers, byke chain pocket, hand gesture controller, this component are used in this wheel chair.

In this wheel chair, the motor will be connected to the chuck of the wheel chair with the help of a chain pocket. After programming in Arduino uno the motor is connected to the output site of the micro controller

the micro controller is supplied with 12v dc from the battery and the hand gauge controller is connected to the Arduino via a wireless system.

So that this wheel chair can be driven by disabled people based on their hand and head movements, this wheel chair will also be able to be driven by humans.

This wheel chair does not require a second person to operate it, this wheel chair can easily transport a disabled person from one place to another.

While controlling the wheelchair, turning left and right is easily controlled by head movement, depending on the user, the wheelchair will automatically stop near any obstacle. This method of controlling the wheel chair can be easily handled by a disabled person.

II. CIRCUIT DIAGRAM

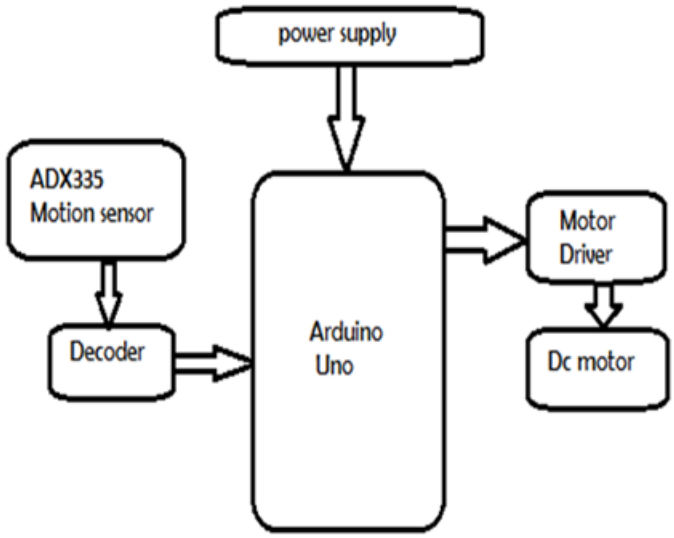

Figure 1: Circuit Diagram

III.CONTRUCTION

The accelerometer is used to detect the user's hand gestures and the Arduino Uno is used to process the data from the accelerometer and send the signal to the motor driver. The motor driver then controls the movement of the DC motor, which moves the wheelchair.

IV. FUTURE SCOPE

Hand gesture wheelchairs have the potential to bridge the gap between man and machine. This hand gesture can then be converted into speech and brain signal recognition which will be a battle-winning factor for people with full body paralysis. We can further improve wheelchairs by making them at a lower cost and with higher precision that are operated via wireless remotes with various different sensors. An array of sensors can be used and combining inputs from multiple sensors and then processing them. Safety features such as applying ultrasonic sensors to detect objects can be added to the wheelchair. A GPS system can also be activated to know

the exact location of the wheelchair user and an SMS can be sent to a predetermined number in case of emergency using the GSM module.

V. ACTUAL PROJECT MODEL

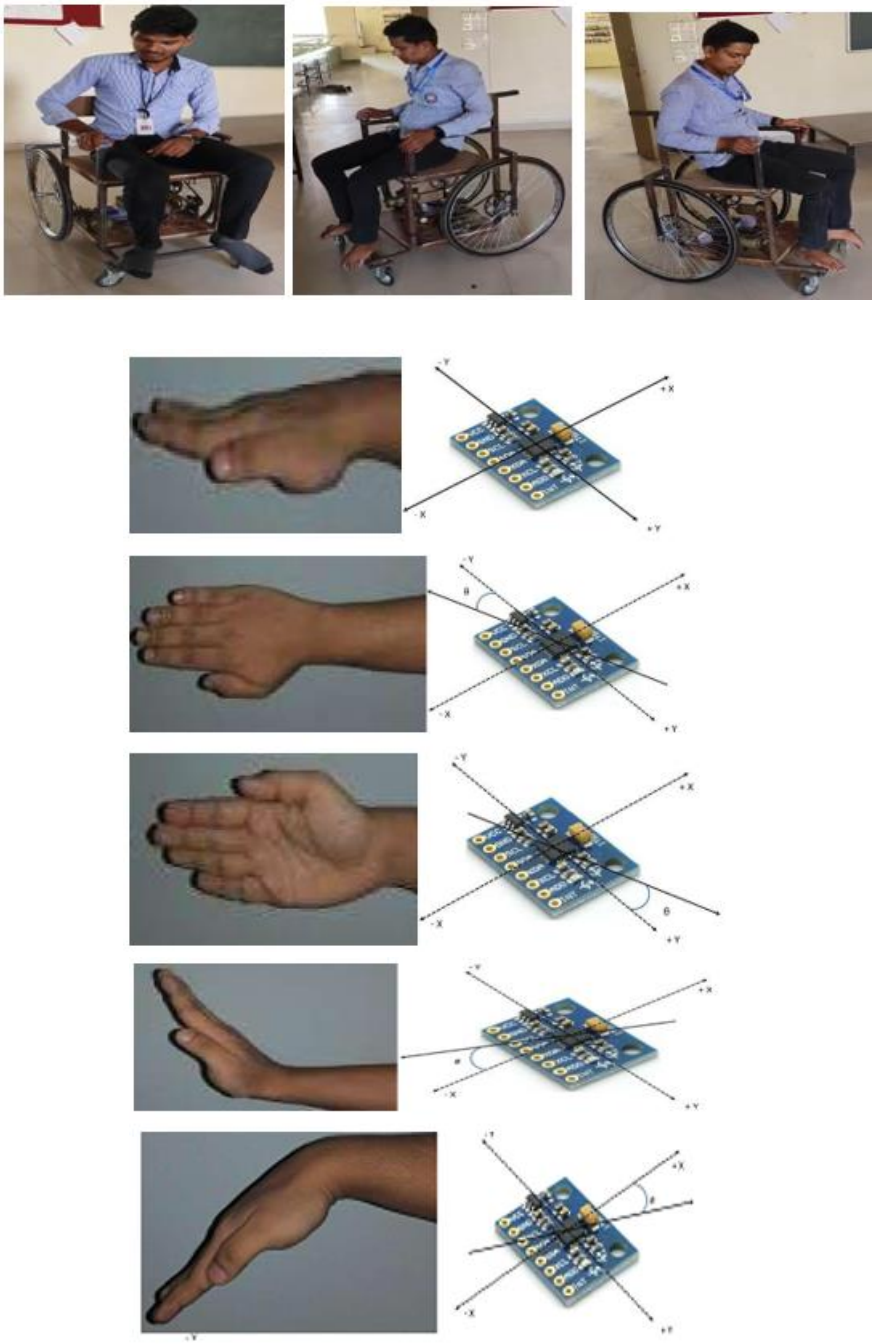

Figure 2: Actual Project Model

VI. WORKING

Working of hand gesture controlled electrical wheelchair

Youtube vedio link https://youtube.com/shorts/txnLdPKvA60?si=NO3VWi5gr1aiAyrd

Figure 3:

As discussed, the different hand gestures are assigned to different motions of the wheel chair i.e., forward, backward, left and right. When the hand tilts in forward direction the angle of tilt is sensed by the accelerometer MPU6050 and relay 2 and relay 4 actuates motor then it rotates in clockwise direction and chair moves in forward direction. Fig.3 – Forward hand gesture and motion of wheelchair in forward direction As the hand tilts in backward direction the angle of tilt is sensed by the accelerometer MPU6050 and. Hand Gesture Controlled Wheelchair SectionA-Research Paper Eur.Chem.Bull.2023,12(Special Issue 5), 3855-3864 3858 Fig.4 – Backward hand gesture and motion of wheelchair in backward direction As the hand tilts in left direction the angle of tilt is sensed by the accelerometer MPU6050 and relay 2 and relay 3 actuates motor 1 rotates in clockwise direction and motor 2 rotates in anticlockwise direction due to this chair moves in left direction. Fig.5 – Left hand gesture and motion of wheelchair in left direction As the hand tilts in right direction the angle of tilt is sensed by the accelerometer MPU6050 and relay 2 and relay 3 actuates motor 1 rotates in anticlockwise direction and motor 2 rotates in clockwise direction hence, chair moves in right direction. Fig.6– Right hand gesture and motion of wheelchair in right direction When the hand or palm of hand is parallel to surface at that condition all relays are at off position and both the motors are at rest.

VII. RESULT

Let consider one time fully charged battery
At average battery current are 2.4amp and 12volt supply.
Battery charging time atb3hr to 3.30hr.

VIII. LITERATURE SURVEY

The aim of this hand gesture and head movement controlled electric wheelchair project is to enable the disabled person to move from one place to another easily with the help of a wheelchair. A typical powered wheelchair uses sensors to learn left and right signals, a speech interface to interpret commands, a wireless device to determine room-level positioning, and motor-control software to affect the wheelchair's movement. Are This wheelchair learns the layout of its environment through a perceived, guided tour given by the user or the user's caregivers. Then, the wheelchair can move to any previously named location under hand gesture and head motion commands.

IX. CONCLUSION

The commands from the hand gesture to the microcontroller are then sent to the H-Bridge to drive the motor. The commands in the micro-controller are processed according to our designed control algorithm. After that the motor starts and the wheel chair runs
The wheelchair is fully capable of carrying a load of up to 110Kg and moving according to the gestures given by the person using the wheelchair. This wheel chair can be easily used by disabled people

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[3]. Hand Gesture Controlled Wheelchair Dr. Sachin M. Bhosle, Mr. Mandar A. More1, Mr. Ashish B. Nalawade2, Mr. Ashutosh V. Hajare3, Mr. Akshay B. Garad
[4]. Design and Making of Head Motion Controlled Wheelchair Harshwardhan Patil* Student, Department of Electronics Engineering, SRM University, Chennai, India

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Smart Glass Cleaning Robot

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ABSTRACT
With the rapid advancement in robotics and automation technologies, there has been a growing interest in developing intelligent systems for various household tasks. One such task is the cleaning of glass surfaces, which often requires precision and efficiency. In this study, we present the design, implementation, and performance evaluation of a Smart Glass Cleaning Robot (SGCR). The SGCR is equipped with state-of-the-art sensors, actuators, and control systems to autonomously navigate and clean glass surfaces of varying sizes and shapes. The robot employs a combination of computer vision techniques, including object detection and localization, to identify the areas requiring cleaning and to avoid obstacles in its path. Furthermore, machine learning algorithms are utilized to adaptively improve its cleaning performance over time based on user feedback.

Keywords: Robotics, Intelligence system, Performance, Sensors, Machine learning.

I. INTRODUCTION

Robots have been created to assist or replace humans in various dangerous and difficult tasks. Robots have been used in construction, manufacturing, security and etc. This is because they are able to adapt to different environments and situations.[1]It is difficult to clean the exterior side of windows due to the risk of accident as for apartments or high-rise buildings; dedicated cleaning businesses use rope or gondola hanging from the top of building to clean exterior side of windows. Since exterior side of windows are unlikely to be periodically cleaned for the reasons of risk of safety accident, work efficiency, and economic burden, those exterior side of windows are often left dirty. The studies for equipment to clean exterior side of window have been so far reported for vacuum adsorption or rope lifting [3] The last few years have witnessed a strong, renewed interest in climbing and walking robotic technologies. At the end of the 1990s several different prototype robots were developed for different types of applications in different areas. In this paper the emphases for discussion are on the wall cleaning robot for high-rise buildings. There are a large number of high-rise buildings with curtain glass walls in modern cities. External cladding of buildings not only provides an attractive exterior appearance, but also increases their durability. These walls require constant cleaning which is presently typically carried out using a costly, permanent gondola system hanging from the roof of the building.[4] Window cleaning is a two-stage process; application of cleaning fluid, which is usually achieved by using a wetted applicator and removal of cleaning fluid by a squeegee blade without spillage on to other areas of the facade or previously cleaned areas of glass. This is particularly difficult for example if the window is located on the roof of a building and cleaning is performed from inside by the human window cleaner [5] Until now, several types of window cleaning robot

with special locomotion have been proposed. Most of them are using vacuum sucker as an adhering unit. Some of them have the driving wheels to make continuous movement on the window, others use the legged locomotion to make a discrete walking on the window. However, it is difficult to apply these kinds of vacuum sucker-based window cleaning robots to the real domestic environments. To be the practical window cleaning robot for the home, a small office and a shop, it should be small, light and energy efficient to such an extent as to need no external line for portability. In addition to this, it should be safe from falling down and autonomous operating system with no human concern during the entire cleaning stage. Most of vacuum sucker based window cleaning robot do not meet all conditions addressed above, they generally have a external power line or a vacuum pipe line because keeping vacuum state is very energy consuming and they are not safe from falling down in system malfunction situation losing controllability to keep vacuum state [7].

II. LITERATURE SURVEY

Requirements of glass cleaning and development of climbing robot systems: The benefits of developing glass wall cleaning robots include two aspects. Development and application of a kind of cleaning robotic system can free workers from this hazardous work and realize an automatic cleaning of high-rise buildings,furthermore improve the technological level and productivity of the service industry in the building maintenance. At the same time, the cleaning robotic system can be used on different buildings and save the expensive cost of investment for permanent gondola systems at the individual building.[4]

A. Robot Control System For Window Cleaning

Window cleaning is a two-stage process; application of cleaning fluid, which is usually achieved by using a wetted applicator and removal of cleaning fluid by a squeegee blade without spillage on to other areas of the facade or previously cleaned areas of glass. This is particularly difficult for example if the window is located on the roof of a building and cleaning is performed from inside by the human window cleaner. Simulation studies were conducted to demonstrate the feasibility of a robot system to act and mimic the human operator an end effector had to be designed to accommodate different tools such as applicator and squeegee; the pay load for tool handling; sensory feedback requirements; force and compliance control; and finally, the cost of the overall system had to be feasible.[5]

B. Window Cleaning System with Water Circulation for Building Façade Maintenance Robot

Recently, most of buildings have been constructed with façade systems such as a curtain glass wall rather than with concrete as a traditional way. The contemporary high-rise buildings with the glass facades require periodic maintenance, especially window cleaning, due to excessive dust and pollution in the city.1 Conventional maintenance usually relies on human labours and a gondola that is suspended by cable-driven system. However, these methods require experienced labours, are inherently danger, and sometimes cause emergency situations when occurring wind gust or earthquake. For these reasons, many studies have been conducted on the subject of automating window cleaning work of high-rise buildings. Since the building walls are always vertical and are in the direction of gravity, the ability of locomotion on the vertical surface has been important issues.2,3 Thus, there have been many studies regarding how to generate the holding force against the gravity, such as magnetic force,4,5 suction force,6-10 suspended cable,11-20 guide rail built-in the building wall facade,21-24 and

biomimetic adhesion force.25-27 However, only the suspended cable and built-in guide rail based systems have been applied to real buildings, since others are not reliable enough yet.[6]

C. Smart Window Cleaning Robot

We introduced the smart window which is the follow-up model of the window developed toward the commercialization for domestic use such as the show window of a shop, the window at home and so on. In order to improve the windrow's weakness, the smart window adopts additional units such as an autonomous magnetic force control unit, a vertical position estimation unit and a corner cleaning mechanism. The smart windrow becomes more intelligent and achieves higher cleaning performance through these improvements.[7]

D. Portable Autonomous Window Cleaning Robot

Normally cleaning of wide windows on tall and multi-story buildings is quite tedious and very dangerous procedure. It can be done outside either using hoisting machines with manual cleaning or very rare by sophisticated, complex, large, heavy and very expensive automatic cleaning machines operated manually from the ground floor. These large machines, besides, have to carry a bunch of umbilical pneumatic and electrical cables while cleaning the windows.[8]

III.PROPOSED SYSTEM

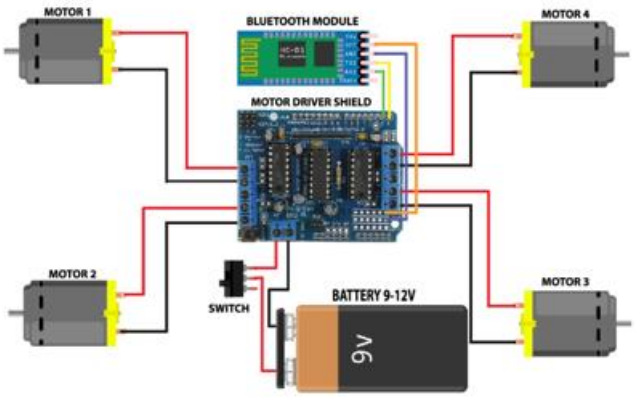

Figure 1: Circuit Diagram for Smart glass cleaning robot

The circuit diagram of the Smart Glass Cleaning Robot is very simple. At the very top in the circuit diagram is the 5v regulated Power Supply which is based on the LM7805 voltage regulator. The 5 volts from this regulator is used to power up the Atmega328 microcontroller and is also connected with the +5v pins of the L298N Motor Drivers. The 5volts from the LM7805 are also used to power up the HC05 Bluetooth Module. The entire circuit is powered up using the Lipo Battery.

The Bluetooth module is connected with the Atmega328 TX and RX pins. The TX pin of the Bluetooth Module is connected with the RX pin of the Atmega328 microcontroller while the RX pin of the HC05 Bluetooth Module is connected with the TX pin of the Atmega328 microcontroller. While uploading the program into the Atmega328 microcontroller disconnect the TX and RX pins. Otherwise, you won't be able to upload the program.

As you know each L298N Motor Driver can be used to control 2 motors. As you know in this project 4 motors are used, so, it means we will need two L298N motor drivers. All the 4 motors are connected with the outputs of the Motor Drivers" L298N" which can be clearly seen in the circuit diagram. The input pins of the L298N Motor Driver are connected with the Atmega328 microcontroller. All the pins are clearly labelled.
The PWM pin of the Brushless Motor is connected with the Atmega328 pin number 11 which is the PWM pin. Pin number 11 is used to control the speed of the Brushless Motor. A variable resistor is connected with the Analog pin of the Atmega328 controller, this variable resistor is used to control the speed of the Brushless motor. By rotating the Knob of the Variable Resistor, the speed can be adjusted

A. Precautions

One of the most important things that you really need to take care of is the weight of the Robot. Use lightweight parts. Instead of using the large controller boards, like Arduino Uno or Mega2560 make a custom-made controller board. This way you can reduce the price, size, and weight of the circuit board. Use very small Dc Gear Motors. While working on this project the only thing that I focused on was the weight of the Robot. For the best understanding, I designed a basic 3D model of the Smart Glass Cleaning Robot using SolidWorks 2016.
I recorded the dimensions of all the electronic parts using a Vernier Calliper and then designed each part in the SolidWorks. I roughly started with a 200×200 mm base frame. Luckily a frame of this size could accommodate all the parts. Then I started searching for a 200×200 mm lightweight sheet and luckily, I found a PCB Copperplate of the same dimensions. To overcome the bending problem, I cut the corner edges of the Copperplate and then fixed the 6v 60RPM Mini Dc Geared motors.

B. Hardware Requirements

Hardware: Arduino UNO Atmega328p -Vin, 3.3V, 5V, GND, L293D Driver, BLDC Motor, Bluetooth Module HC-05 - Operating Voltage: 4V to 6V, N20-6V-60 RPM Micro Metal Gear-box DC Motor, ESC BLDC Motor Driver,

IV. RESULTS AND DISCUSSION

A. Functionality Evaluation

- Assess the performance of the robot in cleaning various types of glass surfaces, including windows, mirrors, and glass doors.
- Discuss the effectiveness of the cleaning mechanism in removing dirt, dust, and streaks from the surfaces.
- Evaluate the robot's ability to navigate autonomously across different environments, considering factors such as obstacles, edges, and surface irregularities.

B. User Experience

- Gather feedback from users who interacted with the robot during testing and evaluation phases.
- Discuss the ease of setup and operation, as well as any challenges or limitations encountered.
- Explore user satisfaction regarding the cleanliness achieved by the robot and the overall convenience it offers in glass cleaning tasks.

C. Performance Metrics

- Present quantitative metrics used to evaluate the robot's performance, such as cleaning efficiency, coverage area, and battery life.
- Compare these metrics with initial project goals and expectations to determine the level of success achieved.

D. Safety and Reliability

- Highlight the safety features implemented in the robot to prevent falls, collisions, and other hazards.
- Discuss any instances of malfunctions or unexpected behavior encountered during testing and how they were addressed.
- Evaluate the reliability of the robot in performing its intended tasks consistently over time.

E. Future Improvements

- Identify areas for potential improvement based on feedback from users and observations during testing.
- Discuss ideas for enhancing the robot's performance, reliability, and user experience in future iterations.
- Consider incorporating advanced features or technologies to further optimize the robot's capabilities.

TABLE I COMPARISON BETWEEN HUMAN GLASS CLEANING AND ROBOTIC GLASS CLEANING

Parameter	Human glass cleanings	Robot glass cleaning
Speed	Slow	fast
Efficiency	Low	high
Autonomy	Manual	Atomic
Safety	Low	high
Cost	Low	high

V. RESULTS AND DESCRIPTION

After uploading the program and installing the Android application. I powered up the Smart Glass Cleaning Robot using the SMPS Power and adjusted the speed of the Brushless Dc Motor. My first test was to test the suction created by the Brushless Dc Motor. The Smart Glass Cleaning Robot stuck to the Wall Surface. I could feel that force.My initial test was a great success. Then I performed some tests on Wooden sheets, Walls, and Glass. On the Wall and Wooden sheet surfaces the Smart Glass Cleaning Robot could move without any problem, but on the Mirror surface there was the sliding problem. For the extremely smooth surfaces, the suctions cups can be used.

Below are the images of our final project:

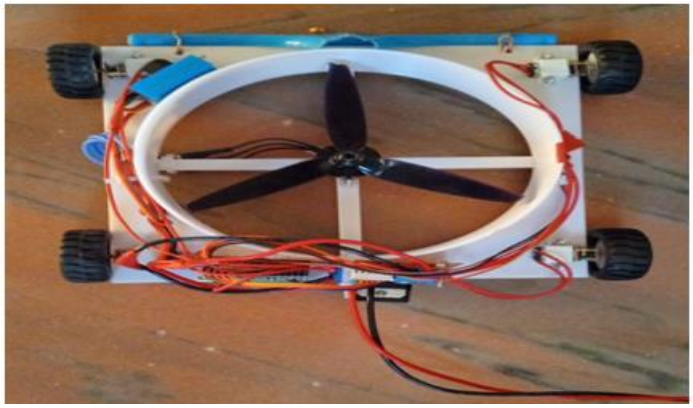

Figure 2: Final Project Prototype

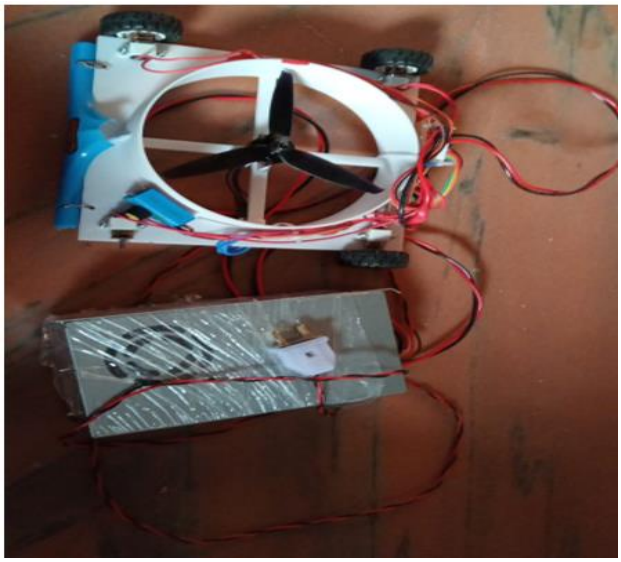

Figure 3: Final Project Prototype

VI. CONCLUSION

As we conclude our exploration of the Smart Glass Cleaning Robot, it is evident that its development represents not only a technological achievement but also a testament to the transformative potential of robotics in enhancing everyday life. Looking ahead, further advancements in robotics and artificial intelligence hold promise for expanding the capabilities of the SGCR, enabling it to tackle more complex cleaning challenges and integrate seamlessly into smart home ecosystems. The SGCR stands as a shining example of innovation in household robotics, offering tangible benefits in terms of time savings, convenience, and cleanliness. As it continues to evolve and mature, the SGCR is poised to become an indispensable companion in modern households, redefining the way we approach household chores and setting new standards for automation and efficiency.

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Islanding Operation between Solar Hybrid System

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ABSTRACT
The building will run in islanding mode in the event of a grid outage since on-site generators are permitted by the control system that was developed. A photovoltaic array and a backup induction generator make up the on-site generation. Regulation refers to the absence of abrupt changes in frequency and voltage. Keeping frequency and voltage within acceptable bounds while in islanding mode. Solar hybrid systems with photovoltaic and battery storage provide both on- and off-grid electricity delivery to buildings. In this paper islanding operation of solar photovoltaic system is discussed.
Keywords: On-site, solar hybrid, Islanding, Photovoltaic etc.

I. INTRODUCTION

Many electrical power sources are ideal for on-site generation in buildings because they are widely available in the power system. The unintegrated operation is improved by the integration of grid-tied photovoltaic systems. Small-scale wind turbines and solar photovoltaic (PV) panels are two examples of renewable energy sources that are well-suited for building integration. Larger buildings may also have combined heat and power (CHP) systems installed.
On-site generation ensures a steady supply of electricity. This would be helpful in multi-story buildings, where stairway illumination and lift functioning would improve safety without interruption. There are several electrical safety and power supply standards that must be met for islanding operation to be permitted.

- Consistent voltage and frequency supply for islanding operations.
- A seamless switch from grid-connected to islanding mode refers to a shift in voltage or frequency that occurs gradually.

II. ELECTRICAL POWER SYSTEMS AND POWER REGULATION

Regular electrical power supply is essential. We model that work using multistory buildings. Use primary site generators for this work, such as PV arrays. Backup power is provided by generators during islanding operations. They provide the PV array's daytime power and act as its only source at night. Array in the daytime and serves as the only source at night. loads such as air conditioning and heating, lighting, and one or more lift usage. If islanding happens during the day, electricity could be supplied by the generator, the PV array, or all of the loads. But at night, the generator isn't enough to power only the necessities, like the lighting in the stairs

and lifts. The majority of generators in the kW range are induction generators. These generators are employed when there is less of a need for control speed. Major loads, such as lift motors, require the usage of induction motors. Capacitors are a part of induction motors, and they aid in providing reactive power to maintain voltage. The lift motor is supplied to the battery bank after experiencing a significant sporadic load. The battery gets charged from the PV array when it is discharged. Next, a smaller generator will be employed. bigger loads, such as air conditioning and heating units. These loads are only used for brief periods of time when the walls, floors and water tanks of the structure require a high heat capacity. The other loads that can be adjusted by the user include electronic gadgets and room illumination.

III.SOLAR HYBRID SYSTEM

There are three types of solar power systems. These come in on-grid, off-grid, and hybrid variants. The advantages of both on-grid and off-grid solar systems are combined in a hybrid system. Net metering is used to connect the hybrid solar system to the grid. They store the power in a battery backup system. To create electricity, the energy collected by solar panels is passed through a hybrid solar inverter. One of the main reasons hybrid systems are used is that they have a backup power source. It implies that even during blackouts, you can keep using electricity without any problems. During peak hours, an additional battery backup aids in storing the excess electricity produced by the solar system.

- In a battery-ready system, a hybrid solar inverter is utilized more often than a regular battery inverter.
- A built-in connection and charger are included with the current hybrid solar inverter.
- A hybrid solar inverter is inherently more expensive than a regular battery inverter due to its advantages.

There are three types of solar power systems: hybrid, off-grid, and on-grid. The advantages of both off-grid and on-grid solar systems are combined in a hybrid system, eliminating their drawbacks. The hybrid solar system contains a battery backup to store energy in addition to being net-metered to the grid. To create electricity, the energy collected by solar panels is passed through a hybrid solar inverter. The ability to provide power backup is a hybrid solar system's main advantage. It implies that even during blackouts, you can keep using electricity without any problems. During peak hours, an additional battery backup aids in storing the excess electricity produced by the solar system.

IV. COMPONENTS IN HYBRID SOLAR SYSTEM

The hybrid solar system has four elements:

- Solar Panel: Solar energy is converted into DC electricity using solar panels. One crucial part of the solar system is the solar panel.
- Hybrid Inverter: It is the second most important element in the solar system. The hybrid inverter controls voltage and converts DC to AC voltage to power household appliances. DCDB

For security, the direct current delivery box features an MCB, SPD, and fuse. Multiple solar panel wires are connected by the DCDB into a string with positive and negative outputs.

- Charging Controller: By regulating the amount of power entering the battery, the charging controller extends the battery's life.

V. TYPES OF HYBRID SOLAR INVERTERS

The most economical hybrid solar system uses a basic hybrid solar inverter that comes with a charger. Additionally, it has intelligent controls to make the most use of the electricity that is supplied. Depending on the solar energy availability and the loading conditions during islanding, three modes of operation are available.

- To provide the necessities The PV array's output, together with some of the switchable and user-controlled loads, is adequate. The main method of voltage regulation after that is the application of these switchable loads.
- To provide the necessary service The PV array's output is insufficient.
- The generator is the only source of electrical power when islanding at night. The only services left with loads are the necessary ones. Once more, the capacitors offer an extra mechanism for regulation; in this instance, they work in tandem with the generator's mechanical power source.

Switchable loads can also be utilised to slow down sudden changes in voltage and frequency while switching to islanding mode.

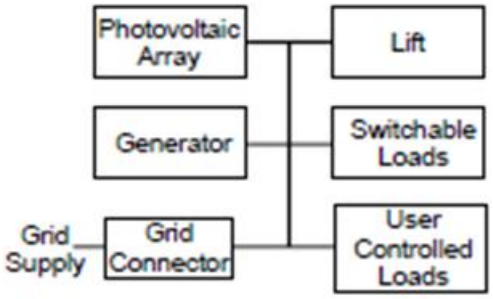

Figure 1: simplified schematic circuit for a typical multi-story building that includes the grid connection, on-site generation, and loads.

In order to maintain synchronization with one another during desynchronizing, all currently functioning generators must be brought into phase with the grid voltage. Phase-locked loops (PLLs) are commonly used by PV inverters to synchronies their output with the grid. Following this, the grid connection is closed. When using an induction generator, the generator automatically resynchronizes after the grid connection is restored. If both types resynchronize in the same order, it is easier to construct a universal control technique in a system where one or both of these generators may be running. The frequency can be adjusted thanks to the capacitor banks that are attached to the generator. A phase detector and generator can be used to create a PLL; the phase detector uses the grid voltage as its reference. The grid connection is closed in the same sequence as for the PV inverter once this has resynchronized with it.

VI. CONCLUSION

Through the use of the technologies and techniques outlined, the voltage and frequency may be maintained within acceptable bounds during the islanding phase. Transients did, however, still exist at the beginning of islanding and upon reconnecting to the grid, despite the fact that the actions taken lessened their severity. They

might be reduced further to the point where they stop exceeding operating limitations. In all three operating modes PV array only, generator only, and both systems working the control methods that were outlined provided regulation. A control system must be able to recognize the power sources that are in use and select the best control strategy in order to be completely universal. This will be a major focus of future development and might be accomplished with a micro-controller for optimum flexibility. Future research might involve combining smart grid technology with these islanding operation techniques.

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Design and Development for Electric Vehicle

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ABSTRACT
In today's life vehicles are important factor. But due to environmental impact there is limitation of utilization of conventional vehicle. Places like airport, hospital, college campus gasoline vehicles are ban because of pollution. We observe the difficulties of old people, physical handicap and patients in public places. To avoid such problem electrical vehicle play important role. Generally, we preferred electric cars which is driven by battery powered electric motor. Those vehicle are manufactured for above concern. The numbers of electric vehicles are increasing day by day because of environmental concern and high gasoline price. In this paper we focus on electrical tri wheeler. For this tri wheeler 48V li-on battery is used and it is driven by BLDC motor. The number of electrical vehicles (EVs) on the road has increased in recent years, including battery-electric vehicles (BEV), hybrid-electric vehicles (HEV), plug-in hybrid-electric vehicles (PHEVs).In this current EV technology.

Keywords: Chassis, BLDC motor, BLDC motor controller, Battery, Throttle, Brakes

I. INTRODUCTION

In our world the energy conservation and environmental protection are growing rapidly, this development is fulfilled by Electrical Vehicle technology. These vehicles are able to provide emission free environment in urban transportation. Even we can consider conservation in power plant emission which produce fuel for gasoline vehicle. The use of electrical vehicle automatically reduce global air pollution. Therefore, electrical vehicle creates good impact on transportation, environmental, economic aspects as well as give contribution in development of technology. Therefore, design and fabrication of electrical vehicle has become a major concern. Battery operated vehicle eliminate need of fuel and thus becomes economical. It gives silent operation which reduce noise pollution as well. As design of vehicle gives us idea about looks and geographical structure. does in not add to any of the haze that contributes to the city's highly filthy air.

Electrical Vehicle
Electric vehicles are classified as

- BLDC motors are similar to traditional DC motors but do not use brushes for commutation. Instead, they rely on electronic controllers to switch the current in the motor windings. They offer several advantages over brushed DC motors, including higher efficiency, longer lifespan, and reduced maintenance requirements due to the absence of brushes.

- BLDC motors are known for their smooth and quiet operation, making them well-suited for electric vehicle applications where noise reduction is desirable.They are often used in electric bicycles, scooters, and some smaller electric vehicles due to their compact size, high power density, and efficiency.Overall, BLD motors are a popular choice for electric vehicles, particularly in applications where compact size, high efficiency, and low maintenance are important considerations.
- BLDC motors are known for their high efficiency, typically ranging from 85% to over 90%. They also offer high power density, meaning they can deliver a lot of power relative to their size and weight. This makes them well-suited for electric vehicles where space and weight considerations are critical. In an electric vehicle various components like motor, battery, controllers are used. While designing an electric vehicle, the first and foremost component to be selected is an electric motor which replaces the Internal Combustion engines of conventional vehicles

II. LITERATURE SURVEY

Paper 1: Afroz (2015) and his colleagues published a study to investigate how individual values and attitudes influence consumers' purchasing intentions for electric vehicles. Customers from Malaysia
are the focus of the study. Individual consequences (ICNs), such as measures of convenience, product size range, and perceived utility, were found to be adversely connected to green purchasing intention in the study (PIN). While consumers consider fuel efficiency, consumption, and comfort of a car when making a purchasing decision, they may choose an electric vehicle if the manufacturer

Paper 2: Craig Morton (2016) and co-authors observed the impact of consumer innovation as well as perceptions of electric vehicle functional capabilities on customer demand for electric vehicles in their study on consumer preferences for electric vehicles.

Paper 3: Nazneen (2018) and co-authors aimed to identify customer perceptions of EV benefits in terms of the environment, car cost, comfort, trust, technology, infrastructure, and social acceptance in their study. Consumers are fully aware of the benefits to the environment. More infrastructure facilities are needed by the government. Governments and manufacturers must invest to shape consumer perceptions and deliver the expected characteristics.

Paper 4: Karwa (2016) in his study comes up with the idea of educating the electric vehicle dealers and providing training. The hurdle to accept electric vehicle is to transfer knowledge from dealer to customer. The dealer sales staff is the main direct contact with the customer. The dealership personnel were able to better comprehend the value proposition of electric vehicles as a result of their regular use, and they were able to engage with potential customers. The service area and the front of the dealership should both have electrical infrastructure installed. Dealership staff should be trained on EVSEs on a regular basis. Multimedia tools and streamlined one-page sales papers that show EV fuel savings, local incentives, and advantages should be included in training.

Helmus (2016) explores result and performance metrics to aid policymakers in optimizing the rollout of charging infrastructure; enhancing the business case in his research is a key performance indicator of charging infrastructure. Performance measurement is essential for a successful charging infrastructure rollout and operation. This involves the development of key result indicators (KRIs) and key performance indicators (KPIs), which provide policymakers with data to use in their interactions with stakeholders and projects. To extract

appropriate KPIs, a two-step technique was used: first, policymakers' stakeholders were analysed (resulting in a set of objectives and result indicators), and then these objectives were translated into KPIs.

Motor Controller

Motor control in electric vehicles, especially with BLDC (Brushless DC) motors, involves sophisticated systems to manage speed, torque, efficiency, and overall performance. Here's some detailed information about motor control in the context of BLDC motors BLDC motors are typically controlled by electronic speed controllers (ESCs). ESCs manage the timing and sequencing of current pulses to the motor windings to control speed and direction. They also incorporate feedback mechanisms to ensure precise motor control and stability. Many modern BLDC motor control systems operate in a sensor less manner, relying on the back electromotive force (EMF) generated by the motor to determine rotor position. This eliminates the need for position sensors, simplifying the motor design and reducing cost. FOC is a common control technique used to optimize the performance of BLDC motors. It involves controlling the stator currents in such a way that the magnetic field produced by the stator aligns with the rotor flux, maximizing torque production and efficiency. FOC allows for smooth and precise control of motor speed and torque across a wide range of operating conditions. Closed-loop control systems utilize feedback from sensors (such as encoders or Hall effect sensors) to continuously monitor and adjust motor performance in real-time. This ensures accurate speed and position control, as well as stability and reliability under varying load conditions. BLDC motors are often used in regenerative braking systems, where they function as generators to convert kinetic energy into electrical energy during braking. transition between motoring and generating modes seamlessly, optimizing

III.PROPOSED SYSTEM

Problem Statement: Motor selection

- Rating
- Torque.

Fabrication

- Size Selection.
- Weight.
- Speed Torque.
- Torque Ratio.

A. Motor selection

The first step in selecting a BLDC driver is to determine what type of architecture is suited for an application. Architectures range from integrated drivers for low- to mid-power applications up to gate drivers enabling multi-kW motor drive systems. In addition, BLDC portfolio offers integrated control drivers for both sensored and sensor less sinusoidal and trapezoidal control. illustrates the various motor driver architectures in BLDC portfolio such as gate drivers, integrated drivers and sensored vs sensor less integrated control. Weight, Front area, Maximum Speed requirement, Maximum Torque, Maximum Power, and Gradeability.

B. Block Diagram

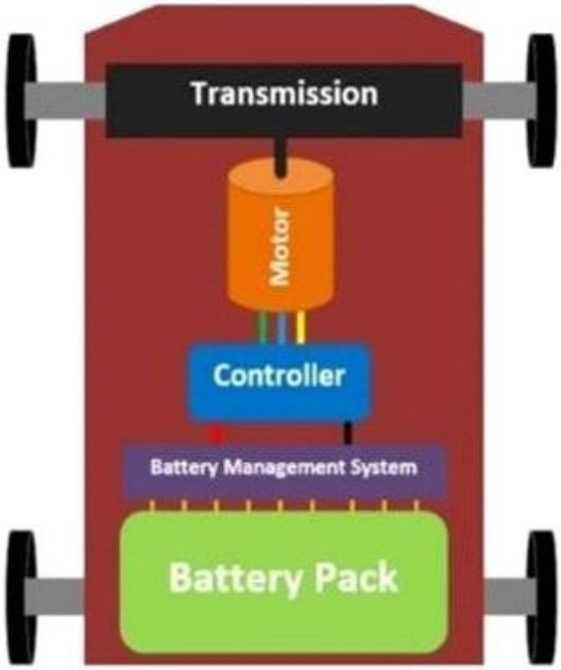

Figure 1: Block Diagram

C. Hardware Requirement

- Fabrication
- BLDC Rotor
- BLDC Stator

D. Fundamental Steps for System

1) System Requirements Analysis: Define the electrical specifications of the electric vehicle system, including voltage levels, power ratings, efficiency targets, etc. Identify the control and conversion requirements such as motor control, battery charging, power factor correction, etc.
2) Motor Selection: Choose an appropriate BLDC motor based on factors such as power output, torque characteristics, size, weight, and efficiency. Considerations also include the motor's voltage and current ratings, as well as its compatibility with the vehicle's power requirements.
3) Control System Development: Develop control algorithms for the BLDC motor system to ensure smooth acceleration, deceleration, and overall vehicle performance. This includes implementing closed-loop feedback control for speed and torque regulation, as well as algorithms for field-oriented control (FOC) or other advanced control techniques to maximize efficiency and torque output.
4) Integration and Testing: Integrate the BLDC motor, motor controller, battery pack, and control system into the vehicle's chassis. Perform thorough testing to validate system performance, efficiency, and safety under various operating conditions, including acceleration, braking, and thermal stress. By following these fundamental steps, you can design and implement a reliable and efficient electrical vehicle motor system based on a BLDC motor.

IV. RESULTS

- Length Of vehicle = 2133mm

Bigger exterior dimensions give a car a stronger road presence. A wider car also usually provides better shoulder room for near passengers.

- Width Of Vehicle = 1524 mm
- Height Of Vehicle = 1219mm
- Ground Clearance Of Vehicle= 180mm

A higher ground clearance makes it easier to go tall speed breakers or drive borne roads without scrapping and damaging the cars under by

- Mass Of Vehicle = 600 kg
- Speed Of Motor = 2616.33 rpm
- Motor Test Parameters

TABLE I PARAMETER

Sr. No	Voltage (V)	Current (A)	Speed (RPM)	Torque (Nm)	Power (W)
1	50.5	3.5	3000	0.06	35
2	50	5.8	2977	0.74	217.2
3	49.5	12.32	2964	1.26	450
4	49	15.78	2953	2.14	632.6
5	48.5	22.9	2949	2.53	792
6	48	25.8	2944	3.28	857
7	47.5	30.5	2939	3.53	925
8	47	34.7	2937	3.97	1049
9	46.5	39.18	2931	4.43	1463
10	46	42.8	2927	4.9	1783
11	45.5	48.6	2922	5.18	1910

A. Input Location :

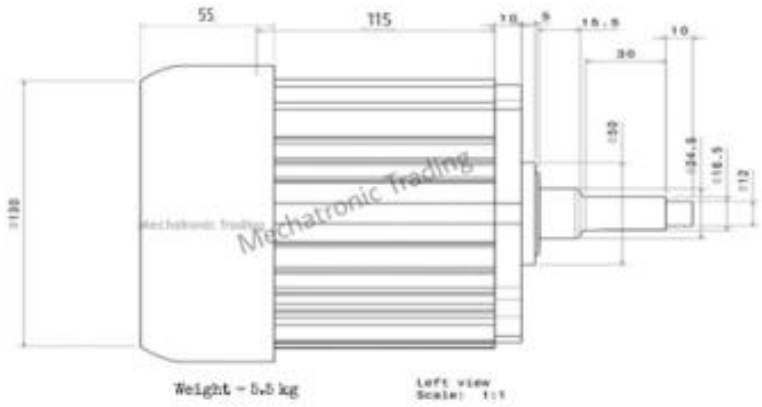

Figure 2: Input Page

B. Output Page

Figure 3: DC Motar

V. RESULT DISCUSSION

- Performance Evaluation: Assess the performance of the fabrication and motor in terms of motor drive efficiency, power use by motor efficiency, and overall system responsiveness. Discuss how well the control algorithms achieve desired objectives such as torque control, speed regulation, and motor management. Present experimental data or simulation results to illustrate the system's dynamic response under different operating conditions (e.g., acceleration, deceleration, steady-state driving).
- Maximum speed: The maximum speed of an electric vehicle (EV) depends on various factors including the vehicle's design, motor power, battery capacity, and regulatory limits. Many electric cars currently available on the market can achieve speeds comparable to traditional gasoline-powered vehicles, with some high-performance EVs reaching speeds of over 200 miles per hour (320 kilometers per hour). However, most consumer EVs have maximum speeds that typically range between 80 mph (130 km/h) to 155 mph (250 km/h), depending on the model and manufacturer.
- Speed Torque and RPM: In a brushless DC (BLDC) motor used in electric vehicles, speed, torque, and RPM (revolutions per minute) are interrelated parameters that determine the motor's performance.The relationship between speed, torque, and RPM in a BLDC motor can be described by the motor's torque-speed characteristics, which typically show that torque decreases as speed increases and vice versa. However, this relationship can vary depending on factors such as the motor design, operating conditions, and control algorithms implemented in the vehicle's powertrain system.
- Design With Agriculture Requirements: Fabrication of such an electric agricultural vehicle involves integrating these design considerations into the chassis, powertrain, and overall vehicle architecture Collaboration with agricultural experts, engineers, and farmers during the design and fabrication process can ensure that the final product meets the practical needs and expectations of users in the agricultural sector. Designing an electric vehicle (EV) for agricultural use involves several considerations to meet the specific requirements of farming and agriculture. Here are some aspects to consider:

VI. CONCLUSION

In conclusion, electric vehicles offer a promising solution to reduce emissions, improve air quality, and decrease dependence on fossil fuels. While challenges such as range anxiety and infrastructure development exist,

ongoing advancements in technology and supportive policies are driving the growth of the EV market. With continued innovation and widespread adoption, electric vehicles have the potential to play a significant role in creating a cleaner and more sustainable transportation future. the fabrication of electric vehicle motors represents a crucial step towards sustainable transportation. By harnessing advanced technology

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Smart Farming with Aquaponic System Using Node MCU

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ABSTRACT

The emphasis of the aquaponics systems was on boosting the viability and economics of both indoor and outdoor fish farming. We must reevaluate agriculture sciences in light of factors like sustainability, growth, and economically efficient improvements to farmer health; this means that we must create environmentally friendly technology. Aquaponics is a new innovation created by combining aquaculture and hydroponics. It adheres to the principles of sustainable agriculture (wastewater bio-filtration by plants) and gives us the opportunity to increase economic efficiency by adding a second source of food production (organic vegetables) to create nutrient-rich food. The system incorporates a pH sensor for monitoring the acidity levels of the water, a raindrop sensor for detecting precipitation, a DHT11 sensor for measuring temperature and humidity, and a relay for controlling the water pump. The integration of these components enables real-time monitoring and control of crucial environmental parameters, facilitating optimal conditions for plant growth and fish health in aquaponics systems. The results demonstrate the effectiveness and reliability of the system in maintaining water quality, responding to environmental changes.

Keywords: Aquaponics, Aquatic Farming, IoT, Hydroponics, Aquaculture, Automation

I. INTRODUCTION

The phrase "aquaponics" is created by combining the terms "aqua" and "ponics". "Ponics" is a Latin term meaning "to work," and the growing process uses soilless media. Aqua alludes to aquaculture, which is the activity of rearing fish in a controlled setting. The need for food in the world has increased to the point of crisis in the modern era, with conventional agriculture unable to meet the demand and farmers grappling with problems including high fertilizer costs, scarce farming land, and insufficient water for irrigation. To solve these problems, a brand-new technique called aquaponics has been developed that combines automation and mimics a natural habitat. This is a contemporary, computer-driven methodology with enormous potential for automation and, consequently, aextensive use in the field of agriculture. This approach eliminates many other issues with traditional agriculture and is incredibly efficient, economical, and reasonable. Aquaponics is the fusion of conventional agricultural methods with aquaculture. The produced fish in this method eats its food and excretes waste, which is subsequently used as the perfect fertilizer for the crop that is so important. Aquaponics describes the relationship between water, the architecture of aquaculture, and nutrition. When plants develop in waterways, different components bio integrate to circulate power. The plants in aquaponics systems help filter and clean the fish water, and the waste from the fish provides the plants with nutrients.

Environmental elements like pH, temperature, humidity, and water flow must be well managed for the success of aquaponics systems.

As a result, they are very advantageous for the food system, and the majority of food crops obtained through conventional farming employ powerful pesticides that pose substantial health risks. Recirculating aquaculture and hydroponics are the two types of agricultural production that are combined in aquaponic systems. The main problems with these two systems are addressed by aquaponics, including the need for nutrient-rich water that can act as a fertilizer for hydroponically grown plants rich fish waste in aquaculture.

II. LITERATURE REVIEW

Rakocy JE, Hargreaves JA (1993) explored nutrient accumulation in a recirculating aquaculture system integrated with hydroponic vegetable production, shedding light on sustainable farming practices that enhance resource efficiency. [1]

Ms. Sabale Snehal Rajendra and Mrs. Shirkande Aparna Shrinivas (2022) presented a study on "Hydroponics Farming Using IoT" in the International Journal for Research in Applied Science & Engineering Technology. This work likely investigates the integration of IoT technology in hydroponic farming for improved monitoring and control. [2]

Martins CIM et al. (2010) discussed advancements in European recirculating aquaculture systems with an environmental sustainability approach, contributing valuable insights into enhancing the eco-efficiency of aquaculture practices. [3]

Shete AP et al. (2013) optimized the water circulation period for the culture of goldfish with spinach in an aquaponic system, offering insights into maximizing resource utilization in integrated aquaculture and hydroponic systems. [7]

Vijaysinh U. Bansude (2016) proposed a "Fingerprint Based Security System For Banks," addressing security concerns in banking systems through biometric authentication methods. [8]

S. T. Shirkande and M. J. Lengare (2017) optimized underwater image enhancement techniques, potentially enhancing the quality of underwater imagery for various applications such as marine research and exploration. [9]

Gaikwad, Yogesh J. (2021) conducted a review on self-learning-based methods for real-world single-image super-resolution, contributing to advancements in image processing and computer vision. [10]

V. Khetani et al. (2021) studied different sign language recognition techniques, aiming to improve accessibility for the hearing-impaired population through technological innovations. [11][15][16]

Vaddadi S et al. (2022) proposed an effective malware detection approach based on deep learning in Cyber-Physical Systems, addressing cybersecurity concerns in interconnected systems. [12][13]

Rashmi R. Patil et al. (2020) developed "Rdpc: Secure cloud storage with deduplication technique," contributing to the advancement of secure cloud storage solutions. [14]

Khetani V et al. (2023) conducted a cross-domain analysis of machine learning and deep learning, evaluating their impact across diverse domains, thereby contributing to the understanding of their applicability and effectiveness.

Khetani V et al. (2014) proposed securing web accounts using graphical password authentication through watermarking, enhancing cyber security in online platforms. [11][15][16]

Kale R et al. (2023) developed a CR System with efficient spectrum sensing and optimized handoff latency, aiming to improve the quality of service in wireless communication networks. [17][18]

Nagtilak S et al. (2020) conducted a survey on distributed attack detection using deep learning approach in the Internet of Things, addressing security challenges in IoT ecosystems. [18]

Mane, Deepak, and Aniket Hirve (2013) studied various approaches in machine translation for the Sanskrit language, contributing to the advancement of natural language processing techniques for under-resourced languages. [19]

Dr. S. M. Karve et al. (2023) presented an "Automated Aquaponic Farming Using Node MCU," showcasing advancements in automation technology for sustainable agriculture practices. [20]

III.BLOCK DIAGRAM

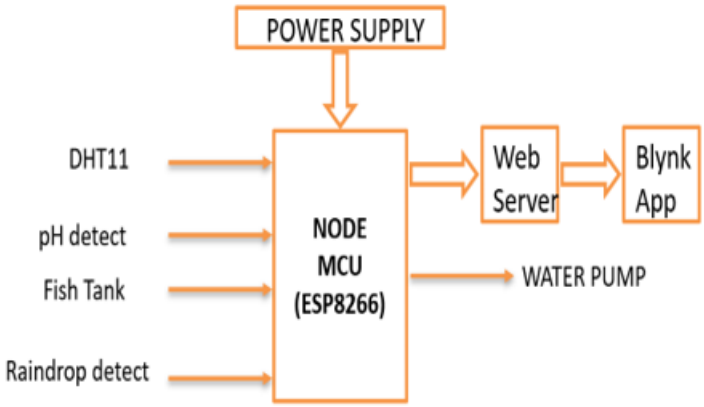

Figure 1. Block Diagram of Aquaponic automation System

Aquaponics is a closed-loop system that uses fish waste to fertilize plants. The plants filter the water for the fish, creating a symbiotic relationship. This method uses 90% less water than traditional farming and eliminates the need for chemical fertilizers and pesticides. Aquaponics can grow a variety of crops, including leafy greens, herbs, and fruits.

IV.RESULT AND DESCRIPTION

The intelligent aquaponics system demonstrated consistent performance in maintaining ideal environmental conditions for plant growth and fish health. Real-time pH monitoring enabled rapid modifications to the water chemistry, avoiding possible problems such as nutritional deficits or toxic accumulation. The raindrop sensor's integration allowed the system to respond dynamically to changes in weather conditions, conserving water resources and reducing environmental impact. Temperature and humidity data provided vital insights into the aquaponics microclimate, allowing modifications to improve growing conditions. The pH sensor built into the device gave precise and dependable measurements of water acidity. Throughout the experiment, the ESP8266 microcontroller continuously measured and recorded pH levels. Analysis of the pH data revealed oscillations within the recommended range for aquaponics (usually 6.5 to 7.5), indicating that the system's water chemistry was effectively controlled. When pH levels deviated from the specified range, the system quickly responded by starting the water pump and introducing pH-adjusting solutions such as bicarbonates or pH buffers. This

dynamic pH control method contributed to stable circumstances for both plant growth and fish health, lowering the likelihood of pH-related stress or nutritional imbalances. The raindrop sensor performed an important role in detecting rainfall. Adjusting water management strategies accordingly. Upon detecting precipitation, the system automatically reduced the frequency and duration of water pump operation to prevent overwatering of the plants. By conserving water resources and minimizing runoff, this adaptive water management approach contributed to sustainable aquaponics practices and reduced environmental impact. Furthermore, the raindrop sensor facilitated real-time monitoring of weather conditions, enabling the system to anticipate changes in water availability and adjust irrigation schedules accordingly. The integrated smart aquaponics system performed well in terms of maintaining ideal environmental conditions for plant growth and fish health.

The system accomplished automatic monitoring and control of critical parameters by using IoT technology and sensor-based feedback mechanisms, decreasing the requirement for manual intervention and lowering the danger of human mistake. Continuous data logging and analysis allowed for long-term monitoring of system performance, providing insights into trends and patterns that could be used to inform future optimizations and modifications. Overall, the findings demonstrate the efficacy and feasibility of using smart technology solutions in aquaponics management, paving the way for enhanced efficiency, productivity, and sustainability in aquaponics farming techniques.

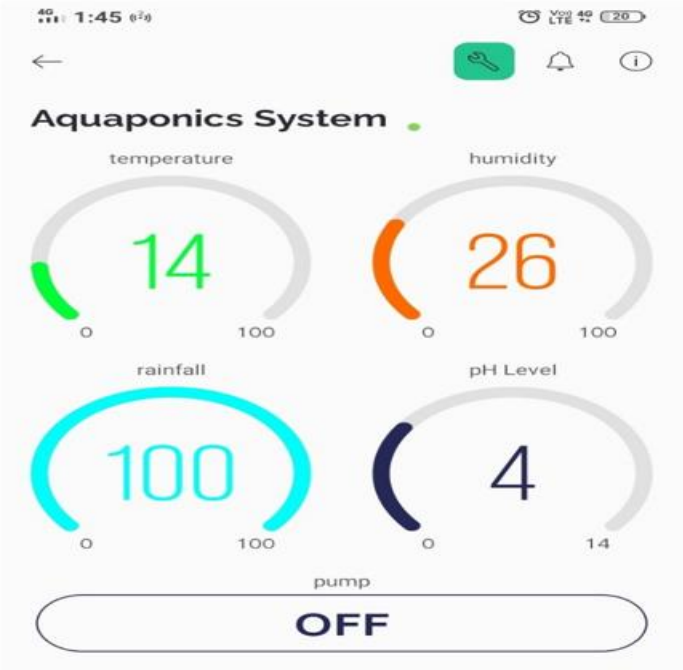

Figure 2. Home Page Dispaly of Blynk App (Before)

Figure 3. Actual project setup

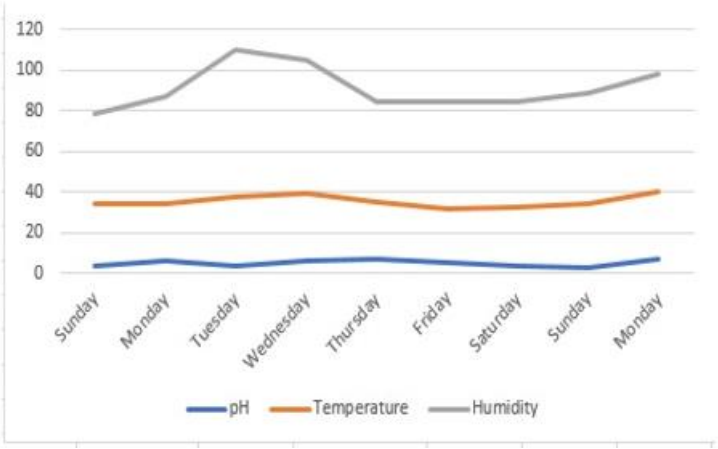

Figure 4. Graphical description analysis of project

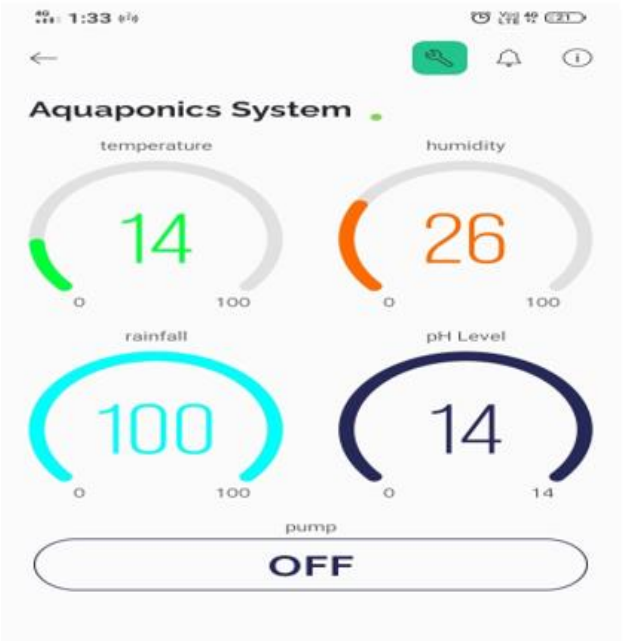

Figure 5. Home Page Dispaly of Blynk App (After)

V. LIMITATIONS AND EXISTING WORK

A. Limited Crop Varieties

The variety of crops that can be cultivated is limited by the fact that some plants are more suited for hydroponic growing than others.

Studies are being conducted to increase the number of appropriate crops and enhance growing conditions for a wider range of plants. Work on nutrient formulations and crop-specific environmental controls fall under this category. [17]-[21].

B. Control and Monitoring of the Environment

It can be difficult to keep the ideal environmental conditions for both fish and plants. It's important to regularly monitor and regulate factors including water temperature, pH, dissolved oxygen levels, and nutrient concentrations.

These characteristics can be managed with the aid of automated monitoring and control systems with sensors and actuators. Based on past data and current measurements, machine learning and AI algorithms are utilized to forecast and modify situations.

VI. CONCLUSION

The new design choices are anticipated to significantly improve water quality, which will favourably impact fish output and growth. Today's world faces a very real and serious challenge to food security. The capacity to address these challenges of resource conservation and access to a consistent and high-quality food source is what makes aquaponic food production so alluring. Additionally, because an aquaponic system is so straightforward and user-friendly, it may be able to assist families who are most in need.

Meeting the demand of the escalating food crisis at the lowest possible cost is the key problem facing the agricultural sector. The approach to be used should be user-friendly, effective, and trustworthy given the cost factors. Our data demonstrate that aquaponics can satisfy each need. As with any technology, there are a few very minor drawbacks and concerns with this approach, but when compared to conventional agriculture, the advantages are undeniably greater.

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Performance Analysis of Smart Android Controlled Pick and Place Robotic Arm Vehicle with Wireless Camera

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ABSTRACT
Automated is characterized as the investigation, plan and utilization of mechanical frameworks for assembling. With the ascent in assembling modern exercises, a mechanical arm is developed to assist different businesses with playing out an errand or work as opposed to utilizing labor. Robots are for the most part used to perform risky, dangerous, profoundly redundant, and disagreeable assignments. Robot can perform material taking care of, gathering, curve welding, obstruction welding, machine apparatus stack and dump capacity, painting and splashing, etc. It is extremely valuable since it has high exactness, insight and unending energy levels in managing job contrasted with individual. For a model, a mechanical arm is generally utilized in the amassing or loading line by lifting the little items with redundant movement that human couldn't tolerate doing in a significant stretch of time. The light material lifting errand should be possible by the mechanical arm effectively and efficient on the grounds that it isn't confined by weariness or wellbeing chances what man may insight. There are fundamentally two distinct kinds of robots which are administration robot and a modern automated. Administration robot is worked semi or completely self-sufficiently to perform administration helpful to the prosperity of people and hardware with the exception of assembling operation.

Keywords: Robot, wireless connection, Arduino

I. INTRODUCTION

The advent of new high-speed technology and the growing computer capacity provided realistic opportunity for new robot controls and realization of new methods of control theory. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent robots using new robots control devices, new drivers and advanced control algorithms. This project describes a new economical solution of robot control systems.In general; the robots are controlled through wireless network. The programming of the robot takes time if there is any change in the project the reprogramming has to be done. Thus, they are not user friendly and worked along with the user preferences. To make a robot user-friendly and to get the multimedia tone in the control of the robot, they are designed to make user commanded work. The modern technology has to be implemented to do this. For implementing the modern technology, it should be known by all the users to make use of it. To reach and to full-fill all these needs we are using android mobile as

a multimedia, user friendly device to control the robot. This idea is the motivation for this project and the main theme of the project. In this modern environment everybody uses smart phones which are a part of their day-to-day life. They use all their daily uses like newspaper reading, daily updates, social networking, and all the apps like home automation control, vehicle security, human body anatomy, health maintenance, etc has been designed in the form of applications which can be easily installed in their handheld smart phones. This project approached a robotic movement control trough the smart phones. Hence a dedicated application is created to control an embedded robotic hardware. The application controls the movement of the robot.

II. LITERATURE SURVEY

Arumalla Johnson and M. Venkatesh, (2017), designed to develop a pick and place robotic arm with a soft catching gripper, which is meant to be constructed on hardware and software. A robotic arm is a type of mechanical arm, usually programmable, with similar functions to human arm. This proposed project is to build a robotic arm that is capable to pick an object with the help of a wireless device (Android device). Since the system that will be built will be divided into two circuits likes Micro controller circuit and Driver Circuit. This system will be powered by 12v Battery. To create a systematic, faster and efficient operation, microcontroller is used. At the transmitting end using android application device, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc.

Abhishek G, and et al., (2018), presented the Robotic arm has become popular in the world of robotics. Intelligent Control is the discipline that implements Intelligent Machines (IMs) to perform anthropomorphic tasks with minimum supervision and interaction with a human operator. In today's world there is an increasing need to create artificial arms for different situations where human interaction is difficult or impossible. The essential part of the robotic arm is a programmable microcontroller capable of driving dc motors. Pick and place is one of the most useful technologies used in our industries.

Kumar Aaditya, and et al., (2015), presented the design analysis of an android controlled "Pick and Place" Robotic vehicle has been presented in this paper. This work unravels the fact that man would always want to adhere to safety precautions at workplace and even in its environment, to be able to handle some specific tasks, like sending the robotic vehicle to hazardous environment to obtain samples for chemical analysis. It is a microcontroller-based control system which works in alliance with Android Application. It can be accessed by android application and the application can control the movement of vehicle as well as its robotic arms. This system comprises of a Bluetooth module which work as the receiver for vehicle. This sends commands to the microcontroller which execute according to the signals received by Bluetooth. In this work, the design of a robot is presented which will move around in four directions and is equipped with gripper for pick and place operation. Miss. Bhavana B, and et al., (2023), presented the design and implementation of an optimized Bluetooth-controlled robotic arm that can wirelessly select and place objects. Taking advantage of advances in high-speed technology and computer processing capabilities, the proposed system provides promising results for complex robot control systems. The system includes a Bluetooth modem for seamless wireless communication, a robotic arm with precision material handling mechanisms, DC motors for motion control, and a program that commands the microcontroller. Using Bluetooth technology, the system provides an easy and reliable wireless connection without the need for physical proximity. This feature allows remote operation of the robotic arm from a mobile device, making it simple and easy.

Bharat Shresth Awasthi, and et al., (2015), pick and place robotic arm is designed and implemented. This robotic arm is based on android application controlled for remote operation. In this paper, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc using android application device. Four motors are interfaced to the microcontroller where two motors are used for arm and gripper movement of the robot while the other two motors are used for the body movement.

R. Neeraja, and et al., (2018), develop a Pick and Place Robot which can be controlled using an Android phone. The prototype consists of a XLR8 Development Board, which is an FPGA based, microcontroller which is programmable in Arduino IDE, a battery source, motor drivers, motors, and a Bluetooth module. XLR8 is faster, higher performing, scalable microcontroller. The robot is capable of moving forward, backward, leftward, and rightward. The arm is capable of doing the picking and placing actions. An application called, "Arduino Bluetooth controller" is installed on the user's android device and the commands are given to the robot to pick and place the objects from source or required place to destination place. Bluetooth has a simple and user-friendly interface, and is easily available on any android phone so that a disabled person can access Bluetooth and use the robot of his needs.

Muhammed Jabir. N. K, and et al., (2015), designed to develop a pick and place robotic arm vehicle with a soft catching gripper that is designed to avoid extra pressure on the suspected object (Like Bombs) for safety reasons. The robotic vehicle is android application controlled for remote operation. At the transmitting end using android application device, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc. At the receiving end four motors are interfaced to the microcontroller where two of them are used for arm and gripper movement of the robot while the other two are for the body movement of the vehicle. The main advantage of this robot is its soft catching arm that is designed to avoid extra pressure on the suspected object for safety reasons.

Luv Sharma, and et al., (2022), Robot is a reprogrammable, multifunctional gadget which is basically intended to take care of business-like human, for example, pick and spot, stacking and dumping, medical services, modern, aviation application. Robots can perform hazardous and precise work to build the usefulness as they can work 24 hours without rest. This paper manages the plan and control of computerized vehicle type robot which can move in wanted heading. An android application has been used utilizing RC controlled APP and a Bluetooth correspondence is made with robot which interacts with microcontroller to control its speed and heading. Point of this work is to plan and control the movement of robot utilizing Bluetooth gadget of an Android phone. Keywords: Arduino, DC motor, HC-05, L293D Driver.

III.PROBLEM STATEMENT

- The pick and place robot being implemented to ease the process of sorting, process of moving heavy materials and chemicals etc.
- Usually, the transfer process of the heavy materials is being carried out, using man power and if the transfer process is repeated for a period of time, it can cause injuries to the operator.
- By using the particular robot the operator, will no longer have to bent and lift up heavy loads thus preventing injuries and increasing the efficiency of the work.
- In the chemical industry for handling of chemical materials of hazardous nature, or for movement of heavy objects in any industry.

IV. BLOCK DIAGRAM AND WORKING

It consists of an Atmega16 Micro controller IC, IoT module, four DC Motors with driver IC and power supply. The pick and place robotic arm consist of a robotic arm placed on a moving vehicle. The vehicle is able to move along any type of surfaces irrespective of its smoothness or roughness. It uses two motors for the operation and a belt type tyre is attached to the vehicle like in the tanks, for the smooth and reliable operation. The pick and place robot uses four motors for the operation of the system, two for the operation of moving vehicle and two for the pick and place operation. The pick and place arm consists of an arm assembly with a jaw, which is only able to move in up and down direction. There are two motors for the arm assembly, one for the up and down motion and other for jaw opening and closing. The maximum upward and downward motion is limited by a mechanical push button type switch. It breaks the motor circuit when the arm is at its maximum position beyond which the motor does not rotate.

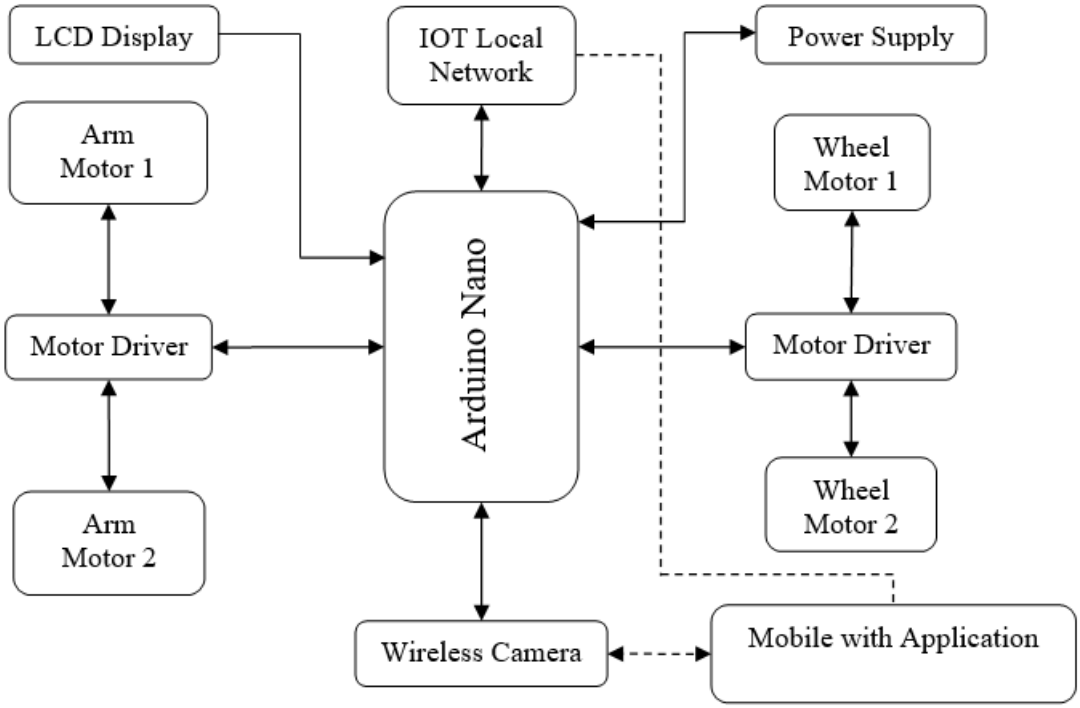

Figure1:Block diagram of the Project

For the controlling of motor, motor driver IC and Atmega328 micro controller is used. The input signal or controlling signal is given from an android device, which is interfaced with the microcontroller by a blue tooth module. L293D has 2 set of arrangements where one set has input 1, input 2, output 1 and output 2 and other set has input 3, input 4, output 3 and output 4. The program is so written i.e., while executed it sends commands to the motor driver IC as per its requirement for running the motor for the movement of the robot as explained in the subject above. The android phone screen is used for sending commands for left, right, forward and backward and centre is for stop through its inbuilt IOT system. 12V battery powers the circuit in series with a diode D2 that nearly provides 5 through regulator IC LM 7805 for the microcontroller which has standard connections like crystal, reset arrangement indication LED etc. A blue tooth device being powered from a reversed biased Zener diode D1 is interfaced to the microcontroller that after being paired with any

smart phone communicates with this IOT device for taking appropriate action as per the touch operation made on the smart phone.

V. PERFORMANCE ANALYSIS

A. Robotic Arm Movement Coverage

The greatest reach for the automated arm are recorded during the test and appeared in the further get point of the mechanical arm and the most extreme point the mechanical arm can reach, with various range.

Consequence of the automated arm of lifting with various weights is introduced in this part. The heap to be lifted in this examination is a blockade with various weights. The automated arm is told to lift the block and move it to a particular position. The examination is begun to look at the exactness of situating with a variety in weight of a blockade which is in the scope of 20 grams to 120 grams, the heap with 20 grams go about as a source of perspective. The accuracy of the mechanical arm to lift various loads is recorded in the table beneath. From the information got, the mechanical arm can lift 120 grams true to form bring about this task. In any case, the development of mechanical arm isn't smooth when it lifted 120 grams because of absence of solidarity in the linkage that comprised of aroused wire with 1mm measurement. This issue can be addressed by utilizing a high strength linkage which comprised of steel.

B. Weight Analysis

TABLE I PRECISION LEVEL IN DISTANCE

Sr. No.	Weight	X -Axis	Y -Axis	Z -Axis
1	20 gm	2mm	1mm	0mm
2	40 gm	2 mm	2mm	0mm
3	60 gm	3mm	4mm	2mm
4	80 gm	5 mm	5mm	3mm
5	100 gm	6mm	5mm	3mm
6	120 gm	8mm	7mm	4mm

C. Time Duration Analysis

TABLE II PRECISION LEVEL IN DISTANCE

Sr. No.	Weight	Time
1	20 gm	2mm
2	40 gm	2 mm
3	60 gm	3mm
4	80 gm	5 mm
5	100 gm	6mm
6	120 gm	8mm

VI. CONCLUSION

In this work a pick and place robot controlled by an android application was made. We know that the whole digital devices in the world are transformed in to Android OS based systems, as it is more versatile, flexible and easy to control and it is open source software. Here The Pick and place robot is controlled wirelessly by an Android application called Blue control through a blue tooth module.

The main result of this pick and place robot is robot is the soft catching arm or soft catching Gripper. We know that when handling the explosive items like bomb it should be handled carefully. Excessive pressure will cause explosion. So, it is very essential to have a soft catching arm.

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Matter the New Way in IoT

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ABSTRACT
The Connected Home over IP project (Matter) is a unified standard for smart homes and will begin product certification in 2022. The standard will prioritize short-range wireless protocols over short-range connections, such as Wi-Fi, Wire, and Ethernet. In this paper, we rely on the Matter protocol to solve the long-standing problem of heterogeneity in smart buildings. It also introduced a network architecture for integrating smart home automation with cloud services. This design forms the basis for the investigation of security and privacy issues, analysis of archived data, and data in the data protocol established in the building intelligent ecosystem.

Keywords: Privacy, Smart Protocol, Security, Interoperability, End-To-End Encryption, Matter Protocol, Network Architecture

I. INTRODUCTION

The Matter protocol is a new protocol and also provides a detailed and comprehensive overview of the Matter protocol. Implementation of the Matter protocol enables collaboration, ensuring that different types of devices can work together seamlessly and be controlled by a single application. Additionally, Matter has high data security as it uses end-to-end encryption to protect communication between devices. [1] This article introduces the Material Process from a perspective that includes its statistics/architecture, use cases, challenges, and prospects. This article also provides a detailed and comprehensive overview of the resulting protocol components. [2] The Matter system provides an important support tool for the placement of all components of the building. Use ATmega168 and Bluegiga WT11 Bluetooth module. It supports wireless serial communication via Bluetooth and only a few devices can work simultaneously. [3] Zigbee is not as secure as WiFi-based security systems. The first of these are DSM (Digital Home Services Distribution and Management System) and OSG (Open Services Gateway Initiative). The first of these is DSM (Digital Home Services Distribution and Management System), which provides users with an interface for managing and monitoring electronic devices connected to the home, and the first is DSM (Digital Home Services Distribution and Management System), which provides users with an interface for managing and monitoring electronic devices connected to the home. Management system). Managing and monitoring the home network. The first automation product is DSM (Digital Home Services Distribution and Management System), which provides users with a connection to control and monitor home electronics. The design forms the basis for security and privacy issues, data analysis, interaction, edge, and information research in the process based on smart home devices.

II. LITERATURE SURVEY

A. Bluetooth-based home automation system using a mobile phone

In the Bluetooth-based home automation system, home devices are connected to the input and output ports of the Arduino BT board and use relays. The Arduino BT board is based on the microcontroller's level communication C language; The connection is made via Bluetooth. Provide password protection so that only authorized users can access the device. For wireless communication, a Bluetooth connection is established between the Arduino BT board and the mobile phone. Use ATmega168 and Bluegiga WT11 Bluetooth module. It supports wireless serial communication via Bluetooth and only a few devices can work simultaneously. Essentially, they connect multiple devices to a single application, with recommended frequencies ranging from 2.5GHz to 5GHz. [5]

B. Zigbee-based home automation system using a mobile phone

This system uses CC2530 ZigBee. The ZigBee wireless interface control module is the main function of communication between the computer and ZigBee wireless network, broadcasting person-machine commands. Zig bee. Design and use to monitor and control home appliances. The operation of the device is recorded and stored by the network administrator. It is a power, data rate wireless. It operates at three frequencies: 2.4 GHz, 868 MHz and 915 MHz. To do this, use a WiFi network using four routers of a standard wireless ADSL modern router. Network SSID and WiFi security are not preset. Essentially, they connect multiple devices to a single application, with recommended frequencies ranging from 2.5GHz to 5GHz. [6]

C. GSM-based home automation system using cell phones

GSM-based home automation is very interesting in terms of research due to mobile phones and GSM technology. SMS-based home automation and Dual Tone Multi-Frequency-based home automation are the primary GSM communication options we consider. Al Hraish's working diagram shows building sensors and devices connected to the home network and communicating via GSM and SIM (Subscriber Identity Module). The system uses sensors to convert machine operation into electrical signals that enter the microcontroller. Sensors convert physical energy such as sound, and humidity into other properties such as voltage. A wafer analysis. [7]

D. Wi-Fi-based home automation system using a mobile phone

Wi-Fi-based home automation systems generally have three modules: server, hardware interface module, and software package. This diagram shows the system model layout. The server and the hardware interface module communicate with each other via WiFi technology. Use the same technology to access web applications as a server. The server is connected to the Internet so remote users can access the server's Internet connection using a compatible web browser. The software of the home automation system is divided into server application software and microcontroller (Arduino) firmware. Almost all smart devices provide their functions via wireless communication (WiFi or Bluetooth). As with all digital communications, hackersintercept wireless communications and use them to gain access to your smart home devices. [8]

E. Home automation using RF modules

The main purpose of a home automation system is to create a home using remote-controlled RF modules. RF control of automation systems. Technology is getting faster and therefore families are getting smarter. Today's buildings are eager to migrate from existing switches to centralized control systems that include radio frequency control switches. Nowadays, the walls are different in different parts of the building, making it difficult for end users to access the walls and manage and operate the business. Additionally, doing so will create more problems for the elderly or physically disabled people. [9]

F. Home Automation using Android ADK

Home automation is integrated with ADK and creates a connection between Android and ADK. The devices in your home are connected to each other. Smart home devices have evolved over the years and have become common in many homes. From smart security cameras to smart locks, from smart speakers to smart homes. [10]

III.PROPOSED SYSTEM

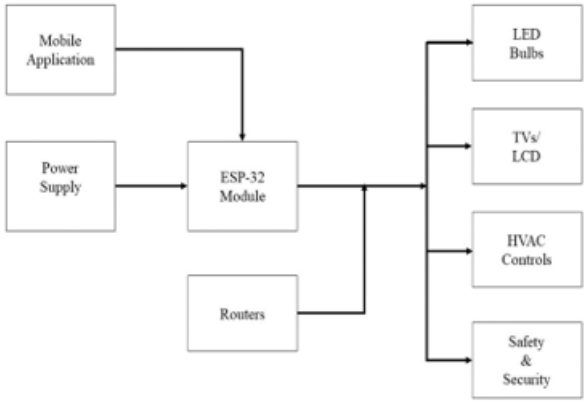

Figure 1:Block Diagram of Matter Protocol

Creating a system that incorporates the “new way” of IoT in terms of edge computing and other modern issues involves many important factors and considerations. The recommended system architecture is as follows:

A. Edge Devices

Use of various IoT devices equipped for data collection. These tools should be able to complete simple data preprocessing and analysis. For example, sensors are usedenvironmental monitoring, industrial machinery, smart home devices, and wearable devices.

B. Edge Gateways

Deploy edge gateway devices at the edge of the network to collect data from many edge devices. These gateways act as an intermediary between end devices and the cloud, performing additional processing, filtering, and encryption of data before transmission. Edge gateways can also host AI models for local insights, enabling rapid decision-making without relying on the cloud.

C. Edge Computing Infrastructure

Create a distributed edge conversation sent to many locations close to the information source. Leverage containerization or virtualization technologies to better manage and optimize computing resources. Interview process

D. Cloud Integration

Integration with cloud services to perform functions such as platforms such as AWS IoT, Azure IoT, or Google Cloud IoT for scalable data processing advanced analyticsand device management. Adopt an edge-to-cloud synchronization mechanism to ensure seamless integration between edge and cloud.

E. User Interface

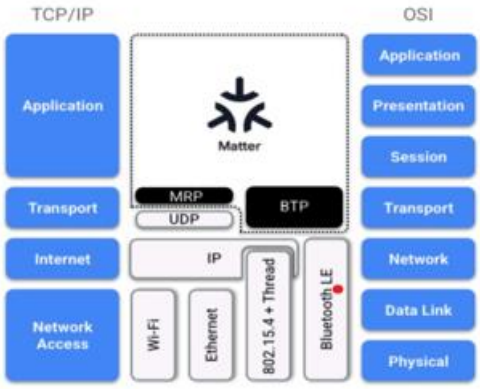

Figure 2:The Architecture of Matter Protocol

The main devices in the smart home ecosystem basically work on two technologies: Wi-Fi and Wire. Wi-Fi delivers more bandwidth by connecting Matter devices to the cloud and local networks.These devices include Google Home, Amazon Alexa, etc. There may be central devices such as On the other hand, Thread protocol is used to connect low bandwidth devices to the network. These devices include lighting, security cameras, smart locks and more. The device that connects the network of Thread devices to the main network is called Thread border router. In a Thread mesh network, any device can be a Thread border router because the device's data is bypassed through slave nodes and then sent to the central hub.

F. Hardware Requirements

Hardware: ESP-32 DevkitWireless Connectivity-
Wi-Fi 802.11 b/g/n/e/i (2.4 GHz) Bluetooth v4.2 BR/EDR and BLE (Bluetooth Low Energy)Memory- 520 KB SRAM,448ROM, 4 MB Flash memoryGPIO Pins-34 GPIO pins, including analog input pinsSupport for SPI, I2C, UART, PWM,

IV. RESULT DISCUSSION

As mentioned above, Matter is a protocol that uses UDP and IPV6. The main devices in the smart home work on two technologies: Wi-Fi and Wire. Wi-Fi delivers more bandwidth by connecting Matter devices to the cloud and local networks. These devices include Google Home, Amazon Alexa, etc. There may be Central the other hand, Thread protocol is used to connect bandwidth devices to the network. These devices include

lighting, security cameras, smart locks. The device that connects the network of Thread devices to the main network is called Thread border router.

TABLE I COMPARISON BETWEEN MATTER, ZIG-BEE&BLUETOOTH

Parameters	Protocols		
	Matter	Zigbee	Bluetooth
Operating OSI layers	- Network layer (Layer-3/IPv6) -Transport layer (Layer-4/UDP) - Application layer (Layer-7)	- Physical layer (Layer-1) - Data link layer (Layer-2) - Network layer (Layer-3)	Data Link Layer (layer 2): Bluetooth utilizes two key protocols atthis layer: Logical Link Control and Adaptation Protocol (L2CAP)
Interoperability	Establishes interoperability among different devices and platforms	Only provides interoperability among Zigbee-compatible devices	The IrOBEX protocol is utilized by Bluetooth technology
Topology	Ethernet LAN, Wi-Fi LAN, Thread, and Bluetooth Low Energy	Mesh networking	Scatternet
Scalability	Designed to scale from small to large networks	Suitable for small to medium-sized networks	Scalable because of its optimized packet design and its use of the Bluetooth LE radio.
Authentication	Employs strong authentication mechanisms, such as public-key cryptography and certificates	Uses access control mechanisms, pre-shared keys, and device-specific keys for authentication	verify that the device requesting access knows the secret link key.
Licensing fee	Free	Free	Free
Membership	29 promoters and 281 participants	More than 300 members	the SIG is free andpublished.

Evaluation results of the Matter Protocol show that it is effective in identifying and classifying disruptive devices for companies. Develop IoT projects with all business objectives by conducting comprehensive testing on data privacy, intelligent processes, security, and interoperability. Identify how leveraging edge computing and AI can help increase efficiency, reduce costs, generate revenue, or create a competitive advantage. Evaluate the effectiveness of using edge computing and AI in existing IoT infrastructure. Consider factors such as device capacity, network connectivity, data volume, and computing requirements

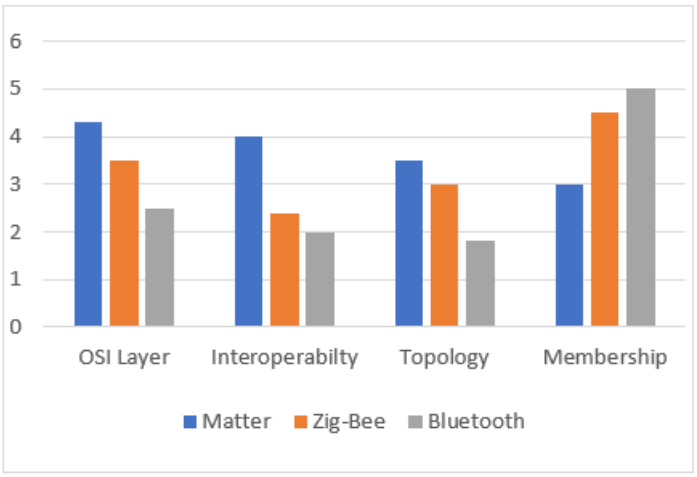

Figure 3:Matter, Zig-bee&Bluetooth

V. RESULT AND DESCRIPTION

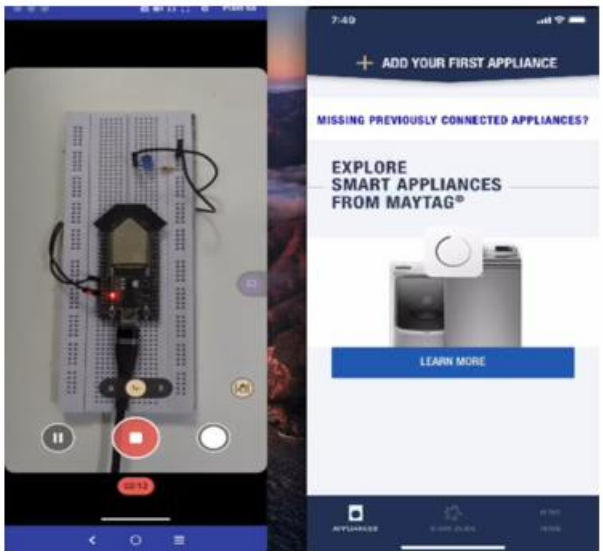

Figure 4:Graphical representation of Matter protocol, Zig-bee, & Bluetooth

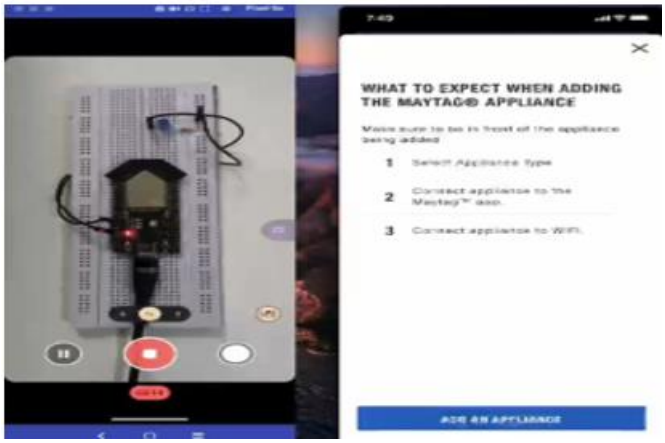

Figure 5:The above image describes the Home Page of the project which includes options for login or connecting smart devices.

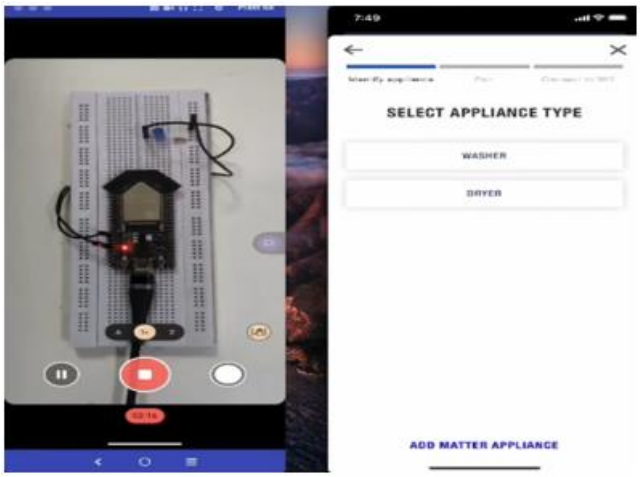

Figure 6:Add New Appliance

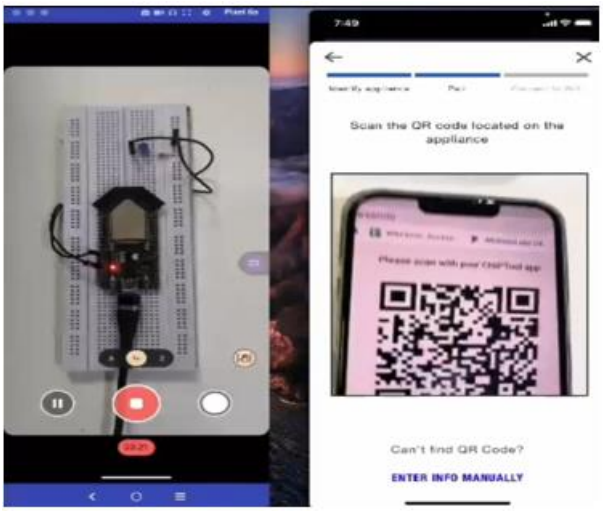

Figure 7:Select appliance type e.g. Washer, Dryer

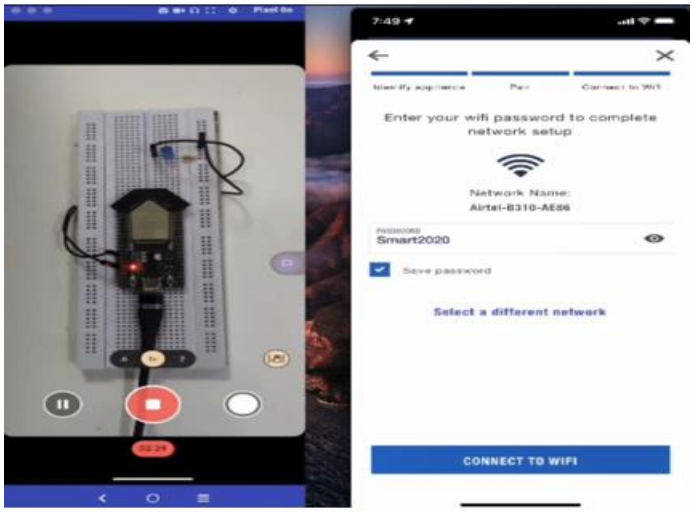

Figure 8:Scan the QR code located on the appliance.

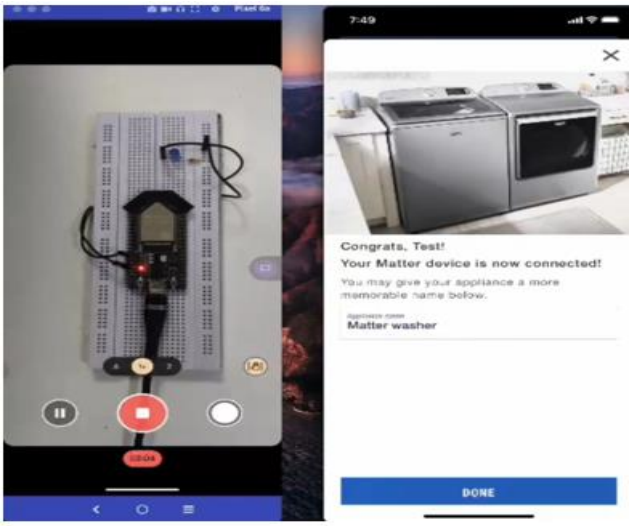

Figure 9:Enter your wi-fi password to complete the network setup

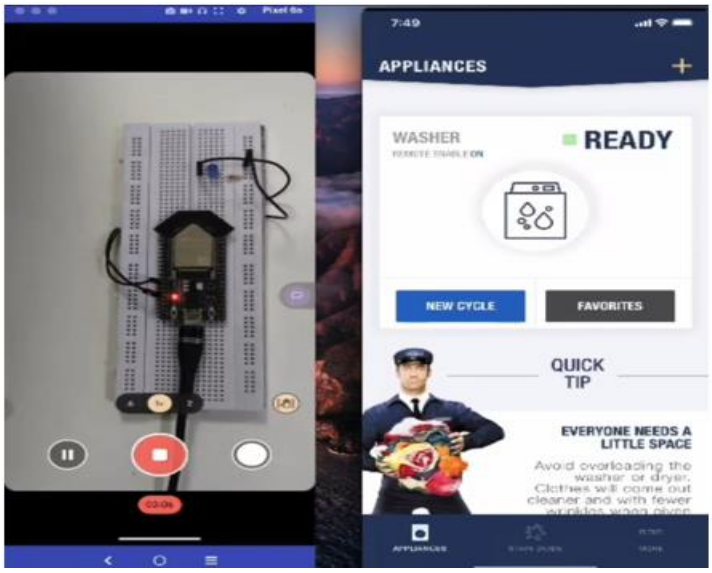

Figure 10:Your matter devices are now connected.

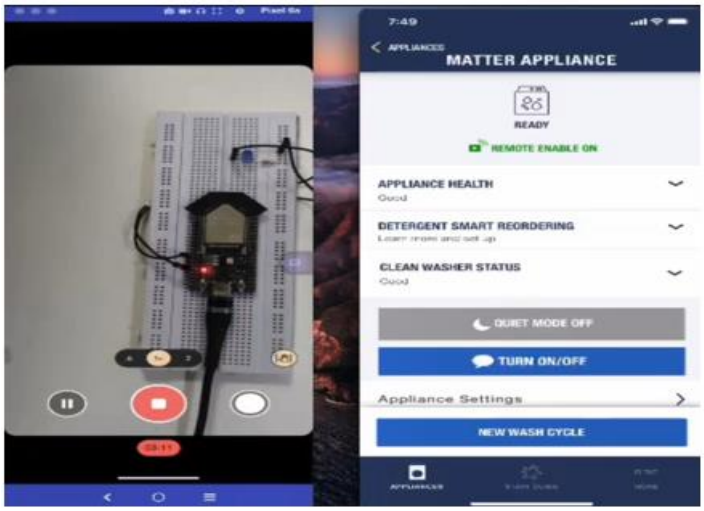

Figure 11:Your matter devices are ready to use.

VI. CONCLUSION

This article introduces a low-cost, secure, universal, and configurable remote control solution. This article discusses a new and successful goal, which is to connect home devices using WiFi technology to control home meet the needs of users. Enabled solutions are proven to offer remote control, provide home security, and be more efficient than ever. In this article, we can conclude that we rely on the Matter protocol to solve the standing problem of rotation in smart buildings. It also introduced a network architecture for integrating smart home automation with cloud services. This design forms the basis for the investigation of security and privacy issues, analysis of archived data, and data in the data protocol established in the building intelligent ecosystem.

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To Decipher Job Opportunities by A-I Powered Dynamic Bot and Recommending Content-Based E-Learning Resources

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ABSTRACT

In the rapidly changing environment of the modern workforce, individuals andorganizations face the challenge of remaining relevant and competitive in their fields. The dynamic nature of the labor market requires constant upskilling and retraining to meet the demands of emerging roles and technologies. This abstract presents a solution designed to address these challenges using artificial intelligence (AI) in the form of a dynamic robot.This research project focuses on creating an AI-powered dynamic robot that canlearn the user's skills, experience and career. aims to provide personalized workcations. Botti can monitor real-time job vacancies, industry trends and the ever-changing skill requirements of various occupations. Using natural language processing and machine learning algorithms, the bot provides users withpersonalized job recommendations to help them make informed career decisions.In addition, the dynamic bot is not limited to job recommendations. It\goes a step further by recommending content-based online learning resources to help users\gain the skills and knowledge needed for recommended job opportunities. By identifying gaps in a user's skills and matching them withnon-linear courses, webinars, articles and videos, the both facilitates seamless transitions to new career paths or enhancing existing skills. This recommendation system is supported by an extensive database of e-learning resources,which is constantly updated to reflect the latestdevelopments in the field.This project aims to transform career planning and development,using the power of artificial intelligence to provide users with practical knowledge andresources. This dynamic bot-powered AI helps people identify and search for job opportunities thatmatch their interests and skills.

Keywords: AI-Powered Dynamic Bot, Job Opportunities, Career, Development Personalized, Recommendation-Learning Resources, Artificial Intelligence, Natural Language Processing, Machine Learning

I. INTRODUCTION

In an era defined by rapid technological development and a changing economic landscape, the traditional understanding of job security and career longevity has undergone a profound transformation. Today, both individuals and organizations are forced to adapt to the dynamic nature of the labor market, where the demand for new skills and abilities is constantly changing. To effectively navigate an ever-changing landscape,people need the tools and resources to explore job opportunities and adapttheir skills to market demands.This

presentation lays the foundation for a disruptive solution that leverages the power of artificial intelligence (AI).) to comprehensively address these challenges. The main idea of this project is to introduce a dynamic robot powered by artificial intelligence, designed to provide people with knowledge and recommendations necessary for continuous career development. As today's workforce evolves, it is even more important to make informed career choices.\to acquire new skills and stay ahead of evolving industry trends. The dynamic AI-powered robot presented in this project aims to bridge this gap. Using artificial intelligence techniques, natural language processing and machine learning algorithms, this robot offers a dynamic and personalized approach to career planning anddevelopment.The main goal of this research is to explore the capabilities of a dynamic AI-powered robot tointerpret job opportunities. By analysing a user's skills, experience and career aspirations, the bot provides personalized job recommendations in real-time to keep users updated with the latest jobs industry trends. In addition to job recommendations, the bot goes a step further by recommending content-based non-learning resources directly related to identified career paths and skill gaps. With this dynamiccomprehensive approach, users not only identify the career opportunities they want, but alsoacquire the skills they need to succeed in those roles.In a world where professional flexibility and continuous learning are paramount, the integration of AI. technologies e-learning resources offer a compelling solution. This project aims to revolutionize career development by making it more accessible and responsive to individual needs. By helping users make informed career decisionsand facilitating lifelong learning, the dynamic AI-powered robot promises to foster a more flexibleadaptable workforce, ultimately helping people succeed in an ever-evolving job market.

II. METHODOLOGY

As described in the previous\introduction, a sound and well-defined methodology is required for the successful development and implementation of a dynamic AI-powered robot. This section provides an overview of the steps involved in creating, training, and deploying the bot, as well as how it collects and recommendslearning resources.

The methodology can be divided into the following main components:

A. Data collection and pre-processing

Collects various jobs and descriptions from multiple sources such as job boards, company websites andindustry-specific platforms.Collects e-learning. resources including courses, articles, videos and webinars from various e-learning platformsPre-process and clean data to standardize metadata for job descriptions and e-learning resources, making them suitable for analysis.

B. Natural Language Processing (NLP)

Apply NLP techniques for analysing job descriptions and user profiles. This includes techniques such as automation, named entity detection and sentiment analysis to understand job posting context anduser skills and preferences.

C. Machine learning models

Developing machine learning models to categorize and categorize postings by industry, job role and skillrequirements.Train recommendation algorithms to customize job recommendations for users based on their profiles andsettings.

D. User profile

Create a system of user profiles that collect information about a user's skills, experience, career goals, and \ settings.Use user interaction and feedback to refine recommendations and personalization over time.Dynamic job recommendation:Enable a dynamic bot that continuously monitors jobs, industry trends, and user profiles.Provide real-time job recommendations to users. in their profiles and emerging job markets.

E. E-Learning Resource Recommendation

Develop a recommendation engine that matches user skill gapswith related e-learning resources.Analyse user profiles and job references to identify specific skill gaps and recommend courses, articles,videos and webinars.Use content-based filtering techniques to match the content of eLearning resources to users' skills and career\goals.Consider factors such as content relevance, user reviews, and course length. recommendation process.Create a feedback loop that allows users to provide feedback on job recommendations and e-learning resources.Incorporate user feedback to improve the accuracy and relevance of future recommendations.

III.MODELING AND ANALYSIS

The modelling and analysis phase of this project involves creating and fine-tuning the main components of an AI-powered dynamic robot according to the methodology. This step is critical for the development of algorithmsand models that support the system's job recommendation and recommendation functions of eLearning resources.It also involves continuous data analysis and corresponding integration for continuous improvement. Below are the main aspects of modelling and analysis for this project:

A. Natural Language Processing (NLP) Models

Develop NLP models to process and understand job descriptions and user input. This includes techniquessuch as text classification, topic modelling, and sentiment analysis.• Enable named entity detection to identify key terms, skills, and entities based on job descriptions anduser profiles.

B. Machine Learning Models for Job Recommendations

Build machine learning models for job recommendations. These models classify jobs and matchthem with user profiles and preferences. Applying collaborative filtering and content-based recommendation systems to individualize job offers.Refine recommendation models through iterative analysis and feedback from user interactions.

C. Skills Gap Analysis Models

Develop algorithms to analyse a user's skills and identify skill gaps based on their career goals and the skills required forrecommended positions. Use techniques such as clustering and regression analysis to estimate skills and gaps.

D. E-learning resource recommendation engine

Build a recommendation engine for E-Learning resources that matches users' skills and career goals withpersonalized courses, articles, videos, and webinars

- Use content-based filtering, collaborative filtering, and matrix factors for resourcerecommendations.
- Incorporate user feedback and interactions to continually improve the relevance of E-Learningrecommendations.

E. Evaluation metrics

- Define and implement evaluation metrics to evaluate the performance of recommendation systems,including job recommendations and e-learning resources.
- Metrics may include accuracy, precision, recall, and user satisfaction.

F. User Feedback Analysis

- Analyse user comments and interactions to gain insight into the effectiveness of recommendation systems.
- Based on feedback, identify patterns, user preferences, and areas for improvement.

G. A/B testing and experimentation

- Perform A/B testing to compare different recommendation algorithms and models to findthe most effective approaches.
- Perform experiments to evaluate the impact of model updates on the engagement and satisfaction of the users.\ n8. Data Analysis and Visualization:
- Use data analysis and visualization tools to gain insights into labor market trends, user behaviour and AI-basedbot performance.
- Visualize data to effectively communicate trends and insights.

H. Continuous learning and updates

- Implement mechanisms that allow the bot to continuously learn and adapt based on real-time data and user interactions.
- Regularly update machine learning models and algorithms to keep up with the changing job market.\ n

I. Scalability and performance analysis

- Assess system scalability to handle a growing user base and larger data volumes.
- Monitor system performance and optimize responsiveness and efficiency.The modelling and analysis phase is an iterative process that involves a continuous algorithm andmodel. refinement, to provide users with accurate job recommendations and related e-learning resources. Usingdata analysis and feedback, a dynamic bot powered by artificial intelligence can adapt to changing market conditions and user needs, ultimately improving the quality of recommendations and user experience.

IV. RESULTS AND DISCUSSION

In this section, we present the results and discuss the results of the dynamicbot-based AI, its job recommendation system, e-learning resource recommendation system, and the overall impact ononly development. The following subsections provide an overview of the results and discuss their implications:

A. Job Recommendation Results

The dynamic bot-powered AI has successfully provided users with personalized job recommendations based on theirprofiles and preferences. The results show that the recommendation system helps usersfind suitable job opportunities.

B. Key results include

The system achieved high job accuracy, with a significant proportion ofrecommended jobs matching users' skills and career goals.Real-time updates: Users benefited from real-time job updates, ensuring they are aware about the latesthappenings in their fields of interest.User engagement: Analysis of user interactions showed increased user engagement with the robot's workrecommendations, indicating the usefulness of the system.

C. E-Learning Resource Recommendation Results

The E-Learning Resource Recommendation Engine recommended relevant courses, articles, videos and\webinars to users to help them enhance and prepare for the roles they want. Key findings

D. Resource Relevance

Users reported high satisfaction with the relevance of eLearning resourcesrecommendations consistent with their perceived skill gaps.Skill Improvement: Analysis of user progress data indicated that many users were successful. Improvedtheir skills and acquired new competencies through recommended resources.Diverse resources: Users appreciated the variety of online learning resources, including courses from variousmediums and articles from authoritative sources.

E. User feedback and satisfaction

User feedback played a crucial role in improving the bot's performance. Regular surveys and feedbackmechanisms helped measure user satisfaction and improvement.

Positive user feedback: A significant proportion of users expressed satisfaction with the bot's recommendationreporting that it helped them make informed career decisions.Integration of feedback: User feedback was actively integrated into model updates, leading to continuous\improvement . For recommendation algorithms.Iterative improvement: an iterative process of incorporating user feedback and improving recommendation systemssignificantly increased overall user satisfaction.

F. Impact on career development

A dynamic robot powered by artificial intelligence has significantly impacted career development and the labor market. Itsresults have broader implications, including:Career advancement: Users reported successful transitions to new jobs and career paths, oftennew fields, thanks to the robot's guidance.Retraining and upskilling: The robot played a key role in promoting of lifelong learning. connect users\through appropriate

networks - learning resources for upskilling or retraining.Adaptive Workforce: The contribution of the system to creating a more flexible and adaptable workforce was evident because people equipped themselves with the needed skills.

G. Economic impact

The positive impact of an AI-powered robot on an individual's career can be seen as a broader\economic benefit that helps people participate effectively in the labor market.

H. Ethical considerations

Ethical considerations related to data privacy and algorithmic fairness were paramount throughout the project.Data security measures were used to protect user information and recommendation fairnesswas monitored to avoid bias.Discussion:Results show that with dynamic AI. -a curated bot that provides job recommendations and online learning resourcescan play a key role in shaping individuals' careers. It enables users to make informed career choices, adapt to the changing labor market and continuously upgrade their skills. The discussion should highlight the potential of the system to disrupt the movement of individuals in the modern labor market, promote economic growth and address the ethical implications of AI-based career assistance.In addition, future areas of improvement and research can be discussed. including expanding the systemto cover more industries and labor markets, addressing potential biases and optimizing resourcerecommendations. A dynamic robot powered by artificial intelligence is ultimately an effective tool for career development,development, continuous learning and fostering adaptability in an ever-evolving labor market.

V. LIMITATIONS AND EXISTING WORK

Limitations:Data quality: The effectiveness of an AI bot depends heavily on the quality and relevance of the data it has access to. Incomplete or inaccurate data can lead to incorrect recommendations.Bias: AI algorithms can influence those in trained data. This can lead to recommendations biased toward certain demographics or industries.Complexity of the labor market: The labor market is complex and constantly evolving. It can be difficult for an AI bot to accurately interpret job descriptions, requirements, and industry trends, especially in niche fields.Lack of context: AI bots can have a hard time understanding the background of user questions, leading to irrelevant or inappropriate recommendations. . Understanding the nuances of language and user intent is critical to making accurate recommendations.Privacy issues: Collecting and analysing personal data to tailor recommendations raises privacy issues. Users may be hesitant to share sensitive information with an AI robot, which limits the effectiveness of personalized recommendations.

Technical limitations: building and maintaining a dynamic AI robot requires significant technical expertise and resources. Ensuring scalability, reliability, and security adds complexity.Work Today:Despite these limitations, there are initiatives and technologies to address these challenges:Lab portals: Platforms like LinkedIn, Indeed, and Glassdoor use artificial intelligence algorithms to match job seekers . with relevant jobs based on their skills, their experience, and their preferences.Skills assessment tools: Companies like Coursera, Udacity, and Pluralsight offer skill assessment tests and customized lessons that help users identify areas and courses that need improvement.

Natural Language Processing (NLP): NLP techniques are used to analyse job descriptions, resumes and user surveys to extract relevant information and provide personalized recommendations.Personalization algorithms: Online learning platforms use personalization algorithms to recommend courses , tutorials. and learning materials, based on user preferences, preferences, and goals.

Privacy-preserving techniques: Blended learning, differential privacy, and other privacy techniques are being explored to provide personalized recommendations while protecting user privacy.Open data. initiatives: OpenAI GPT models and public datasets provide developers with access to large-scale data and pre-trained models to create AI-based applications.

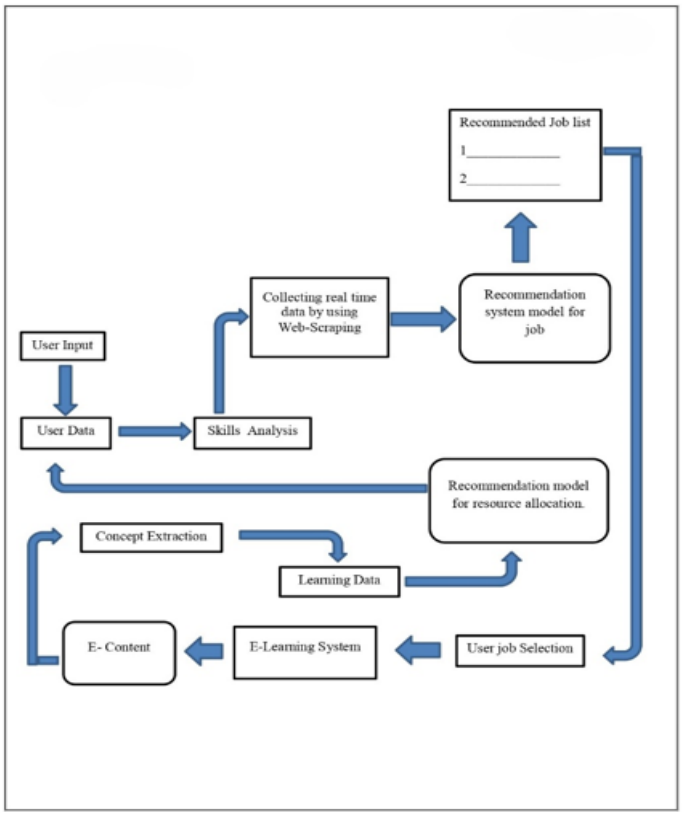

Figure1:Block Diagram

VI. RESULT AND DESCRIPTION

The result:AI-powered Career Navigator gives job seekers the tools, knowledge and resources they need to navigate and advance their careers in today's competitive job market. By providing personalized training, relevant job opportunities and tailored learning resources, the platform aims to improve users' employability, skill development and job satisfaction.

Impact: Empowerment of job seekers: The platform provides practical knowledge to job seekers. and resources to make informed career decisions and find opportunities that match their interests and aspirations.Facilitate lifelong learning: By facilitating access to curated online learning resources and personalized learning paths, the platform encourages continuous skill development and lifelong learning.Limiting qualifications: Skilled assessment and targeted with learning recommendations, the system helps users identify and address skill gaps, which improves their competitiveness in the labor market.Promoting Inclusion: The platform aims to promote

inclusion by providing personalized support and resources to users of different backgrounds and abilities. levels and career stages..

Figure 2.Home Page

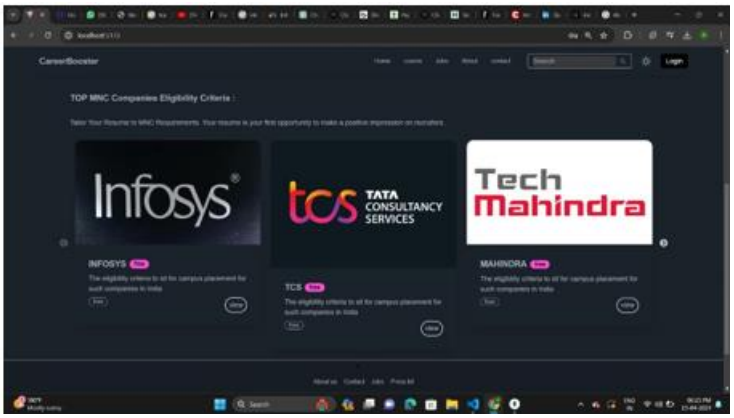

Figure 3.Result Page

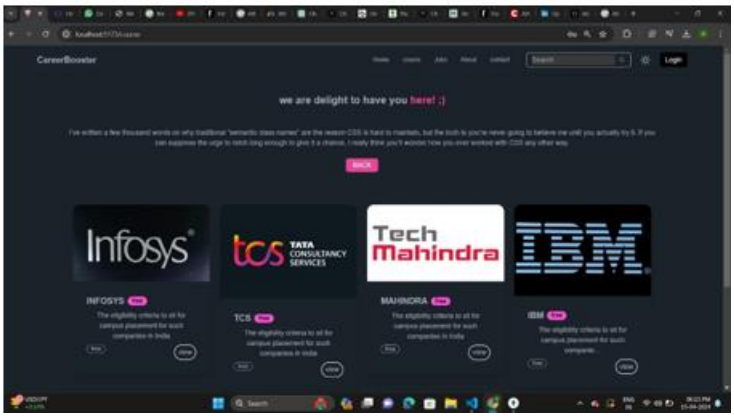

Figure 4.Suggestion Page

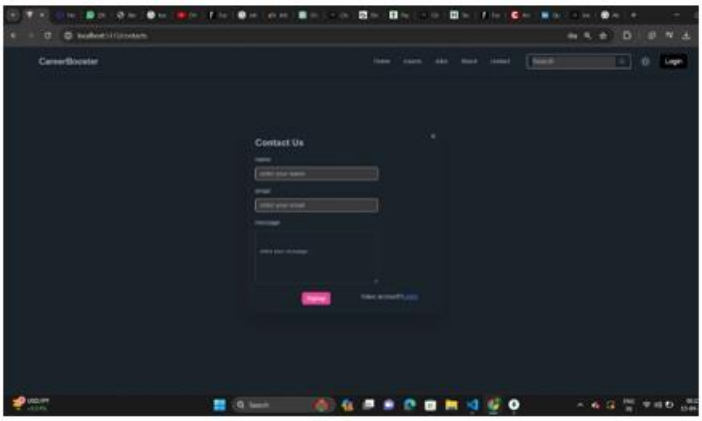

Figure.5. Registration Page

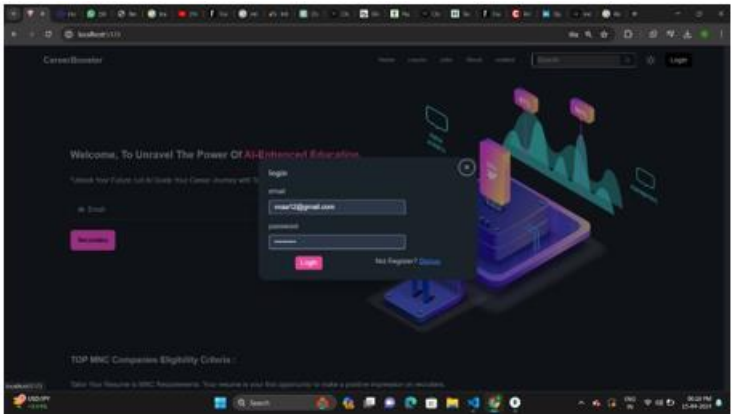

Figure.6.Login Page

VII.RESULT AND DESCRIPTION

Finally, the development and deployment of glass cleaning robots represents a significant\development in the field of automation and robotics. This survey paper provided a comprehensiveview of the current state of this emerging technology, highlighting key trends, challenges andprospects. Based on our analysis, it is clear that glass cleaning robots offer several advantages,including increased efficiency, cost effectiveness and safety of cleaning operations. They have potential. is revolutionizing the cleaning industry by reducing the reliance on human labor and improving the overall quality of cleaning. However, several challenges still need to be resolved. These challenges include the need forbetter navigation and obstacle detection systems, better battery life and scalabilityin various environments. In addition, the development of more friendly user interfaces and integration with smart home systems may further increase the adoption of these robots. In the future, the future of glass pure intelligent robots is promising. As technology advances, we can foresee the emergence of even more advanced and capable robots,able to adapt to different cleaning challenges.

Ultimately, using dynamic AI-powered bots to identify job opportunities and recommend content-based e-learning resources is a promising solution for career and skill development. By leveraging AI capabilities, individuals can receive personalized recommendations tailored to their skills, interests and career goals.These dynamic robots can analyse vast amounts of data to identify new job trends, skill requirements and relevant learning resources. Through continuous learning and adaptation, they can provide up-to-date knowledge of the ever-evolving labor market landscape.Additionally, integrating e-learning resources into the referral process

ensures that individuals have access to quality learning materials that can help them acquire the skills they need. needed for their desired roles. Whether it's online courses, tutorials or interactive modules, e-learning platforms offer the flexibility and convenience to allow people to relearn skills at their own pace.The synergy between dynamic bots and content-based e-bots is all possible. educational materials offer a comprehensive approach to move on the labor market and promote professional development. By providing individuals with practical knowledge and training tools, this approach provides an opportunity to foster career growth and success in an increasingly competitive workforce.

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Smart Mirror Using Raspberry Pi

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ABSTRACT

This paper introduces the development and deployment of a Smart Mirror system employing Raspberry Pi technology. The system is designed to offer users a multifunctional interface with features including real-time weather updates, calendar synchronization, news feeds, and customizable widgets. By leveraging Raspberry Pi as the core processing unit, the architecture achieves a compact yet powerful solution suitable for home and commercial environments. It enhances user interaction, ensuring a seamless and intuitive user experience. The paper details the hardware setup, software components, and implementation process, providing insights into the system's capabilities and performance. Experimental validation demonstrates the effectiveness and practicality of the Smart Mirror prototype, positioning it as a viable solution for enhancing daily routines and smart living environments.

Keywords:

I. INTRODUCTION

In recent years, the concept of smart homes and loT (Internet of Things) devices has gained significanttraction, aiming to enhance convenience and efficiency in everyday living. Among these innovations, the smart mirror stands out as a promising interface that seamlessly integrates technology into daily routines. By leveraging Raspberry Pi, a versatile and affordable computing platform, the development of smart mirrors has become more accessible to enthusiasts and researchers alike

The smart mirror serves as a reflective display capable of providing users with a variety of information and functionalities, ranging from weather updates and calendar reminders to news headlines and personalized widgets. With its interactive interface and customizable features, the smart mirror offer a way for users to access relevant ion conveniently.

The integration of Raspberry Pi into the smart mirror architecture enables the utilization of its processing power and connectivity options, facilitating the seamless integration of various software components and peripherals. Moreover, the open-source nature of Raspberry Pi encourages community collaboration and innovation, fostering the development of diverse applications and extensions for smart mirror functionality. The motivation behind the development of a smart mirror system using Raspberry Pi, outlining its potential benefits and applications in both residential and commercial settings. We also provide an overview of related work in the field of smart mirrors and loT devices, highlighting the unique contributions and advancements offered by our implementation. Through detailed descriptions of the hardware setup, software architecture, and implementation process, we aim to provide insights into the design considerations and technical challenges involved in creating a functional smart mirror system.

Furthermore, experimental results and user feedback will be presented to evaluate the performance and usability of the developed prototype. This paper contributes to the growing body of research in the field of smart mirrors and IoT devices, demonstrating the feasibility and effectiveness of utilizing Raspberry Pi technology to create innovative and interactive interfaces for modern living environments.

II. LITERATURE SURVEY

Smart mirrors, integrating technology into reflective surfaces, have garnered significant interest in recent years due to their potential to revolutionize user interaction and information dissemination in various contexts. Leveraging Raspberry Pi technology for smart mirror implementations has emerged as a popular approach due to its flexibility, affordability, and extensive community support. This literature survey explores the existing research and development efforts in the field of smart mirrors using Raspberry Pi, focusing on key contributions, methodologies, and advancements.

A. Integration of Raspberry Pi for Smart Mirror Development

Several studies have highlighted the use of Raspberry Pi as a central component in smart mirror systems. Researchers have explored its capabilities for processing data, driving displays, and interfacing with sensors and peripherals. By leveraging the Raspberry Pi platform, developers have achieved cost-effective and customizable solutions for creating smart mirrors with various functionalities.

B. Software Architecture and User Interface Design

Literature in this area discusses the design principles and methodologies for implementing software architectures and user interfaces for smart mirrors. Researchers have explored approaches for integrating modules such as weather widgets, calendar synchronization, news feeds, and personalized dashboards. Additionally, studies have focused on optimizing user interaction through voice recognition, gesture control, and touch interfaces, enhancing usability and accessibility.

C. Hardware Integration and Peripheral Compatibility

Investigations into hardware integration with Raspberry Pi for smart mirrors have explored the compatibility and performance of various components such as displays, cameras, microphones, and sensors. Studies have evaluated the effectiveness of different display technologies, including LCD, OLED, and two-way mirrors, in achieving optimal visibility and aesthetics. Furthermore, researchers have explored techniques for integrating sensors for motion detection, ambient light sensing, and environmental monitoring to enhance user experience and system functionality.

D. Applications and Use Cases

Literature has discussed the diverse applications and use cases of smart mirrors in residential, commercial, and institutional settings. Researchers have explored scenarios such as smart bathrooms, fitness centres, retail stores, and interactive exhibits, demonstrating the versatility and potential impact of smart mirrors in enhancing user engagement, information dissemination, and ambient intelligence.

E. Challenges and Future Directions

Despite the advancements in smart mirror technology, several challenges remain, including power consumption optimization, software stability, and privacy concerns related to data collection and user interactions. Future research directions may focus on addressing these challenges while exploring new functionalities such as augmented reality overlays, virtual assistants, and integration with IoT ecosystems for seamless smart home integration.

III.PROPOSED SYSTEM

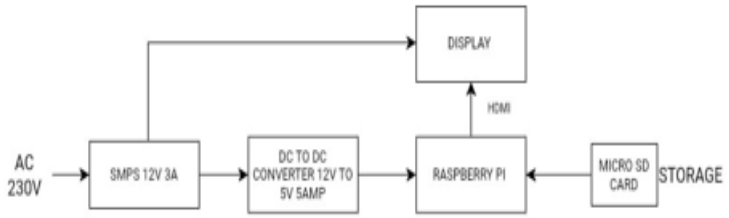

Figure1:Block Diagram of System

The proposed research aims to develop an innovative smart mirror system using Raspberry Pi technology, focusing on enhancing user interaction, customization, and functionality. The project will involve the following key components and objectives:

A. Hardware Configuration and Integration

Designing and assembling the hardware components required for the smart mirror, including Raspberry Pi as the central processing unit, display module, sensors for ambient light and motion detection, and optional peripherals such as cameras and microphones.

B. Software Development and User Interface Design

Implementing a modular software architecture for the smart mirror system, incorporating features such as weather updates, calendar synchronization, news feeds, and customizable widgets. Designing an intuitive user interface optimized for visibility, usability, and personalization.

C. Usability Testing and User Feedback

Conducting usability testing sessions with target users to evaluate the effectiveness, usability, and user satisfaction of the developed smart mirror prototype. Gathering feedback and iteratively refining the system based on user input.

D. Exploration of Advanced Features and Extensions

Investigating advanced features and extensions to enhance the functionality and versatility of the smart mirror system. Exploring possibilities such as augmented reality overlays, virtual assistants, and integration with IoT devices for seamless smart home integration.

E. Documentation and Dissemination

Documenting the design process, implementation details, and experimental results to facilitate knowledge sharing and replication of the proposed smart mirror system. Disseminating findings through academic publications, conference presentations, and open-source repositories.

F. Hardware Requirements

Raspberry Pi board (e.g., Raspberry Pi 4 Model B).Mirror or transparent display panel. Two-way mirror or one-way mirror film. Power adapter compatible with Raspberry Pi, HDMI cable or connector. Wi-Fi or Ethernet connectivity. Enclosure or frame.

IV. RESULT DISCUSSION

The smart mirror project successfully integrated Raspberry Pi technology to create an interactive interface. Hardware components were effectively assembled, and software modules were implemented for weather updates, calendars, news feeds, and widgets

Usability testing yielded positive feedback on usability and functionality. Performance evaluations showed satisfactory responsiveness and data accuracy. Future directions include performance optimization and exploring commercial applications. Overall, the project demonstrates the feasibility and effectiveness of Raspberry Pi-based smart mirror systems.

V. RESULT DESCRIPTION

The smart mirror project successfully utilized Raspberry Pi technology to create an interactive interface. Hardware components were integrated, including Raspberry Pi, display modules, and sensors.Software modules for weather updates, calendars, news feeds, and widgets were developed. The user interface was intuitive, with voice recognition and gesture control enhancing interaction. Usability testing showed positive feedback, and performance evaluations demonstrated satisfactory responsiveness. Overall, the project highlights the effectiveness of Raspberry Pi-based smart mirror systems in providing valuable information and seamless user experiences.

Figure2:

VI. CONCLUSION

This article presents a low-cost, secure, ubiquitous, configurable remote-control solution. The discussion in this article is a new and complete goal of using Wi-Fi technology to connect home appliances to control home appliances, meeting needs, and user needs.Wi-Fi-enabled solutions have been proven to be remotely controllable, provide home security, and be cost-effective compared to previously available systems.

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Online Shopping From Browser

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ABSTRACT

In this era of internet we make websites for small business like merchant, hotel, farmers and so on this website we provide all products to everyone and every customer in this regard no matter where the customer is customer can see all product through internet using this website sites. Also, the middle broker of each product is overcome, so the owner's profit increases and at the same time the customer buys the product at a low price because there is no broker or seller in the customer and owner. We need to see the product on the website, all the details are also given in the product details, if we like any product but don't want to buy it now, you can save that particular product as a cart and those products which you want to buy, then click buy to buy the product. The project will implement a machine learning algorithm to provide a personal product that has more demand, the user can list it on the website by himself, it is very easy to add a product to this project.

Keywords:HTML, CSS, VisualStudio, Internet, Operating System, RFID.

I. INTRODUCTION

The need of this website is because there are so many online websites available but they cannot provide access to the product owner, we can provide this website to the owner which gives the owner access to add the product to the website. The online shopping portal is to develop a GUI based automated system that will cover all the information related to all the products that are used in our daily life. For example – mobile phones, laptops, clothes, books, electronic items and many more. So using this GUI based automated system user wants to buy something then just click the mouse and buy those products. we make website for small business like trader, hotel, farmers and so on this website we provide all product to everyone and every customer in this regard it doesn't matter where customer is customer can see all products through internet using this website. The middleman of each product is also overcome, so the profit of the owners increases and at the same time the customer buys the product at a low price because there is no middleman or seller in the customer and owner.

Thethe browser, which is already an essential tool for accessing information, communicating and working with various online services, is now evolving into a powerful platform for online shopping. This shift has brought a new level of convenience and efficiency to consumers, allowing them to seamlessly research and purchase products from the comfort of their web browsers without having to download and install dedicated apps. In

addition, shopping online using a browser opens up opportunities for developers to create innovative extensions and web applications that enhance the entire shopping experience.

II. LITERATURESURVEY

In this document, we present the design and implementation of a web-based e-commerce system called Campus Accessories, which focuses on the four basic business issues of attraction, interaction, action and response. The system presented here focuses ona business-to-customer e-commerce system that provides a more efficient approach to online shopping. With this app, college students can easily access the buying and selling of the products they need. [Design and implementation of a web-based electronic business system this article was published by Md. Asif Rahman, Faculty of Engineering, BSMRSTU Bangladesh on 12 April 2022][1]

Many factors go into designing a successful e-commerce website. This paper discusses the importance of integrating basic elements of usability and design such as social media presence, social networking, trust and communication online and offline. Both methods were used to evaluate the impact of usability and social and trustworthiness elements on four e-commerce websites. [E-commerce platforms offer a wide selection of products, often more than what can be found in brick-and-mortar stores, allowing consumers to find unique and specialized items.][2]

The growth of Android apps worldwide is extraordinary. People are turning to technology to make their lives more innovative and find solutions to their everyday problems. When shopping, it is very difficult for customers to find their products in the supermarket and also to stand in long queues at the billing counters. Here we have come up with an Android app that can be used in smart shopping carts to solve these dilemmas and provide a better shopping experience. Our smart application consists of two parts, which mainly focus on navigation to the location of the item and automatic invoicing of the products that the user has purchased. The application building environment is an open source software called Android Studio. An RFID reader is used to scan the products. This article discusses the design and implementation of the application and the results obtained. [Megalingam RK, Vishnu S, Sekhar S, Sasikumar V, Sreekumar S and Nair TR. Design and Implementation of Smart Shopping Android Application. In 2019 International Conference on Communication and Signal Processing (ICCSP), pp. 0470-0474.][3]

If your customers want to see your business online and have immediate access to your products or services. Online Shopping is a lifestyle e-commerce web application that sells a variety of fashion and lifestyle products (currently menswear). This project allows viewing of various available products, allows registered users to purchase desired products immediately using PayPal payment processor (instant payment) and can also place an order using cash on delivery (pay later) option. This project gives administrators and managers easy access to view orders placed using Pay Later and Instant Pay options. A number of technologies need to be studied and understood in order to create an e-commerce website. [Vatrapu S R. Design and Implementation E-Commerce site for online shopping. 2014.][4]

By analysing the current analysis of e-commerce recommendation algorithm, propose a way to use dissimilarity clustering and association recommendation algorithm, the algorithm realized the clustering of website user data using dissimilarity, and then use the association rules algorithm to cluster the association recommendation results, the experiments show that the algorithm compared to the traditional by clustering, the association algorithm reduces iteration times, improves operational efficiency, proves the method using real users who buy

the recommended, and evidence of the effectiveness of the algorithm in the recommendation.["Introduction to Electronic Commerce", [Online]Available:http://www.sagepub.com/upm-data/9598_019964Ch1.pdf][5]

With the development of the Internet and the increasing number of websites in minority languages, people from ethnic minorities begin to browse news, comments and other content on the Internet according to their own preferences [6]

Own interests. Currently, there are still no websites in China that provide a search engine for Sino-Tibetan or Sino-Uyghur co-occurrence. In this document, there is a platform for monitoring Tibetan and Uyghur websites designed. Functions and characteristics are designed in detail of the Shopping website[Heo, M., & Lee, K.J. (2018). Chat bot as a new business communication tool: The case of Naver Talk. Business Communication Research and Practice, 1(1), 41-45.][7]

E-commerce is a boom in modern business. E-commerce means electronic trading. Electronic commerce(e-commerce) involves the buying and selling of goods and services or the transfer of funds or data via an electronic network, mainly the Internet.Electronic commerce(e-commerce) is a paradigm shift that affects both merchants and customers.E-commerce is more than just another way to enhance existing business practices. It leads to a complete change in the traditional way of doing business. This significant change in the business smodel is witnessing tremendous growth across the globe and India is no exception[Amin, S., Kansana, K., & Majid, J. (2016). An overview document on e-commerce. TIMS 2016- International conference. Gwalior.][8]

Augmented reality is a great ally of e-commerce. Advances in this technology can be applied to businesses to increase sales or brand building by enhancing the human perception of reality in this application by contextualizing individual objects encountered in the real world with virtual complements to create real objects. more meaningful and attractive [Kannaiah, D., & Shanthi, R. (2015). The impact of augmented reality on e-commerce. Journal of Marketing and Consumer Research, 8.][9]

A strong online start-up culture has led to the rise and growth of many online retailers in India. However, few of them dominate market while others are still struggling with start-ups. So business strategy becomes very important to sustain in a fast growing market. [Ogunmola, G.A., Kumar, V., & Kumar, S. (2020). Online Retailing in India: A Benchmark Analysis of Top Retail Players. International Journal of Indian Culture and Business Management, 1(1).][10]

III.BLOCK DIGRAM

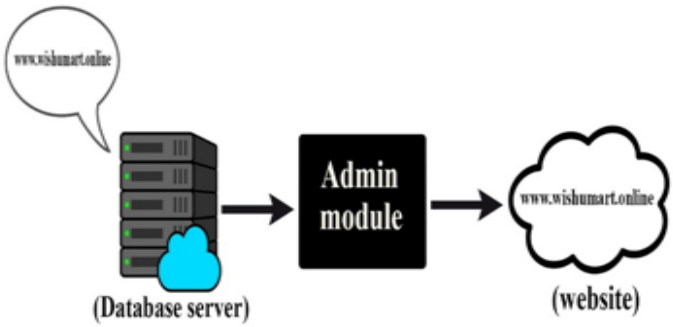

Figure1:Block Diagram

IV. CHALLENGES

Online shopping is prone to security issues such as data breaches, phishing attacks, and credit card fraud. Customers must be vigilant and ensure that they use secure websites and payment methods.

- While many online retailers use recommendation algorithms, the experience is not as personalized as in brick-and-mortar stores, where employees can provide tailored assistance and recommendations.
- Shoppers cannot physically touch or inspect products prior to purchase. This can lead to dissatisfaction if the product received does not meet their expectations.

Shipping costs, delivery times and the risk of damage during shipping are problems faced by online shoppers. These can affect overall satisfaction with the purchase.

- Returning products purchased online can be difficult. Return and refund processes vary from retailer to retailer and can be time-consuming.
- Online shopping requires internet access and a compatible device. People in remote areas or with limited access to technology may face difficulties.
- There are many e-commerce platforms like Amazon, eBay and Shopify that offer a wide range of products and services. These platforms have invested heavily in user experience, security and product recommendation algorithms.
- Many online shoppers rely on user reviews and ratings to make informed decisions. Researchers have investigated the impact of these reviews on purchasing behaviour.
- Research has been conducted to improve the security of online shopping, including the development of secure payment gateways and techniques to identify and prevent fraudulent transactions.

V. CONCLUSION

- Online shopping gives the customer the convenience of browsing and purchasing products from the comfort of their home or on the go without having to visit brick-and-mortar stores.
- E-commerce platforms offer a wide selection of products, often more than what can be found in brick-and-mortar stores, allowing consumers to find unique and specialized items.
- Shoppers can easily compare prices and read reviews to make informed purchasing decisions, which is often not as easy in brick-and-mortar stores.
- Ensuring secure online transactions and building customer trust is critical to the success of e-commerce, and considerable effort is devoted to protecting user data and financial information.
- Online shopping is not without its limitations, including security issues, lack of physical product inspection, shipping issues, and the return process.
- Researchers and the e-commerce industry have made significant progress in addressing these limitations through the development of e-commerce platforms, user reviews, cybersecurity measures, mobile applications, VR/AR technologies, supply chain optimization, personalization algorithms, and sustainable purchasing. practices.
- The future of online shopping from web browsers is likely to continue to evolve with advances in technology, artificial intelligence and data analytics, leading to even more personalized and immersive shopping experiences. Sustainable and ethical considerations will also play a more prominent role in e-commerce.

- Online shopping from web browsers is likely to remain a dominant mode of retail for the foreseeable future, offering consumers the convenience and variety they desire, with ongoing efforts to enhance security, personalization, and overall user experience. It's important for both consumers and retailers to stay informed about these developments to make the most of this digital shopping landscape

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Enhancing Augmented Reality in Revolutionizing Tourism through Convolutional Neural Networks (CNN) For Enhanced Tourist Experiences

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ABSTRACT

Tourism has emerged as a vital element in the global landscape of social and economic advancement, not only offering leisure opportunities but also serving as a significant revenue generator for countries. This study systematically explores the utilization of advanced technology to enrich the tourist experience. By leveraging deep learning methods, the primary focus lies in enhancing augmented reality interactions for tourists. The proposed approach employs deep learning algorithms to improve and personalize the augmented reality experiences of visitors, addressing existing challenges such as customization and engagement limitations within the industry. The adoption of this methodology is driven by its capacity to elevate user satisfaction, accurately identify objects, deliver visually guided tours, incorporate historical context, and ultimately promote the widespread use of augmented reality in tourism. Remarkably, the study concludes with an impressive average accuracy rate of 99% achieved through the integration of deep learning techniques to enhance augmented reality experiences in tourism.

Keywords: Tourism, Advanced technology, Deep learning, Augmented reality, User experience enhancement, Historical context integration, 3D Model

I. INTRODUCTION

In the contemporary era, the tourism industry stands as a vital contributor to economic growth and cultural exchange among nations [1]. Being the world's largest service sector, it commands significant attention, prompting fierce competition among countries to capitalize on its global impact [2]. Particularly within Africa's economy, tourism emerges as a promising alternative revenue stream [3]. However, the sector faces challenges in efficiently accommodating incoming visitors [4]. Advanced technologies offer innovative solutions to enhance tourist experiences and drive business evolution, yet the sector grapples with issues like inadequately trained personnel and skill disparities compared to global standards, hindering effective visitor management [5].

Augmented Reality (AR) technology emerges as a leading-edge tool globally, aiming to revolutionize tourism experiences [6]. By seamlessly blending digital information with real-world environments, AR enhances interactions and connectivity [8]. The technology aims to establish tourism guidance systems, offering valuable travel information and services through dedicated smartphone applications [9].

This study delves into the artistic trends and practical methodologies for identifying and tracking AR patterns in the tourism sector. AR is acknowledged as a transformative technology with vast potential in tourism applications, including destination planning and enhancing tourist experiences [10][11]. For instance, [10] proposed an AR-based museum tour planning system utilizing social sensor data, which although promising, requires integration with Deep Learning algorithms for improved consistency. Similarly, [11] introduced a Smart City AR system powered by Deep Learning for information sharing, showing promising personalized recommendations but with room for efficiency enhancement.

In another study, [12] employed a text-mining method to scrutinize data in the tourism sector, but it lacked in tailoring the AR framework for a thorough examination of tourist behaviour. [13] Performed a quantitative assessment of short-circuit current behaviours in substation transformers, uncovering challenges such as complexity, reliance on data quality, modelling inaccuracies, and difficulties in capturing real-world dynamics. In a different realm, [14] utilized a Mobile Application Approach to enhance museum experiences, yet the current version encounters bugs requiring resolution. [15] employed a Machine Learning technique to personalize tourism experiences and recommendations; however, potential constraints stem from dependency on user demographic data. [16] Explored the application of the UTAUT model to enhance augmented reality (AR) usage in tourist education, highlighting constraints like a limited sample size and reliance on self-reported data. Meanwhile, [17] utilized the UTAUT Model, TAM 1 & 2, to promote AR utilization in tourism, stressing the need for a fuzzy logic approach to evaluate uncertainty scenarios. [18] Conducted a systematic literature review on consumer research concerning conversational agents, albeit with identified limitations in scope and technological evolution [19] [20] [21]. The utilization of a Stochastic Scenario-Based Approach for AR expert co-authorship networks addresses some gaps but acknowledges challenges in analysing tourist behaviour [22] [23]. A modelled and forecasted international tourist arrivals in Zimbabwe using SARIMA is utilized for tourist engagement, though acknowledged limitations in data and seasonal variations were observed [24] [25]. Based on various literature reviews on augmented reality by different authors, they exhibit shortcomings such as inconsistent addressing of locations monitored by sensors, poor recognition in source diversity by tourists, existence of bugs affecting model efficiency, complexity, and non-user-friendliness. Hence, the concept of "Evolution of Augmented Reality in Tourism using Deep Learning Approach" is proposed to address the gaps left by existing models. The subsequent sections of this paper are discussed as follows: Section 3 analyses the methodology used in the paper, Section 4 discusses the findings obtained, and Section 5 provides a conclusion and future scope of the research [20].

II. PROPOSED METHODOLOGY

The research advocates for employing a CNN approach to enhance augmented reality in tourism. This method is evaluated using a deep learning tool in Matlab. The steps involved in this proposed approach are illustrated in Figure 1.

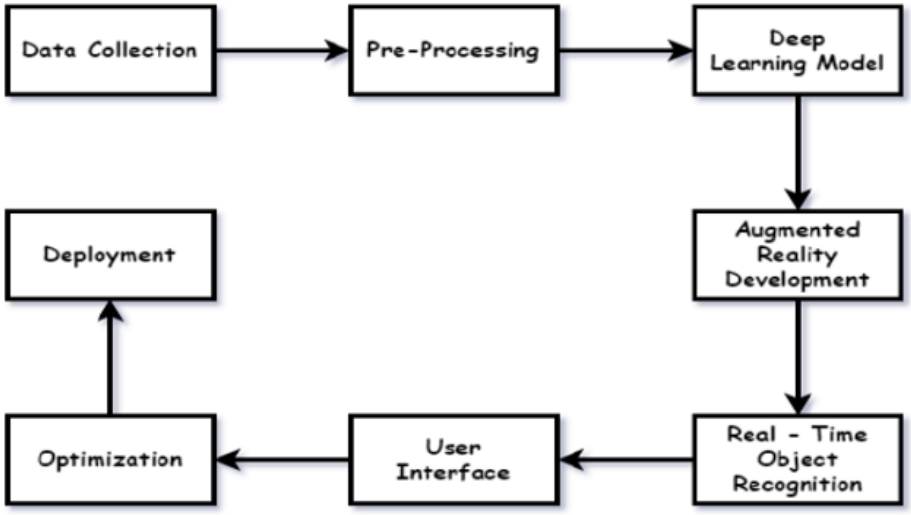

Figure1:Flow chart of the Methodology

The process depicted in Figure 1 outlines the methodology's initial phase as data collection, involving the gathering of various location images for training and testing purposes. Following data collection, the next step involves preprocessing the gathered data, which includes tasks such as normalization, resizing, rotation of image locations, and labelling. This refined data is then fed into the chosen deep learning model, specifically tailored by selecting an appropriate technique like CNN using a Surf method. Subsequently, the data undergoes the selected deep learning process, followed by the development of augmented reality using Matlab to train the deep learning model.

Once the model is trained, a real-time 2D object is employed to assess the efficiency of the model, expected to display recognized objects in a 3D model on a live camera feed. Post-testing, a user-friendly interface is designed for the augmented reality application, incorporating features for information retrieval. To enhance performance and accuracy, optimization of both the deep learning model and augmented reality application is undertaken. Ultimately, the improved augmented reality application, efficient and user-friendly, is deployed.

A. Data Collection

During the data collection phase, historical landmarks such as the Taj Mahal, the Pyramids of Giza, and the Dome Cathedral Church underwent manual inspection and virtual analysis. Subsequently, these landmarks were captured using an iPhone 15 Pro-Max camera featuring 48 megapixels and a 120mm 5x optical zoom capability. The capturing process occurred within a spectral range of 500-900nm with a spectral resolution of 2.5nm. The resulting images of these landmarks are depicted in Figure 2 (a, b, c).

Figure2:Images of historical places

B. Deep Learning (CNN Classifier) of 2D Model and 3D Model

Deep learning is an advanced scientific field that seeks to leverage emerging scenarios by offering innovative solutions and applications. The term "deep" refers to the numerous layers involved in the process of transforming data [24]. It is a specialized form of machine learning that understands the representation of the real world as complex hierarchies of concepts, where simpler and more abstract concepts and representations define each concept. Deep learning models essentially mimic how humans learn by making sense of instances. These models utilize multi-layer neural networks and sophisticated supervised and unsupervised learning techniques, enhancing system performance by adjusting internal settings to discover complex patterns in vast datasets using back propagation [25].

Convolutional Neural Networks (CNNs) exemplify the success of the deep learning approach. The concept of convolutional operations involves mathematical functions A(t) and B(t), resulting in an output function defined as the integral of their product and given by

$$(A*B)(t)=\int_{-\infty}^{\infty} A(\tau)B(t-\tau)d\tau \quad (1)$$

Where, A (t) and B (t) are Operating Input Signal and Convolutional Kernel

In real-life scenarios, data are typically discrete and finite, with discrete convolutions being represented by sums or replaced by integrations.

$$(A*B)[n]= \sum_{-\infty}^{\infty} A[k]B[n-k] \quad (2)$$

Where, (A∗B) denotes the discrete convolution of sequences A and B, resulting in a new sequence (A∗B) [n].

CNNs introduce a significant advancement by allowing the convolution kernels, denoted as B(t), to be adjusted and fine-tuned by the neural network during the training process. However, human experts are still responsible for determining parameters such as the number of convolutions, their dimensions, and the overall network architecture. The design of the network is influenced by factors such as the dimensionality of the input, which is partially dictated by the shape of the input data.

Following the processing of models using deep learning, equations 3 and 4 represent the 2D and 3D models. Figure 3 provides a visual representation of the 2D and 3D input data relevant to the specific problem under consideration. The utilization of both 2D and 3D models is significant as they play a crucial role in enhancing the understanding of how deep learning can improve the augmented reality process.

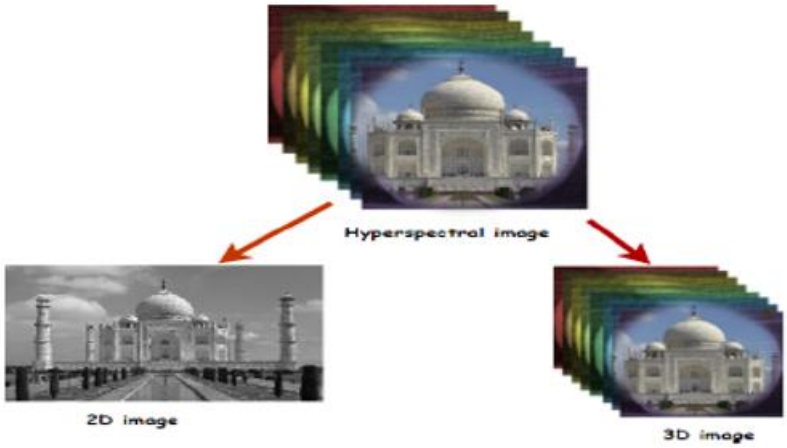

Figure3:Images of historical

C. Collection of data and assessment of the classifier performance

The acquired dataset underwent a random split into distinct training, validation, and test sets, with proportions of 70%, 10%, and 20% of the total images, respectively. This division was chosen to ensure a substantial proportion of test examples (20%) for reliable measurements of classifier performance, given the relatively low number of samples (60 in total). Accordingly, the training and validation sets were allocated 70% and 10%, respectively. Table 1 presents the number of samples in the dataset for each class and partition. It's essential to note that, for the 3D dataset, the numbers indicate samples before applying data augmentation. In the 2D dataset, data augmentation wasn't utilized, as each channel is treated as a sample, resulting in a sufficiently large dataset. Data augmentation techniques, such as random horizontal flip and color jitter, were consistently applied to training data only, not to test data.

TABLE I SAMPLE OF DATASET USED FOR TRAINING, TESTING AND VALIDATION

Model	Name of Dataset	Samples	Classes		
			0	1	2
3D	Train	120	40	40	40
	Test	54	18	18	18
	Validation	27	9	9	9
	Total	201	167	167	167
	Train	18285	6095	6095	6095
2D	Test	8877	2959	2959	2959
	Validation	3135	1045	1045	1045
	Total	30297	10099	10099	10099

To evaluate the effectiveness of the proposed classifiers, several criteria have been calculated, including the widely-used confusion matrix, which compares true labels with those predicted by the classifier. From this matrix, important metrics such as precision, recall, F1-score, and accuracy are derived. Precision measures the proportion of accurately predicted positive samples out of all predicted positives, while recall evaluates the proportion of correctly predicted positive samples relative to all true positives. The F1-score is defined as the harmonic mean of recall and precision. Conversely, accuracy quantifies the ratio of correctly classified samples to the total number of test samples. The CNN Classifier and Confusion matrix for the 2D and 3D models are presented in Tables 2, 3, 4, and 5, respectively.

TABLE III 2D CNN CLASSIFIERS CONFUSION MATRICES

Approach	Real class	Class One	Class Two	Class Three	Total
2D-CNN-18	Class 0	2872	1	80	2961
	Class 1	277	2005	679	2961
	Class 2	442	221	2298	2961
2D-CNN-7	Class 0	2341	427	193	2961
	Class 1	36	2770	155	2961
	Class 2	372	314	2275	2961

TABLE IIIII CRITERIA FOR THE PERFORMANCE OF 2D- MODEL USING CNN CLASSIFIER

Approach	Class	Precision (%)	Recall (%)	F1-score (%)	Accuracy (%)
2D-CNN-18	Class 0	81	98	89	81.2
	Class 1	91	69	78	
	Class 2	77	79	75	
	Class 0	86	78	83	
2D-CNN-7	Class 1	80	93	87	84.3
	Class 2	89	78	83	

TABLE IVV 3D CNN CLASSIFIERS CONFUSION MATRICES

Approach	Real class	Class 0	Class 1	Class 2	Total
3D-CNN-18	Class 0	16.0	1.0	0.0	17.0
	Class 1	0.0	17.0	0.0	17.0
	Class 2	0.0	2.0	15.0	17.0
	Class 0	14.0	1.0	2.0	17.0
3D-CNN-7	Class 1	0.0	16.0	1.0	17.0
	Class 2	1.0	0.0	16.0	17.0

TABLE V CRITERIA FOR THE PERFORMANCE OF 3D- MODEL USING CNN CLASSIFIER

Approach	Class	Precision (%)	Recall (%)	F1-score (%)	Accuracy (%)
3D-CNN-18	Class 0	100	95	98	95.3
	Class 1	86	100	93	
	Class 2	100	89	95	
	Class 0	94	84	87	
3D-CNN-7	Class 1	95	93	96	91.4
	Class 2	86	95	88	

III.RESULTS AND DISCUSSION

The initial focus of the study was on scrutinizing the potential overfitting of shallow (CNN-7) and deep (CNN-18) architectures in 2D models. Subsequently, the attention shifted to examining the outcomes of the corresponding 3D models, ensuring the absence of overfitting. A comprehensive assessment of both mechanisms was then carried out, including a thorough comparison of methods and approaches.

To monitor the training progress of shallow and deep 2D-CNN architectures, accuracy and loss evolution across epochs were tracked for both the validation and training sets, as depicted in Figure 4. Similarly, when dealing with 3D hyperspectral image (HSI) classifiers, accuracy and loss were evaluated on both training and validation sets, with visual representations available in Figure 5. Additionally, Figures 6 and 7 illustrate the precision-recall for 2D and 3D models respectively, utilizing convolutional neural network (CNN) classifiers.

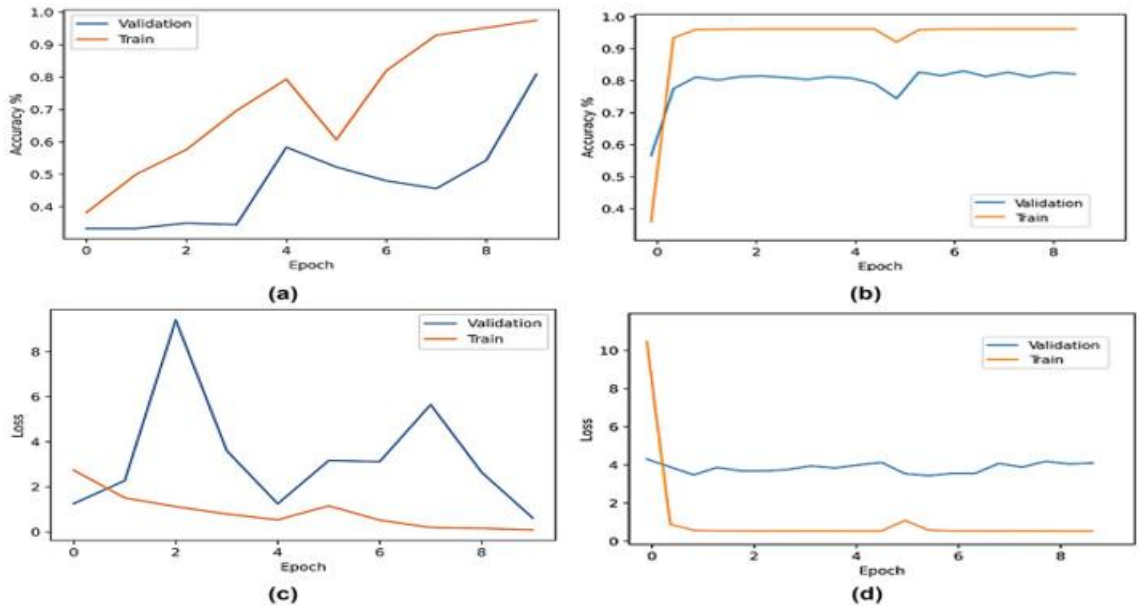

Figure4:The progression of training procedures for 2D-CNN classifiers is depicted through the accuracy and loss metrics on both training (orange) and validation (blue) sets, specifically: (a) accuracy for 2D-CNN-18; (b) accuracy for 2D-CNN-7; (c) loss for 2D-CNN-18; (d) loss for 2D-CNN-7.

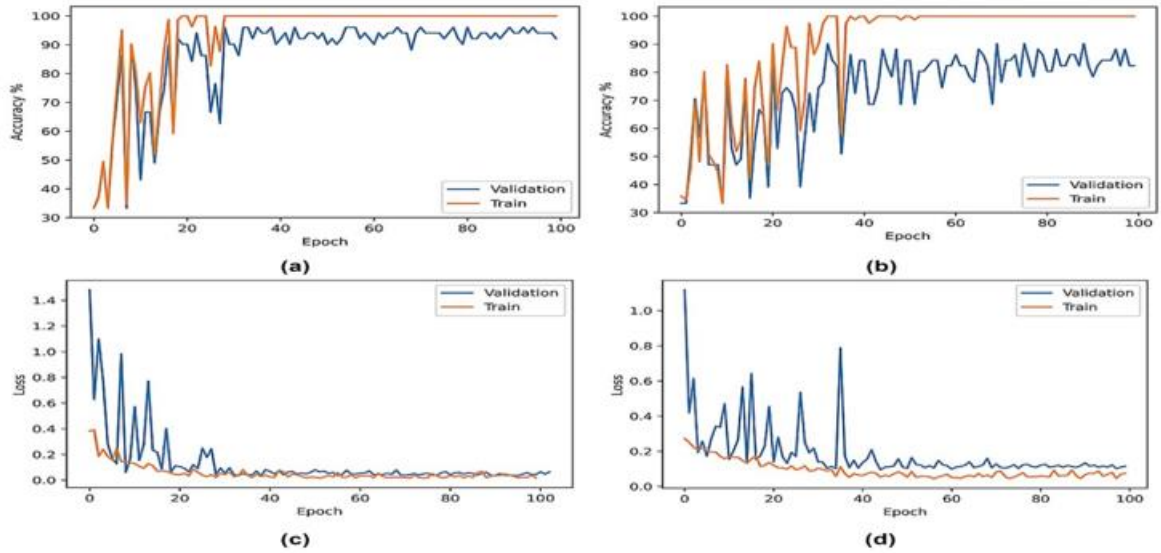

Figure5:The progression of training procedures for 3D-convolutional neural network (CNN) classifiers is illustrated in terms of accuracy and loss across the training (orange) and validation (blue) sets for two architectures: (a) 3D-CNN-18 accuracy, (b) 3D-CNN-7 accuracy, (c) 3D-CNN-18 loss, and (d) 3D-CNN-7 loss

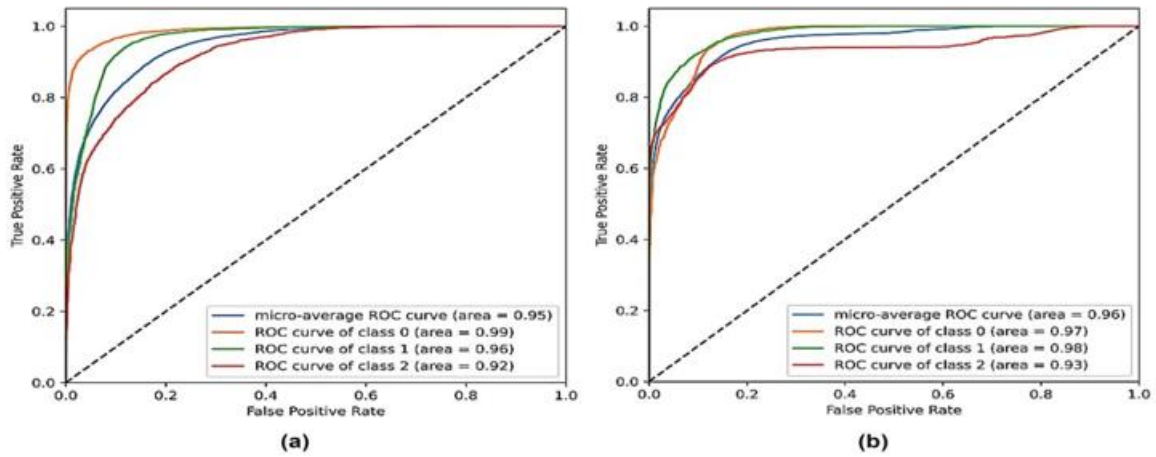

Figure6:2D-convolutional neural network (CNN) classifiers Precision–recall curves: (a) 2D-CNN-18; (b) 2D-CNN-7.

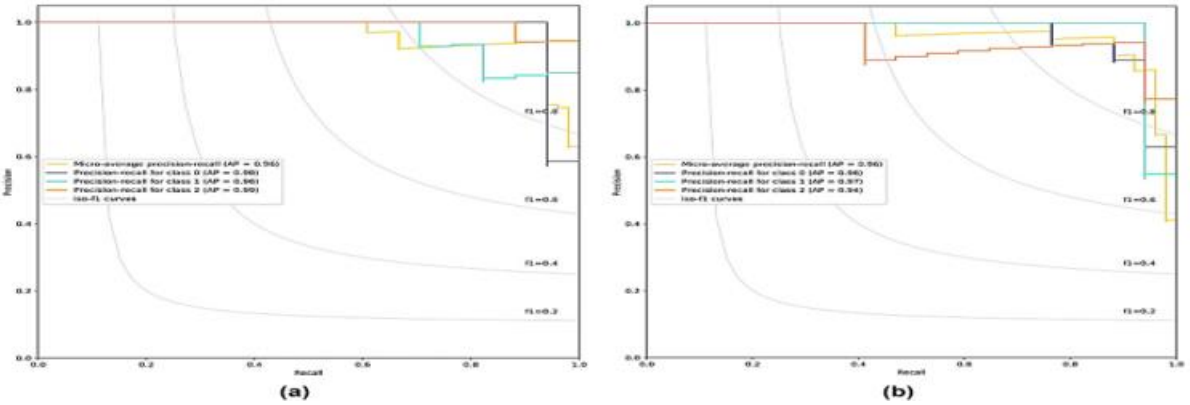

Figure7:3D-convolutional neural network (CNN) classifiers Precision–recall curves: (a) 3D-CNN-18; (b) 3D-CNN-7

Upon comparing the 2D and 3D models, the enhancement in augmented reality for tourism is evident, as demonstrated in Figures 8, 9, and 10. Figure 8a exhibits an image depicting a historical landmark, the Taj Mahal. Subsequently, in Figure 8b, the image undergoes pre-processing and training utilizing a deep learning approach, specifically the speeded-up robust feature (SURF) method. Following this, in Figure 8c, the image is further refined through fine-tuning and the removal of unwanted noise using the deep learning technique. Finally, the processed image is seamlessly integrated into the augmented reality experience, facilitated by the 3D model.

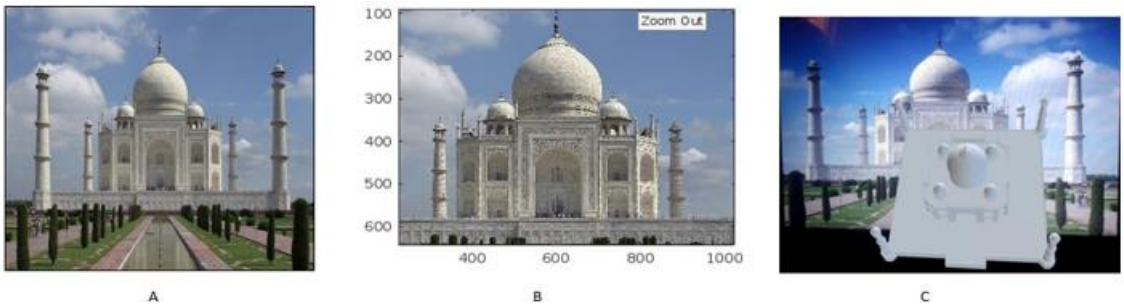

Figure8:Processed images using deep learning

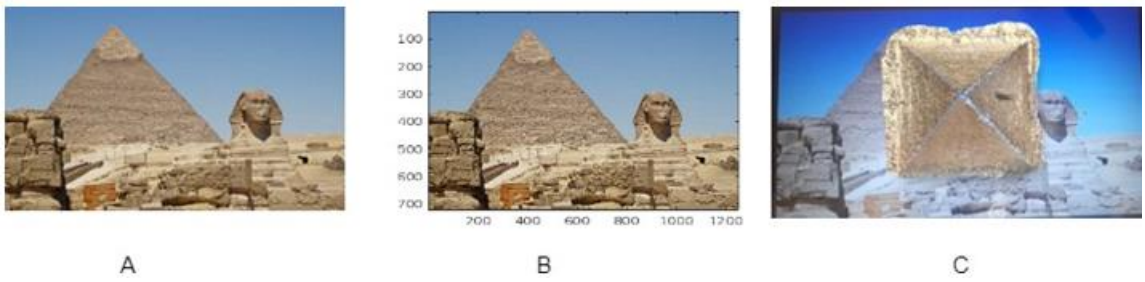

Figure9:Utilized deep learning techniques and 3D models to process images

Figure 9a showcases a photograph featuring the Pyramids of Giza, a renowned historical structure. This image is subjected to pre-processing and training utilizing a deep learning method called the speeded-up robust feature approach, as depicted in Figure 9b. Subsequent to fine-tuning and the elimination of undesired noise through deep learning, the image undergoes additional processing employing a 3D model for augmented reality purposes, as illustrated in Figure 9c

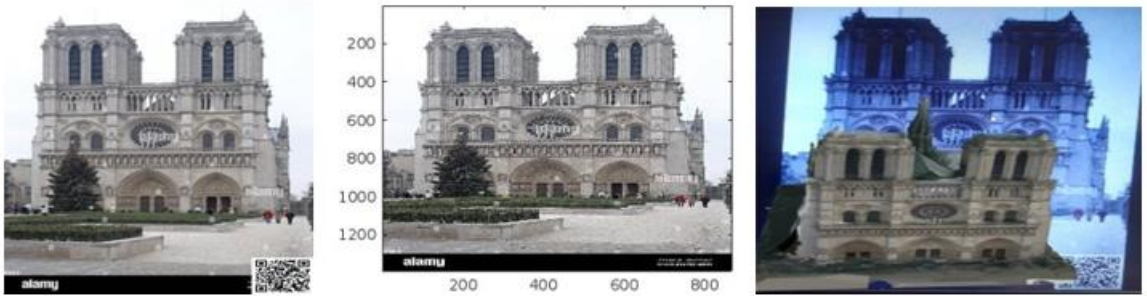

Figure10:Using deep learning and a 3D model, images were processed.

Figure 10a displays a photograph featuring the Dome Cathedral Church in Paris, a significant historical landmark. This image undergoes preprocessing and training using a deep learning technique known as the speeded-up robust feature approach, as shown in Figure 10b. Following fine-tuning and the elimination of undesired noise through deep learning methods, the image is further processed utilizing a 3D model for augmented reality applications, as depicted in Figure 10c.

Figure 11 presents a graphical representation of the enhanced 3D model images achieved through the application of deep learning approaches.

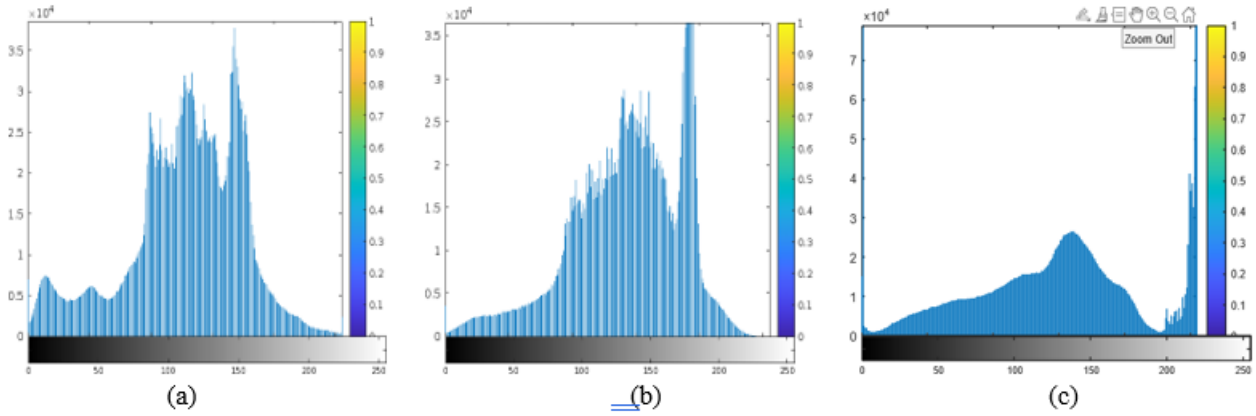

Figure11:Graphical interpretion of an improved 3D models images using deep learning approach. The Histograms in Figure 11(a) (b) (c) showcase intensity variations: gradual increases with broader shades Through 10^4 histograms, Image 1's gradual intensities, Image 2's surpassing concentrations, and Image 3's pronounced peak at x=249, y=41276 highlight distinctive features, affirming the images' good quality.

A. Comparison of image improvement using deep learning

TABLE VI COMPARISON OF ACCURACY USING CNN BETWEEN 2D AND 3D MODELS

Image	2D CNN 18	3D CNN 18	2D CNN 7	2D CNN 18
Taj Mahal	81.2%	95.3%	84.3%	91.4%
Pyramids of Giza	81.2%	95.3%	84.3%	91.4%
Dome Cathedral	81.2%	95.3%	84.3%	91.4%

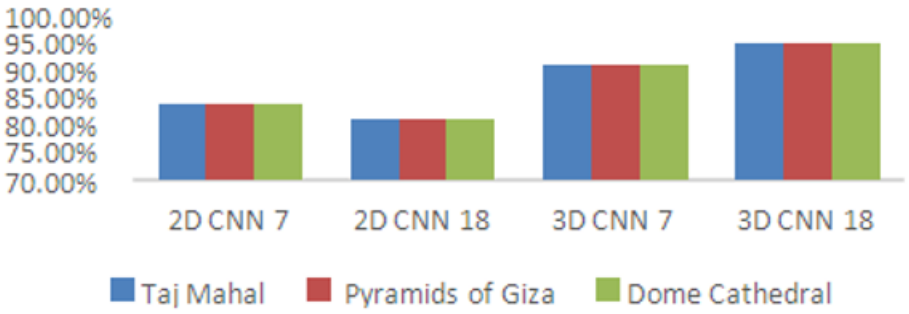

Figure12:Advancements in Augmented Reality through Deep Learning techniques

Figure 12 illustrates the real-world depiction of the Taj Mahal, Pyramids of Giza, and Dome Cathedral. Employing a deep learning approach involving noise reduction and fine-tuning, the accuracy for 2D images reached 84.3%. Furthermore, enhancing these 2D images into 3D models resulted in an accuracy of 95.3%, highlighting the significant impact of deep learning on the enhancement process.

IV. CONCLUSION

From an economic standpoint, the tourism sector holds a unique position and augmented reality (AR) technology stands out prominently as one of the most advanced and valued technologies today. Despite its potential to bridge the gap between physical and digital realms, the effectiveness of AR is hindered by the rudimentary integration of relevant information. Consequently, research is focused on enhancing AR in the context of tourism through the application of Deep Learning techniques. Deep learning has been chosen in this study's methodology due to its ability to improve user experience, accurately identify objects, offer visual guided tours, incorporate historical context, and ultimately drive the adoption of AR within the tourism sector. The study's findings indicate that after undergoing a deep learning process, the accuracies of historical images such as the Taj Mahal, the Pyramids of Giza, and the Dome improved to 95.3% in 3D models, making them more appealing to tourists.

Furthermore, the integration of AR with blockchain technology could bring about a transformative change in the tourism industry. This fusion could establish secure and transparent transactions within tourism, thereby enhancing trust and reliability. Additionally, it could introduce innovative methods to authenticate historical sites or artifacts, ensuring their authenticity. This convergence has the potential to redefine tourist experiences, providing a secure, immersive, and personalized journey for travellers, thereby significantly reshaping the tourism landscape.

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Filtering Techniques Used to Reduce the Noise in Image Processing

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ABSTRACT
Noise is always presents in digital images during image acquisition, coding, transmission, and processing steps. It is very difficult to remove noise from the digital images without the prior knowledge of filtering techniques. Noise, which is an unwanted signal or variation of brightness, may destroy part of an image. In this paper, we used different Filtering Techniques to reduce the noise in image processing. These filters can be selected by analysis of the noise behavior. In this way, a complete analysis of noise and their best suited filters will be presented over here First, we give the formulation of the different types of noise and then we apply the different filtering techniques to restore the image with high quality parameters.

Keywords: adaptive filter, Gaussian noise, Gaussian filter, median filter, poisson noise, speckle noise and wiener filter

I. INTRODUCTION

Image processing is known to be an important area to bring out the best in an image and it is useful in several areas such as remote sensing, medical field, image shaping and restoration, machine vision, pattern recognition and video processing. Several noise removal techniques are described in this paper in other to remove noise. With the explosion in the number of digital images taken every day, the demand for more accurate and visually pleasing images is increasing. However, the images captured by modern cameras are inevitably degraded by noise, which leads to deteriorated visual image quality. Therefore, work is required to reduce noise without losing image features (edges, corners, and other sharp structures). So far, researchers have already proposed various methods for decreasing noise. Noise is a random variation of image Intensity and visible as a part of grains in the image. It may cause to arise in the image as effects of basic physics-like photon nature of light or thermal energy of heat inside the image sensors [10].Noise means, the pixels in the image show different intensity values instead of true pixel values that are obtained from image. Due to the great development in the field of information technology and its equipment, the images taken by this technology has become a source of interest for many and the search for the best image and more accurate demand of many, so there are several ways to process and improve images in case of noise or any other effects[4]. After researching and reading studies interested in the subject of noise and how to remove them using many types of filters. We found it necessary to conduct an analytical study with practical application to know which performance from filters is the best in noise removal and its ability to preserve images. In this paper, selected four types of noise and added

to the images. These types of noise were removed using four types of filters. The main objective of this paper is to understand the type of noise and find out the best suitable filter to remove the noise.

II. NEED OF FILTERING TECHNIQUES IN IMAGE PROCESSING

Filtering is a technique for modifying or enhancing an image. For example, you can filter an image to emphasize certain features or remove other features. Image processing operations implemented with filtering include smoothing, sharpening, and edge enhancement. Filtering is a neighbourhood operation, in which the value of any given pixel in the output image is determined by applying some algorithm to the values of the pixels in the neighbourhood of the corresponding input pixel. A pixel's neighbourhood is some set of pixels, defined by their locations relative to that pixel[5].Linear filtering is filtering in which the value of an output pixel is a linear combination of the values of the pixels in the input pixel's neighbourhood. In image processing filters are mainly used to suppress either the high frequencies in the image, i.e. smoothing the image, or the low frequencies, i.e. enhancing or detecting edges in the image. An image can be filtered either in the frequency or in the spatial domain. The first involves transforming the image into the frequency domain, multiplying it with the frequency filter function and re-transforming the result into the spatial domain. The filter function is shaped so as to attenuate some frequencies and enhance others. For example, a simple low pass function is 1for frequencies smaller than the cut-off frequency and 0 for all others. The corresponding process in the spatial domain is to convolve the input image f(i,j) with the filter function h(i,j). This can be written as

$$g(i,j) = h(i,j) \dot{O} f(i,j)$$

The mathematical operation is identical to the multiplication in the frequency space, but the results of the digital implementations vary, since we have to approximate the filter function with a discrete and finite kernel[6].The discrete convolution can be defined as a `shift and multiply' operation, where we shift the kernel over the image and multiply its value with the corresponding pixel values of the image. For a square kernel with size M× M, we can calculate the output image with the following formula:

$$g(i,j) = \sum_{m=-\frac{M}{2}}^{\frac{M}{2}} \sum_{n=-\frac{M}{2}}^{\frac{M}{2}} h(m,n) f(i-m, j-n)$$

Image filtering is changing the appearance of an image by altering the colors of the pixels. Increasing the contrast as well as adding a variety of special effects to images are some of the results of applying filters. Image filtering is done to improve the quality of the image. For ex smoothing an image reduces noise, blurred images can be rectified. There are broadly two types of filtering techniques linear [1] and non linear [2].

III.TYPESOFNOISE

Different noises have their own characteristics which make them distinguishable from others. Image noise can also originate in film grain and in the unavoidable shot noise of an ideal photon detector. Image noise is an undesirable by-product of image captured. Noise is introduced in the image at the time of image acquisition or transmission. Different factors may be responsible for introduction of noise in the image. The number of pixels corrupted in the image will decide the quantification of the noise. The principal sources of noise in the digital image are: The imaging sensor maybe affected by environmental conditions during image acquisition, Insufficient Light levels and sensor temperature may introduce the noise in the image, Interference in the

transmission channel may also corrupt the image, If dust particles are present on the scanner screen, they can also introduce noise in the image. Usually we know what type of errors to expect and the type of noise on the image; hence we investigate some of the standard noise for eliminating or reducing noise in colorimage[3].

Image Noise is classified as

A. salt and pepper noise

Salt and pepper noise refers to a wide variety of processes that result in the same basic image degradation: only a few pixels are noisy, but they are very noisy. The effect is similar to sprinkling white and black dotssalt and pepperon the image. In other words, the contribution to the MSE from the most significant bit is approximately three times that of all the other bits. The pixels whose most significant bits are changed will likely appear as black or white dots[9].

B. Gaussian noise

Gaussian noise is a statistical noise having a probability density function equal to normal distribution, also known as Gaussian Distribution. Random Gaussian function is added to Image function to generate this noise. It is also called as electronic noise because it arises in amplifiers or detectors.

C. Shot noise or Poisson noise

It is a type of noise which can be modelled by a Poisson process. In electronics shot noise originates from the discrete nature of electric charge. Shot noise also occurs in photon counting in optical devices, where shot noise is associated with the particle nature of light.

D. Speckle noise

Speckle noiseis a multiplicative noise that affects pixels in a gray-scale image, and mainly occurs in low level luminance images such as Synthetic Aperture Radar (SAR) images and Magnetic Resonance Image (MRI) images

Figure1:Saltandpeppernoise

Figure2:Gaussiannoise

Figure3:Poissonnoise

Figure4:Specklenoise

IV. TYPESOFFILTERS

A. Linear filtering

Linear filtering is one of the most powerful image enhancement methods. It is a process in which part of the signal frequency spectrum is modified by the transfer function of the filter. In general, the filters under consideration are linear and shift-invariant, and thus, the output images are characterized by the convolution sum between the input image and the filter impulse response; that is:

$$y(m,n) = \sum_{i=0}^{M}\sum_{j=0}^{N} h(m-i,n-j)x(i,j) = h(m,n)^{**}\, x(m,n)$$

Where the following is true:

he y(m,n) is the output image.

The h(m, n) is the filter impulse response. The x(m, n) is the input image.

B. Non-linear filters

Non-linear filtersmay also be useful when certain "nonlinear" features of the signal are more important than the overall information contents. A linear noise-removal filter will usually blur those features; a non-linear filter may give more satisfactory results (even if the blurry image may be more "correct" in the information-theoretic sense). Many nonlinear noise-removal filters operate in the time domain. They typically examine the input digital signal within a finite window surrounding each sample, and use some statistical inference model (implicitly or explicitly) to estimate the most likely value for the original signal at that point. The design of such filters is known as the filtering problem for a stochastic process in estimation theory and control theory.

C. Wiener filter

Wiener filter is the MSE-optimal stationary linear filter for images degraded by additive noise and blurring. Calculation of the Wiener filter requires the assumption that the signal and noise processes are second-order stationary(in the random process sense). For this description, only noise processes with zero mean will be considered (this is without loss of generality)[7].Wiener filters are usually applied in the frequency domain. Given a degraded image x(n,m),one takes the Discrete Fourier Transform(DFT)to obtain X(u,v). The original image spectrum is estimated by taking the product of X(u,v) with the Wiener filter G(u,v):

$$S(u,v) = G(u,v)X(u,v)^n$$

The inverse DFT is then used to obtain the image estimate from its spectrum. The Wiener filter is defined in terms of these spectra: H(u,v) Fourier transform of the point spread function(PSF) Ps(u,v)Power spectrum of the signal process, obtained by taking the Fourier transform of the signal autocorrelation Pn (u,v) Power spectrum of the noise process, obtained by taking the Fourier transform of the noise autocorrelation
The Wiener filter is:

$$G(u,v) = \frac{H^*(u,v)Ps(u,v)}{|H(u,v)^2|Ps(u,v)+Pn(u,v)}$$

D. Guassian filter

The Gaussian smoothing operator is a 2-D convolution operator that is used to `blur' images and remove detail and noise. In this sense it is similar to the mean filter, but it uses a different kernel that represents the shape of a Gaussian (`bell-shaped') hump[8]. This kernel has some special properties which are detailed below. The Gaussian distribution in 1-D has the form:

$$G(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{\frac{-x^2}{2\sigma^2}}$$

where σ is the standard deviation of the distribution. We have also assumed that the distribution has a mean of zero (i.e. it is centred on the line x=0). The distribution is illustrated in Figure 1.

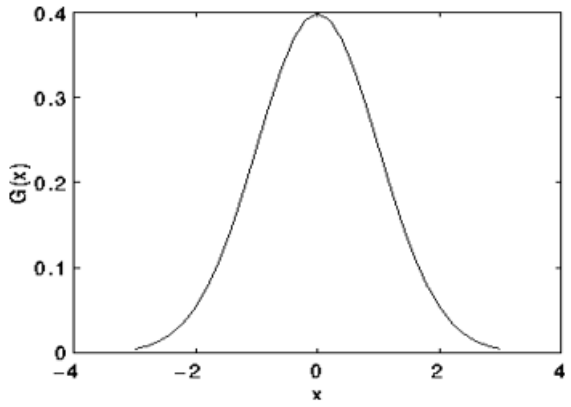

Figure5:1-DGaussian distribution with mean 0and σ=1

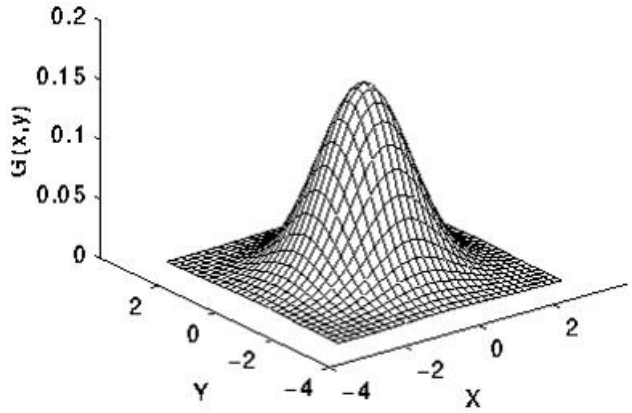

Figure6:2-DGaussian distribution with mean(0,0) and σ=1

In-D,anisotropic(i.e.circularly symmetric) Gaussian has the form: This distribution is shown in Figure2.

$$G(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{\frac{-x^2+y^2}{2\sigma^2}}$$

Figure7:Originalimage

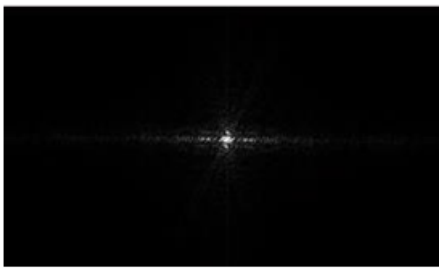

Figure8:FFToforiginal image

Figure9:Lowpassfilteredimage

Figure20:GaussianLPFH(f)

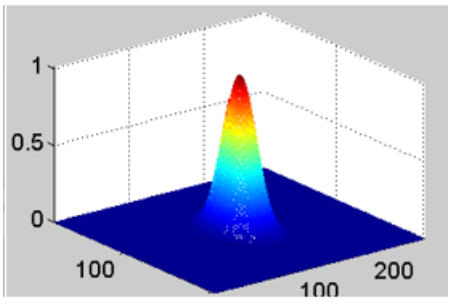

Figure31:GaussianHPFH(f)

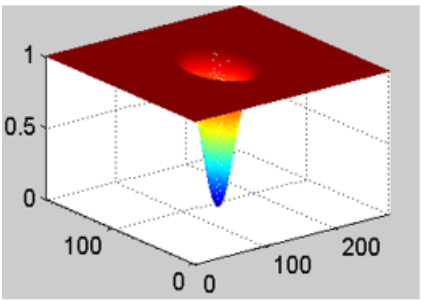

Figure42:Highpassfilteredimage

V. CONCLUSION

In this paper, we discussed different types of noise and filtering techniques for removing noises in colour image. Also we represent that how noise affects the image, we compare the different noise and filtering techniques. The results obtained using Gaussian filter technique ensures noise free and quality of the image as well. The main advantages of this paper is you can remove the noise by identifying its type and also can able chose best suitable filter for respective reduction of noise. Although deep learning is developing rapidly, it is not necessarily an effective way to solve the denoising problem. The main reason for this is that real-world denoising processes lack image pairs for training. This paper aims to offer an overview of the available denoising methods. Since different types of noise require different denoising methods, the analysis of noise can be useful in developing novel denoising schemes. For future work, we must first explore how to deal with other types of noise, especially those existing in real life.

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Design and Fabrication of Hot Ni-chrome Foam Cutter by Arduino Controller and CNC Shield

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ABSTRACT
Hotwire acting is a commonly used method to cut various types of foam in different shapes and sizes. Cut quality of foam depend upon variable cutting parameters of hotwire which affects the cutting process to achieve the needed cut, precise and accurate cutting parameters are needed to be set this research is done to develop 4 axis computer-controlled machine to perform precise and accurate foam cutting using hot wire and to identify suitable cutting parameters to improve foam cutting. This CNC has two mutually perpendicular axes controlled using a motor and micro controller. This design will aid UAV designers, Aero- modeler & hobbyist for rapid prototyping of wings, fuselage & different shapes, also it has wide application in RC modelling, signage, scale model & props, etc. this will save time, increase productivity and quality of cuts.
Keywords:4 axis computer-controlled machine, UAV designers, Modelling, Micro controller

I. INTRODUCTION

Development in the past Decade due its wide range of application in Defense, surveying, surveillance, photography, agriculture, disaster management, etc. Aeromodelling is one of the popular hobbies among all age groups across the world. This rapid development of RC aircraft happened due to the miniaturization of radio electronics, power systems, high power industry in India aeromodeller and UAV Designer need automated machines to cut this foam accurately precisely with no error also which will give them more time for iterating their design & get optimum results. This research aims to design & develop foam cutting Hobby aircraft Remotely piloted

Aircraft and Unmanned Aircraft's vehicle has undergone significant density batteries, and motors along with theavailability of strong & lightweight & easy to use Foam polymers like EPS, EPP, XPS, polystyrene. Many aircraft models are made with these foams to achieve intricate shape for advanced Aerodynamics, stability, and performance. Manufacturers use foam melding processes.This is cost-effective for mass production. Hobbyists prefer these different shapes out of foam. Mostly in this emerging UAV and aeromodelling machines for the rapid prototyping of foam wing & other foam shapes.

A. Overview Of research work

To reduce cutting time and increase its efficiency for current use in UAV industries, we had done a literature review, then we studied different mechanisms. We tookreferences from various research papers. We designed our project through CAD modeling and using AutoCAD FUSION 360. After that, we did fabrications and assembling. We tested our models by cutting different foams to reduce errors and overcome their earlier limitations. We also reduced the overall cost so that small- scale manufacturing industries can also afford it.

Manufacturers use foam molding processes. This process is suitable for mass production, to produce many identical parts, like fuselage or wings (in the case of RC models).

- Hobbyists that prefer to make their models at home with hand tools are usually limited to much simpler shapes that are obtained via bending plain Styrofoam sheets around multiple cross-sectional elements.
- Another method adopted is the layered object manufacturing (LOM) technique used for rapid manufacturing. They build their models from thick (approximately 30-100 mm) layers of XPS that were cut with the hot wire and glued together to form the intended object. Hotwire (heated with an electric current) must follow precisely contours of cross-sections which are achieved with templates glued on both sides of each layer; it needs skill and labor to achieve the desired result. The momentum research is an endeavor to fabricate a framework that can serve comparable requirements (yet not restricted to) of flying airplane modelers.
- A member of RC Groups forum has made a numerically controlled hot wire cutter that uses diving Foam software for cutting long one-piece wings. Hans Seybold from Germany has made an NC hot wire cutter with 4 degrees of freedom. He used a unique mechanical layout where a bow with hot wire is positioned in space with 4 filaments of variable length controlled by 4 stepping motors. He likewise fostered a program to drive the bow along the ideal course which uses the plain content depiction of all directions of the shape. All information is available for free on the internet at Hot-wire cutter by Hans Seybold
- Probably the most advanced technology is used in the Aero Tetris Company located in Russia. They use a 6 axis NC machine which allows achieving an accuracy of 0,09- 0,5 mm with wire inclination up to 165 degrees. During the cutting process speed and temperature are varied. The organization sells sets of Styrofoam parts for building huge models.

B. Formulation of the problem

This research aims to overcome existing problem & to implement new methods

- To improve Precision & accuracy of foam cut using hot wire foam cutting
- Try to use open-source programs for controlling CNC foam cutter
- Try to make it cost-effective for hobbyist, designer
- Use easily accessible parts

Finding out the need of the project

- To save time build time-prototyping for designer
- To make machine using accessible parts
- Easy to use machine based on open-source software
- To help UAV designer to design aircraft design with less expensive material like foam

Development of new prototype modal

To overcome and meet the objectives of the project. We had designed the machine from scratch using CAD software. This design will include 3d printed parts for motor mounting, frames, smooth rod for providing structural rigidity, threaded rod & Stepper motor mechanism for linear movement of Cutting tool i.e. hot wire. This complete assembly will be controlled using Micro controller and Stepper Drivers on G-CODE command generated using open-source software like http://www.diyrcwings.com/ or wing g code generator software

II. RESEARCH METHODOLOGY

A. Introduction of the proposed machine

The proposed machine can be introduced as a CNC Hot wire foam cutter. It has two pairs of vertical and horizontal arms attached. This pair of vertical arms hold the cutting tool i.e. hot wire at a certain distance. These vertical arms are mounted on horizontal arms which are controlled using a Stepper motor. Motor speed and feed rate of the Cutting tool is controlled using a microcontroller through G Codes. Proposed machine intends to save the time of maker, give them good quality cuts, to bring out suitable cutting parameter for foams.

B. Need of this Project

To find suitable cutting parameters like the temperature of Hotwire, feed rate, etc. for different foam. To make this project cost-effective by using easily available material, also 3d printed parts for custom part design. To increase precision accuracy & minimize gross errors. This machine will cut three types of foam like EPS, XPS, HDPE.

C. Identification of problems

Two major parameters that are responsible for the smoothness of cut and their accuracy

The temperature of Hotwire Feed rate in mm/s The temperature of hot wire is regulated using a variable power supply, a cutting tool for foam. The current-carrying wire will vaporize the foam. Feed Rate is the speed of a cutting tool i.e. hot wire at which it is moving this is controlled using a Stepper motor via G code & microcontroller. In the cutting process, a hot wire heated by passing current is directed through a block of Foam. The wire is heated at 200°C, as polystyrene foam melts at around 200°C, but attains its flowing state at 100°C. This heated wire vaporizes the foam at the cutting location. This slightly melts the surface of foam & leaves an open gap at the cut location. This gap is called a kerf. The width or thickness of Kerf depends upon the cutting temperature and cutting speed. It varies with variations in temperature and cutting speed. Kerf is directly proportional to temperature and cutting speed. Kerf can be controlled using the CNC system implemented in this project.

D. Development of prototype model using CAD software

This prototype is made using a 3d printed part, aluminum extrusion, threaded rod, smooth rod, stepper motor, microcontroller, stepper drivers. The 3d models are made using Autodesk Fusion 360.

Length of horizontal arm = 500mm Length of vertical arm = 250mm Length of wire = 500 mm Microcontroller

Figure1:Setup model

Figure2:Assembled Setup

III.TESTING OF THE MODEL

Testing was done to find out Kerf's width. It is the width of the gap between foam parts that are separated by the cut. From Testing it is pointed out that the kerf width value varies with the amount of time and current supplied to the wire. Kerf values vary with the thickness of cutting wire for the proposed model .4mm nichrome wire is used. The temperature of the wire is needed to set according to material properties i.e., foams.

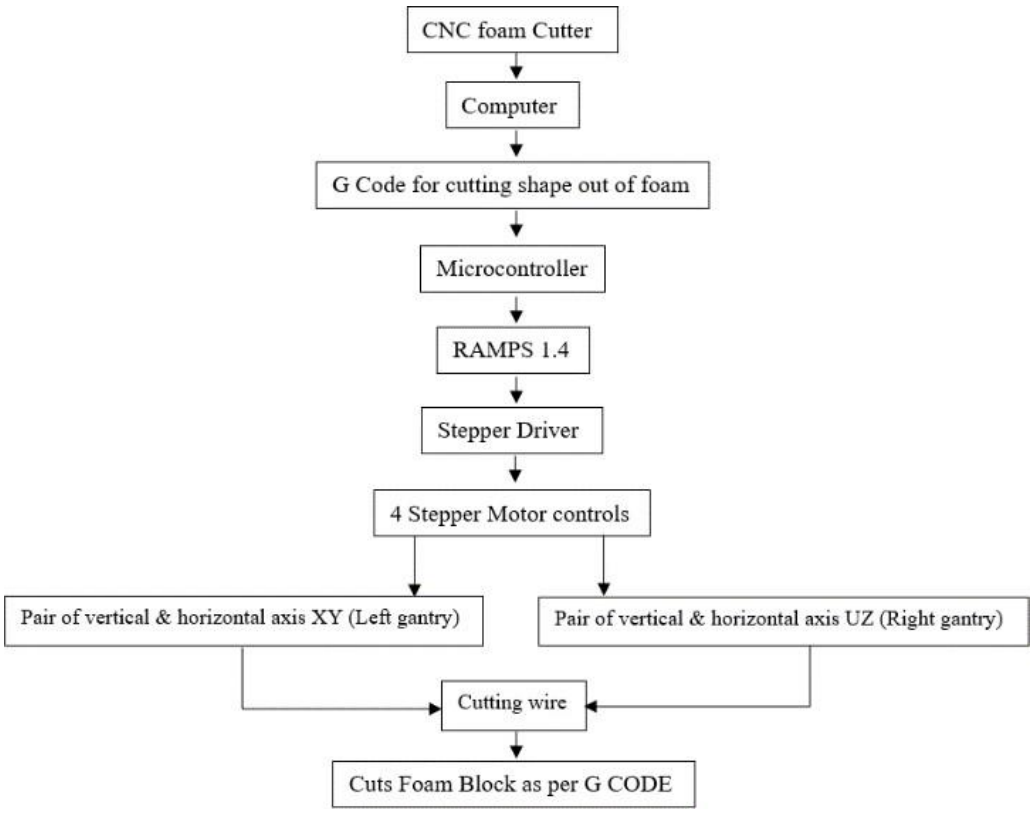

Figure3:Working Chart of CNC Foam Cutter

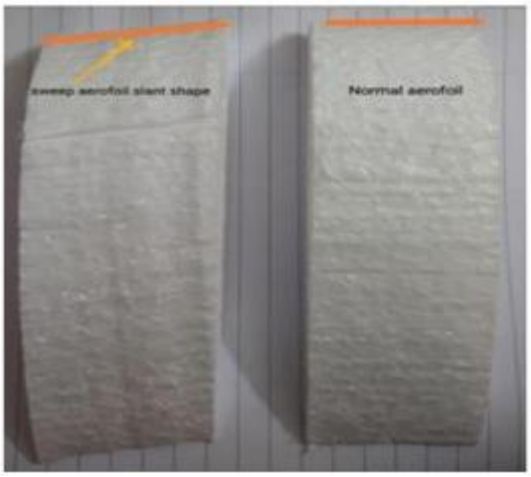

Figure4:Aero foil Cut Sample

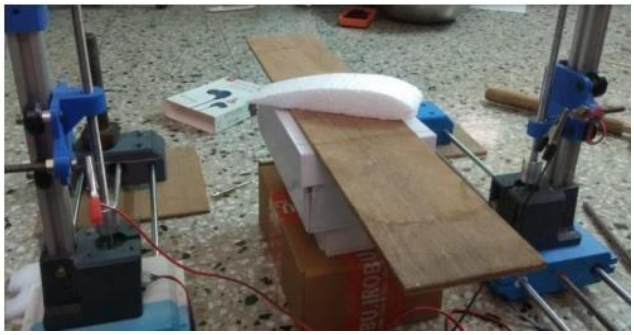

Figure5:Testing Setup

IV. CHARACTERISTICS OF CNC FOAM CUTTER

- Foam Cut Volume 500mm x 500mm x 250mm
- No. of Axis motor 4 stepper motor XYUZ
- Cutting methodology Thermomechanical cutting
- Cutting toolNichrome wire twenty-six
- Machine Size5500mm x 500mm x 2500mm
- Machine Weight 8 Kg
- Power offer 12V, 30Amp
- Connectivity USB
- Foam Material Polystyrene, XPS, EPP

V. CONCLUSION

We have designed and fictitious the most structure (body) of CNC Foam cutter it is four axis system that management movement of hot wire in keeping with G code. This machine cut foam exploitation Thermo mechanical cutting mode during which hot wire is passed through foam with sure cutting speed that creates a spot in foam. This gap is made because of melting of froth done by hot wire. Multiple cutting trials were done on foam before thesis. Material used for cutting trials was vinylbenzene (thermacol). completely different power input & completely different cutting speed were modified in G code. completely different values like kerf, tension in wire, additionally surface texture was discovered while cutting. From these trials we've got come back up with outcome once exploitation constant current cutting the cutting mechanisms amendment over the length of the cut.

The surface texture on a sample cut with constant current changes reckoning on the cutting force gift at that position. High cutting forces lead to a wavy surface. Low non-zero cutting forces give the smoothest surface because the wire shears the adjacent liquified plastic filling within the cell boundaries. once cutting forces area unit zero the wire is sufficiently hot to soften the froth previous the wire resulting in a granular surface texture because of discriminatory melting at the cell boundaries. This cutting force & temperature may be controlled by finding out properties of fabric & exploitation feedback system. This machine will cut desired shape of wing. The preliminary study yielded necessary results concerning dominant and planning a numerically controlled hot wire cutting with high accuracy and reliability.

UAV is rising technology in Asian country and Aeromodelling is hobby of all time. These field uses foams as for prototyping, production, mildew creating of recent model. The machine designed and fictitious will deliver quality of froth move amateur and makers. it's necessary accuracy & exactness in cut if all parameter of cutting is setaccurately. it's price effective & simple to use system for beginner.

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Arduino Nano Based Digital Password Lock for Door Security System Using 4x4 Matrix Membranes

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ABSTRACT

Nowadays, every human has a place of their own where they store their belongings. To prevent others from gaining access to their private property or privacy, they use locks, but these locks have a lot of flaws, like easy penetration, inadequate security, and the inability to deal with the lock in any other way than with a traditional key. Conventional door lock systems consist of a lock and lock system, in which a key is required to open the door lock automatically. Entrants can easily duplicate the keys and access the doors. This method was just as risky as contemporary door locks, which are rarely made with features like entry detection, alarms, and cameras. Door lock systems are essential to the security of offices holding private information or documents, retail establishments holding substantial sums of money or internal storage, and even residences housing numerous pricey but essential objects kept indoors.The Arduino Nano is the circuit's primary component. A 4x4 Matrix Keypad is utilized in the present work to input the password. The entered password and the predetermined password are compared. The system rotates the door motor to open the door if the password is entered correctly, and an LCD shows the door's state. The door stays closed and shows "PWD is wrong on LCD" if the password is incorrect

Keywords: Arduino nano, matrix membrane,IDE, EDA, IoT

I. INTRODUCTION

Main concept behind this project is of a door-latch opening using a password entered through keypad. As well as turning on the Buzzer when password is entered wrong. Today people are facing more problems about security in all over world, nowadays security is the most essential issue everywhere in the world so security of everything gains higher and higher importance in recent years. The main component in the circuit is Arduino nano. Here, 4X4 keypad is used to enter the password. The entered password is compared with the predefined password.

The scope of studying a 4x4 matrix membrane-based door lock system involves examining its design, functionality, security features, and practical applications. This entails understanding the technology behind the membrane keypad, including its layout, material composition, and how it detects and registers user input. Additionally, research may delve into the integration of the keypad with the door locking mechanism, exploring aspects such as encryption algorithms, access control protocols, and potential vulnerabilities. Furthermore, the study may encompass user experience considerations, such as ease of use, reliability, and

durability, as well as potential challenges like weather resistance and maintenance requirements. Overall, investigating a 4x4 matrix membrane-based door lock system offers insights into both the technical and practical aspects of modern security solutions for residential and commercial applications.

II. LITERATURE SURVEY

Mei-Chuan Tseng et al. proposed how the door opening function can be monitored by a single wrist-worn sensor. It can track the movement of a person's upper limb during daily activities. It can track the movement of a person's upper limb during daily activities. It had three subtitles for the complete motion of opening the door, which includes holding, turning and opening the door. The proposed system can detect and recognize these signals. The data collection phase includes the collection of data from a 3-axis accelerometer and a wrist-worn gyroscope.

Steven Zeiss et al. proposed a door locking security system with sensory sensors that detect human presence at a distance and without physical contact between the door and the person needed to lock/unlock the door. This helps prevent the spread of sanitary problems, such as infectious diseases, because fewer people touch the slide with their hands as in public toilets. Their project can be used in hospitals for leg replacements and for people with physical disabilities. When swiping, only the vertical and horizontal touch sensors are activated. The four touch sensors are numbered in a way that contradicts the movement of the clock. Active touch can be detected by digital numbers 1-4 (as there are 4 touch sensors). If the pattern is 12341, it indicates a circular touch, and the pattern 111444 represents a straight swing. There are different taps to lock, unlock, open and close the door, which can be done in different ways circularly, horizontally or vertically.

Yuan-Chih Yu [8] suggested in his article that the traditional door lock system involves carrying keys to open the door, Door lock systems also run on electrical equipment, making them dependent on electricity and ineffective during power outages. The author invented a digital door lock system that included a smart card reader and a touch panel. For example, in the event of a power failure, the system was connected to a USB port where a power bank could be connected to power the system.

III.HARDWARE DESCRIPTION

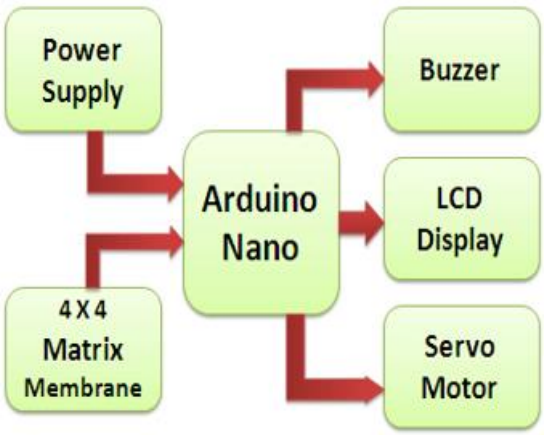

Figure1:Block diagram

The block diagram of 4X4 matrix membrane keypad door lock system contains the components like Arduino Nano, LCD, Servo motor, Keypad and Buzzer. For this purpose, we used a random password like “4574” by using the keypad.

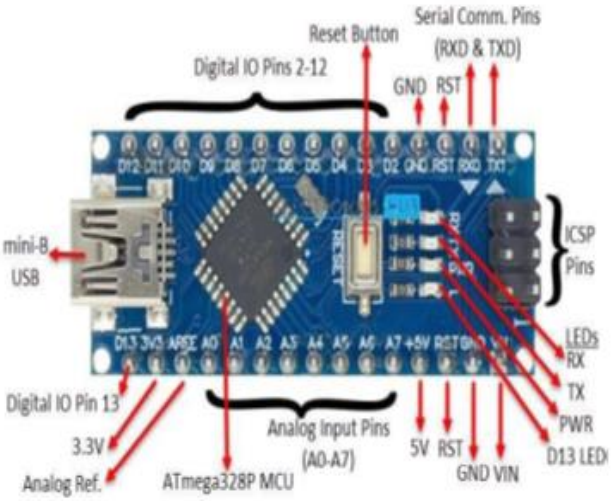

Figure2:Pin diagram of the Arduino Nano

The Arduino platform has become well acquainted with people into electronics. Unlike most previous programable circuit boards, the Arduino does not have a separate piece of hardware in order to load new code onto the board, you can simply use a USB cable to upload, and the software of the Arduino uses a simplified version of C++ , making it easier to learn to program, and it provides you with an easier environment that bypass the functions of the micro-controller into a more accessible package.

IV. MATRIX MEMBRANE

A 4x4 matrix membrane keypad is a type of input device commonly used in electronic systems for user interface purposes. It consists of 16 keys arranged in a 4x4 grid, typically labeled with numbers, letters, or symbols. Each key is connected to a matrix of conductive traces, and when a key is pressed, it makes electrical contact with the corresponding traces, allowing the system to detect which key has been pressed. These keypads are often used in applications such as security systems, industrial control panels, and electronic appliances for data entry and menu navigation. A 4x4 matrix membrane keypad is a type of input device commonly used in electronic systems for user interface purposes. Here's some more detailed information about it:

The keypad utilizes a matrix arrangement of conductive traces. Each row and column of keys is connected to a set of conductive traces on the membrane. This the number of required connections to the controller.

When a key is pressed, it makes contact between a specific row and column, creating a unique electrical connection. The microcontroller or dedicated keypad controller detects this connection by scanning through each row and column sequentially, determining which key has been pressed based on the activated row and column.

The keypad is usually connected to a microcontroller or other electronic device using simple digital I/O pins. The controller reads the keypad inputs and processes them according to the application's requirements, such as menu navigation, data entry, or system control.

4x4 matrix membrane keypads are commonly used in various electronic devices and systems, including security systems, industrial control panels, medical equipment, consumer electronics, and appliances. They provide a simple and reliable means of user input in a compact form factor.

A. Integrated Development Environment (IDE)

Arduino Integrated Development Environment, or Arduino software(IDE)- includes a text editor for writing code, a message area, a text console,a toolbar with common function buttons and a set of menus. It connects to Arduino hardware to download and interact with programs.

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension. ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

B. Easy EDA

An Easier and Powerful Online PCB Design Tool Featuring Parts and PCB Services Powered by LCSC. Easy EDA is an easier and powerful online PCB design tool that allows electronics engineers, educators, students, makers, and enthusiasts to design and share their projects. This is a design tool integrated LCSC components CatLog and JLCPCB PCB service that helps users to save time to make their ideas into real products.

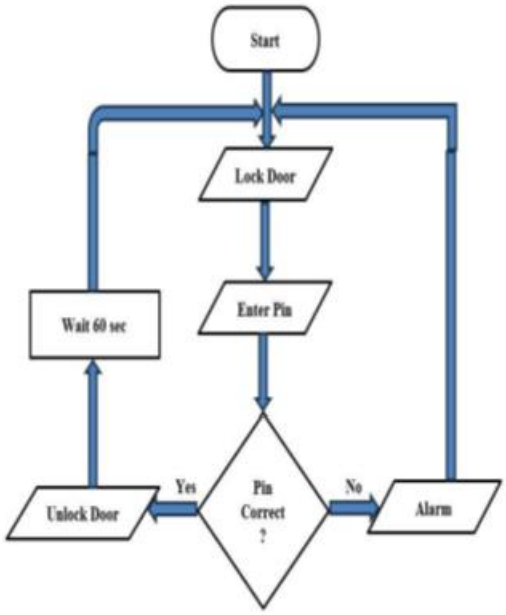

Figure3:Flowchart

Figure4:Flowchart

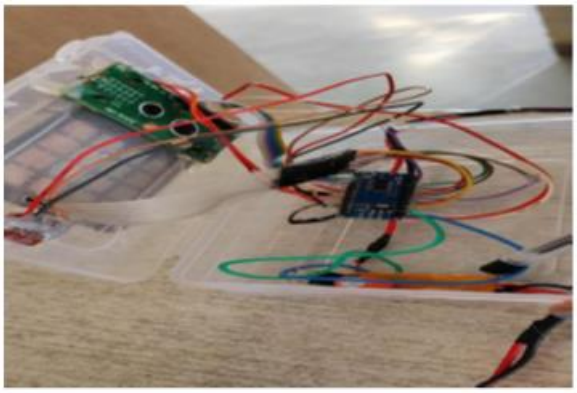

Figure5:Flowchart

The working principle is so simple. You just need to enter the password through the keypad provided. If the password is matched with the Arduino, it sends a signal to the servo and the servo rotate 180 degrees and then the door will open. Also, the LCD display shows a message “Access Granted”.
But if the password does not match. The Arduino does not send any signal to the motor and the door remains closed. This time the LCD display shows “Password Incorrect, Dismiss”. The alarm is beep when any of the keys are pressed. You can change all these messages anytime from the code.

V. CONCLUSION

The goal of our system was to create a safe door lock system using a 4x4 matrix membrane keypad. We were able to successfully integrate the keypad with an Arduino Nano by means of careful design and implementation, which established a strong code verification algorithm. The system proved to be very accurate and dependable during testing, however there were a few minor issues with interface optimization. User comments emphasized how practical and efficient the approach is. Future improvements might include connectivity with smart home systems and biometric authentication integration. Even with its success, it still needs to be improved upon in order to overcome some constraints. This study offers prospects for further developments in the industry and is a major step toward secure and effective door access control systems.

Future Scope

A 4x4 matrix membrane-based door lock system in the future might include machine learning algorithms for predictive maintenance and user behaviour analysis, IoT connectivity for remote monitoring and control, and

sophisticated biometric authentication techniques for increased security. It may also be easily integrated into ecosystems for smart homes, allowing for smooth automation and device interaction.

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Automatic E – Bike Stand for Two Wheeler

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ABSTRACT

This paper aims to enhance the efficiency of manual actuation and automation for sliding of side-stand to increase the safety of the rider. In the modern developing world, automobile plays an important role especially two-wheeler i.e. (motorcycles& bikes) plays a major role. Even though they are helpful there are some accidents due to the carelessness of the rider. To rectify this problem many advanced measures have been taken, but they are least helpful. To overcome the limitations of the existing methods a new model of "Automated E- side stand retrieving device", an electromechanical system, is introduced by using electric circuits and gear mechanism. The automatic side stand retrieval system is powered by the same source as every other electrical component on the vehicle, namely the battery. Due to the gear mechanism, increased torque will help the motor to lift the side stand easily.

Keywords: Auto Bike Stand, Motor, Motorbike, Gear, Arduino, Fabrication.

I. INTRODUCTION

Two wheelers are most prone to accidents due to their fragile nature. One of the issues of motorbike accidents is that people forget to slide their side stands back in place on starting the bike. So here we propose an automated side stand slider system that will automatically slide the side stand back in position when user starts his/her bike. In this system e make a demonstration model with a demo starter for bike and a frame used to hold starter, demo bike and sidestand in position. The frame is used to mount bile upright using frame. The starter consists of a microcontroller circuit used to monitor the starter and then operate the stand sliding mechanism. The stand consists of a motorized system used to operate the stand. The circuit monitors the starter, on starting the bike the sidestand is operated by the motor using a shaft to slide from a vertical position to a horizontal position. On turning off the key in other direction to lock bike the system moves the motorized

stand shaft in opposite direction so as to move the stand in a direction perpendicular to the bottom frame rod which rests the motor bike on side stand. Thus we have a fully automated sidestand system.

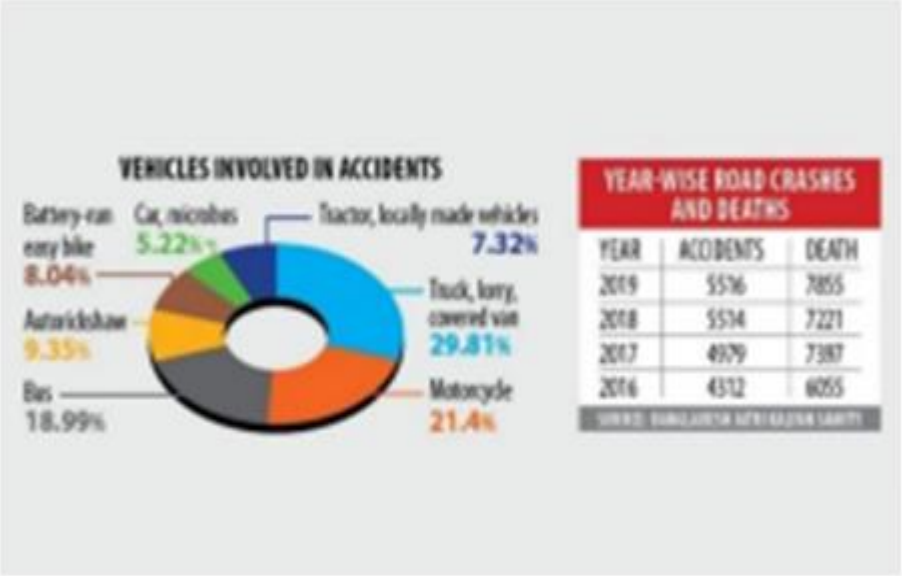

Fig.1: Types of vehicles involved in accidents

When it comes to two-wheelers, crashes happen when people ride at high speeds, don't wear helmets, don't stick to the speed limit, and fail to remove the side stand while riding. What are the most common causes of the collision? Forgetting to lift the side stand causes massive injuries in rural and urban areas alike since all other causes of accidents to have safety measures in place, but accidents caused by side stands do not. Here at the crash statistics [3], this condition is responsible for 36% of all deaths.

Table 1: Cause of Accidents During The Year 2012-2015

Serial No	The Accident's Cause	Accidents as a percentage
01	Forgetting to raise the side-stand	36%
02	Does not maintainspeed limit	38%
03	Does not obey traffic rules	22%
04	Other Problems	04%

A lot of researchers have dedicated their time to this field. We gather some information about the work of the researchers and giving them in the sequence below. Diagaraja [4] developed and filed a patent for a two wheel side stand warning device that alerts the rider to the retrieval of the side stand. The warning is used in two wheelers to warn or guide the rider to the unreleased position of the side stand while driving. It consists of the

tension spring, the touch switches, and the electrical wiring circuit. There is a tension spring in the side stand, which closes the electrical circuit for the horn supplied in the vehicle or the alarm to beep through the touch switch. It's getting its power from the battery in the vehicle. It indicates to the rider the horn or warning about the unreleased location of the side stand or side stand in use. A patent is developed and filed by Parvez [5] for a two wheel automatic stand, using a DC motor and a hydraulic pump, together with a distribution manifold and with a power pack reserve oil tank (Other choices are: a) 12 V DC actuator type or b) pneumatically motorized cylinder type or c) a hydraulically charged cylinder type. This mechanism allows the two-wheeler legs to be unfolded from their horizontal position to the vertical position and to force the mounting of the legs to a preset height that raises the two wheels and parks them up to their pre-set height, using the use of hydraulic cylinders or other methods such as Pneumatic Cylinders or Motorized Actuators. On the return path, the motor is reversed and, in the case of a hydraulically charged cylinder, the multiply inverses flow of the fluid, so the reversal of the operation sinks the stand to the previous position again and then unfolds it back to the horizontal position, which positions the two wheels ready to travel. The stand will quickly lift and unload a two-wheel when positioning it on the stand and back 7 in the riding position. It's simple to use and enables a person to park the two-wheel-drive in narrow lanes when the manual stand has no room. In this way, it can be possible to rotate horizontally across vertical positions, such as a combination of racks and pinion gears or liver systems or a hydraulic multi cylinder system. Joy [6] developed a battery-connected anti-accident ignition device that is connected to the battery, plunger. The switch system is connected on one side of the battery to the other end with the ignition body as well as with the plunger by means of the node.. With the help of a frame, the plunger is earthed. The battery used is a regular 12V battery. The plunger device is attached to the side by the coiled spring. All the appliances used are common systems used in two wheelers. The interface between a switch system and the plunger is through cables. The main feature is that the circuit will not be braked while the stand is in the OFF position so that the current from the battery passes through it directly. The earth given for it won't work in this case. All the current flows only from the created main circuit, hence the current fluctuates from the battery to the ignition coil. This current flow allows the vehicle to get started. When the stand is in the ON position, the circuit breaks and the current flows from the battery not through the ignition coil, but rather through the earthling, supplied by the plungers with the help of the chassis. The voltage-current is transferred into the rubber portion of the vehicle in which the current is absorbed and the current flow into the Earth's surface using the side stand current. Kumar [7] developed a new mechanism that is based on the simplicity and success of the trigger mechanism. The operation consists of three principal components: clutch, stand, and trigger. The pitch causes the button and the clutch triggers to raise the pitch. The stand retrieves itself as it is applied to the clutch to move the machinery. He assessed and optimized the

spring to its final design that is the most productive process. Sanjeev [8], developed a Two-wheeler Side Stand Unfolded Side Lock Link mechanism In this system the side stand lock link makes the contact with the gear lever thereby indicating the person handling the vehicle about the unreleased side stand when the rider tries to apply the gear in an unreleased state of stand and prevent him from being endangered or to have an unsafe ride of the motorcycle. The two-wheeler side stand unfolded side lock link for the vehicle is one of the lifesaving mechanism which prevents the rider from riding the vehicle in the unreleased position of the ride stand. Gulhane [9] fabricated a side stand lifting mechanism based on a simple mechanism and it is operated manually by the means on the feet power of the rider. The working consists of three mechanisms. The main mechanism is the spring mechanism by which the stand lifts up automatically without any manual effort. The second one is the locking mechanism which is used for locking and de-locking the stand. The last one is the lever mechanism which can operate the spring. As pressing the gear lever which is attached to the hook catch-lock get stretched to pull the lock by which lock gets de-locked. With this hook, it escapes from the lock and the stand gets lifted automatically by spring action manually. As pressing the lever the wire which is attached to the hook catch-lock gets stretched and pulls the lock by which lock gets de locked. With this hook, it escapes from the lock and the stand getslifted automatically by spring action. Gawande [10] developed a side stand lifting mechanism on which Electrically operated servo motor driven mechanisms are used to do the end job of lifting and unlocking the side stand and the footrest respectively. The mechanism works on the signals sent to it by a microcontroller circuit,which generates these signals based on the user code feed to it. By integrating this mechanism to the vehicle, the side stand will automatically leave off when the ignition is turned on and the footrest will automatically unlock when an adult passenger is seated on the vehicle's pillionseat Nayan[11] developed a Mechanism that retrieves side stand by Clutch. As the starter button is pushed, the electric circuit begins to operate, and when the clutch is pressed, the electric circuit receives electricity. The electric motor then rotates and applies driving power to the stand, lifting it. When the maximum of the stand is touched or pressed, the power supply for the motor's forward path is removed. Power will be sent directly to the spark plug at the same time, and the two-wheeler willrun. In line with cycling operational theory, Jichkar [12] has created a new side stand slider. With the aid of electronic components such asservo motor, engine driver,Arduino, the system operates on electronic circuits on the bike. A demonstration model with a bike demo starter and a frame is created in this procedure to preserve the starter, the demo bike, and the side stand. The frame is 9 used tomount the bike with a frame upright. The starter consists of a circuit for controlling the starter and then using the mechanism for the sliding stand. The stand consists of a motorized device used to power the stand's microcontroller. The circuit tracks the starting pad, the motor pushes the side stand from a slider to a horizontal position at the start of the bike. When the key turns off to lock the bike, the mechanism pushes the

motorized stand shaft in the opposite direction to drive the stand perpendicular to the underframe rod, which lies on the motorcycle side. We, therefore, have a fully automated motorcycle side-stand system.

The limitations of the existing methods, to say, when the rider is not paying attention, the side-stand sensor just sends a blip to the speedometer interface and is ineffectual. In mechanical projects, various difficulties such as gear wear and limb injuries are seen while actuating gears. The main disadvantage is that it cannot be used on all sorts of two-wheelers. So, in order to address this issue, this "Automated side stand retrieving device" is fabricated which can be mounted to any type of two-wheeler (mopeds, geared, non-geared, hand geared bikes). Because the assembly uses electronic components, there is no wear in the gears and no injury to the legs when actuating the gears.

The Automatic Side-Stand Retrieving system is designedto reduce the number of accidents caused by riders forgetting to recover their side-stand before starting their two-wheeler. It operates in such a way that when the vehicle rider turns on the ignition key of the two-wheeler, the side-stand of the two-wheeler is retrieved, and when the ignition key is switched off, the side-stand automatically returns to the upright position. The details are briefly explained in the Methodology sections of this paper.

II. COMPONENTS USE

- Transformer
- Starter Key Switch
- Servo Motor
- Motor Driver
- Side stand
- Arduino-Uno
- Adopter 12v-1A
- I2C Module

2.1 Frame: In Automatic side stand the frame or stand are used which is in box shaped. We have used box shaped cross section because it has good bending stiffness. The frame or stand provide base for Transformer, motor, and Switch. We have taken a from side frames of window. It bears the load of motor and side stand is bolted to it.

2.2 Transformer: A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction.

Electromagnetic induction produces an electromotive force across a conductor which is exposed to time varying magnetic fields. Commonly, transformers are used to increase or decrease the voltages of alternating current in electric power applications. A varying current in the transformer's primary winding creates a varying magnetic flux in the transformer core and a varying magnetic field impinging on the transformer's secondary winding. This varying magnetic field at the secondary winding induces a varying electromotive force (EMF) or voltage in the secondary winding due to electromagnetic induction.

Basic principles of Transformer:

According to Faraday's law of induction, since the same magnetic flux passes through both the primary and secondary windings in an ideal transformer, a voltage is induced in each winding. The primary EMF is sometimes termed counter EMF. This is in accordance with Lenz's law, which states that induction of EMF always opposes development of any such change in magnetic field.

By Ohm's Law and the ideal transformer identity:

- The secondary circuit load impedance.
- The apparent load impedance referred to the primary circuit to be equal to the turns ratio squared times the secondary circuit load impedance.

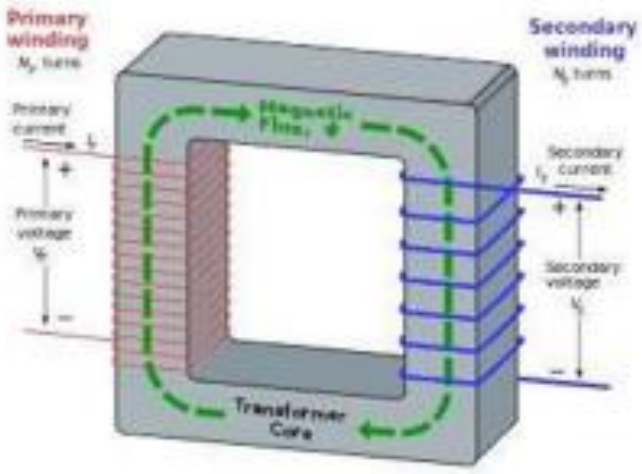

Fig 3.1- Ideal Transformer

Transformer used: The Transformer is used in the automatic side stand is12 volt or 5 ampere transformer. Transformer converts the D.C. into A.C. The power amount given to the Automatic side stand is low but from the supply power is came high, so we use the step down transformer which step down the power for usable in Automatic side stand.

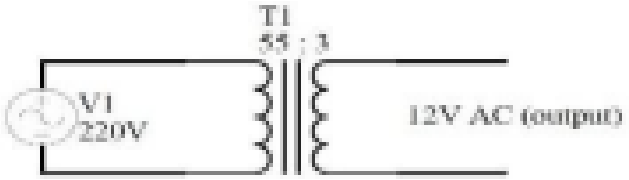

Fig 3.3 CIRCUIT DIAGRAM OF TRNSFORMER

Leakage flux

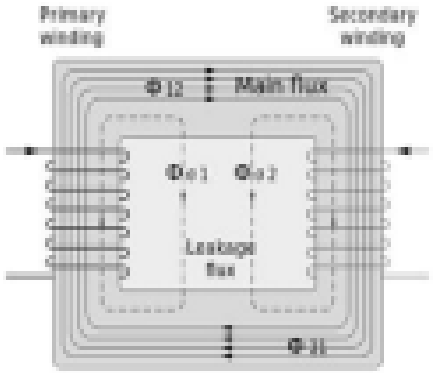

Fig 3.2 LEAKAGE FLUX OF A TRANSFORMER

The ideal transformer model assumes that all flux generated by the primary winding links all the turns of every winding, including itself. In practice, some flux traverses paths that take it outside the windings. Such flux is termed leakage flux, and results in leakage inductance in series with the mutually coupled transformer windings. Leakage flux results in energy being alternately stored in and discharged from the magnetic fields with each cycle of the power supply. It is not directly a power loss, but results in inferior voltage regulation, causing the secondary voltage not to be directly proportional.

2.3 Starter Key Switch: An ignition switch, starter switch or start switch is a switch in the control system of a motor vehicle that activates the main electrical systems for the vehicle, including "accessories" (radio, power windows, etc.). In vehicles powered by internal combustion engines, the switch provides power to the starter solenoid and the ignition system components (including the engine control unit and ignition coil), and is frequently combined with the starter switch which activates the starter motor. Historically, ignition switches were key switches that require the proper key to be inserted in order for the switch functions to be unlocked. These mechanical switches remain ubiquitous in modern vehicles, further combined with an immobilizer to only activate the switch functions when a transponder signal in the key is detected. However, many new vehicles have been equipped with so called "keyless" systems, which

replace the key switch with a push button. The ignition locking system may be sometimes bypassed by disconnecting the wiring to the switch and manipulating it directly; this is known as hotwiring.

Fig. 3.3 Starter Key Switch

2.4 Servo Motor: A servo motor is a rotary actuator that allows for precise control of angular position. It consists of a motor coupled to a sensor for position feedback. It also requires a servo drive to complete the system. The drive uses the feedback sensor to precisely control the rotary position of the motor.

Fig. 3.4 Servo Motor

2.5 Side Stand: A Side stand is a device on a bicycle or motorcycle that allows the bike to be kept upright without leaning against another object or the aid of a person. A "smaller, more convenient" kickstand was developed by Joseph Paul Treen, the father of former Louisiana Governor, Dave Treen. A kickstand is usually a piece of metal that flips down from the frame and makes contact with the ground. It is generally located in the middle of the bike or towards the rear. Some touring bikes have two: one at the rear, and a second in the front. A side stand style kickstand is a single leg that simply flips out to one side, usually the non-drive side, and the bike then leans against it. Side stands can be mounted to the chain stays right behind the bottom bracket or to a chain and seat stay near the rear hub. Side stands mounted right behind the bottom bracket can be bolted on, either clamping the chain stays or to the bracket between them, or welded into place as an integral part of the frame.

Fig. 3.5 Side Stand

2.6 Adopter 12v-1A This Adopter is commonly used for power supplies, chargers, and other electronic devices. It means the device requires a power input of 12 volts with a current draw of 1 ampere. A "12V 1A adapter" refers to a power adapter that provides a direct current (DC) output of 12 volts and a current of 1 ampere. Such adapters are commonly used to power various electronic devices like routers, modems, small speakers, LED strips, and many other low-power gadgets. They're often referred to as "wall warts" due to their blocky shape. When purchasing or using one, it's important to match the voltage and polarity requirements of the device you're powering to ensure safe and proper operation. Voltage: The "12V" indicates the voltage output of the adapter. Voltage is a measure of the electrical potential difference between two points in a circuit, and it's typically measured in volts (V). In this case, the adapter provides a voltage of 12 volts.

Current: The "1A" indicates the current output of the adapter. Current, measured in amperes (A), represents the flow of electric charge in a circuit. In this case, the adapter can supply a current of up to 1 ampere.

Power: Power, measured in watts (W), is the product of voltage and current (P = V x I). For this adapter, the maximum power output would be 12 watts (12V x 1A = 12W).

Usage: This type of adapter is commonly used for low-power electronic devices that require a 12-volt power source. It's important to match the voltage and polarity (positive and negative connections) of the adapter with the requirements of the device you're powering to avoid damage.

Safety: When using any electrical device, including adapters, it's essential to follow safety guidelines to prevent electrical shocks, fires, or damage to equipment. This includes using the adapter only for its intended purpose,

avoiding overloading it with devices drawing more current than it can handle, and ensuring proper ventilation to prevent overheating.

: The Arduino Uno is a versatile microcontroller that provides a convenient platform for integrating sensors, controlling motors, implementing custom logic, and creating user interfaces. These capabilities make it a suitable choice for designing and prototyping an automatic bike stand.

Fig 3.6 Arduino-Uno

2.7 I2C Module: The I2C LCD component is use in application that required a visual or textual display. This component is also used where a character display is needed but seven consecutive GPIOs on a single GPIO port are not possible.

Fig. 3.7 I2C Module

2.8 Working Principle: Automatic Side Stand Braking Mechanism for Two-Wheeler is nothing but one of the braking systems in automobile at the time of vehicle switches off condition. In this braking system motorized operated one. In this project, the control unit is received the signal from the key switch from ignition and side stand. The key switch is 'ON' at the time of vehicle starts condition. The control unit will check the side stand positions, if the side stand will be released so that the motor is rotating in forward direction for 2 sec to release the break (Already wheel is on braking condition). The key switch is 'OFF' the motor is rotating in reward direction for 2 sec to applying the break.

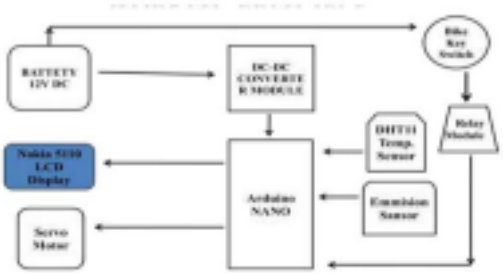

Fig. 3.8 Working Principle

III.DESIGN OF SIDE STAND

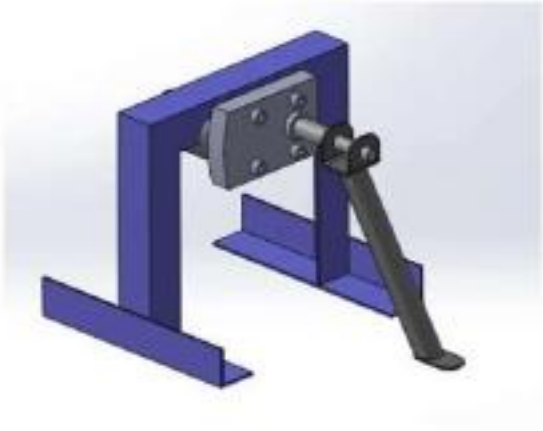

Fig. 4.1 Geometry

With the help of the 3d designing software CATIA we can prepare the side stand frame for our project according to our requirement.

Object Name: Geometry

State: Fully Defined

SourceC:\Users\PowerUser\Desktop\ayushman bhai_1simu.stp

Type: Step

Length Unit: Millimetres

Element Control: Program Controlled

Display Style: Body Colour

3.1 DESIGN AND DRAWING: Having been decided about the project to be manufactured, it must be designed. The work of the design should be done very carefully considering all the relevant factors. After designing the project, its detailed drawings are prepared so that no doubts are left for future. Detailed

specifications of the raw materials and finished products should be decided carefully along with the specifications of the machine required for their manufacture. This project work is designed by considering all the particle difficulties while fabricating, in advance.

3.2 MATERIALS REQUIREMENT: The list of the material requirement is prepared from the drawings. "This list is known as the "BILL OF MATERIALS". This can be passed to the storekeeper and the required materials are taken from the store under permission of the storekeeper.

3.3 OPERATION PLANNING Next work of planning is to select the best method of manufacture, so that wastage of raw material, idle time of the man and machinery and total manufacture time are restricted. Machine tools required to do the jobs are considered, while planning the operation. After considering the above questions, best method is developed and applied.

IV. ADVANTAGES AND DISADVANTAGES

Advantages of Proposed System:

1. It is easily installed.
2. It is rigid versatile.
3. It is low-cost application.
4. Near about less maintenance.
5. It is light in weight.
6. Electrical supply not required.
7. It does not affect the structure of a vehicle

Disadvantages of Existing Side-Stands:

1. Accident prone
2. Maximum Fatigue.
3. Only indicate the position.
4. Expensive To be imported – (Fully Automatic Stands)
5. It is not suitable for auto transmission vehicle

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Automatic Farming Kit (AFK) for Automation in Agriculture Sector using Advanced Sensors and Equipment

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ABSTRACT

In this paper, we delve into the unrelated parallel machines static scheduling problem, considering both renewable and non-renewable resource conditions, and accounting for the deterioration effect. The primary challenge lies in determining the optimal assignment of tasks to machines and the efficient allocation of resources, aiming to minimize both the makespan and the cost of non-renewable resources. To address these goals, we develop a mathematical programming model and apply a multi-objective simulated annealing algorithm to our problem. Our computational experiments encompass a range of instances, including small, medium, and large scenarios. The mathematical model proves effective for small instances with 8N2M, 10N3M, and 15N3M, providing solutions to the problem. Remarkably, for these instances, the MOSA approach achieves optimal solutions similar to those obtained by the solver but does so within a shorter computational timeframe.

Keywords*:* Metaheuristic, Linear Programing, Resources Cost, Unrelated Parallel Machine.

I. INTRODUCTION

This The Automatic Farming Kit is designed to operate amultiple functions and works in agriculture industry withApplication like automatic drip irrigation system, automaticfertilizing system, weather detection system, fertilizersuggestion software based application, soil moisture andnutrient observers, Raindrop alerts and alarm, water leveldetector and UV light insect killer system with many moreadvantages.The agriculture sector plays a crucial role inensuring global food security. As the world's populationcontinues to grow, the need for efficient and sustainablefarming practices becomes increasingly important. In recentyears, there has been a significant focus on leveragingtechnology to improve farming methods, resulting in thedevelopment of innovative solutions such as AutomaticFarming Kits. This report explores the future scope ofAutomatic Farming Kits, specifically their integration withadvanced sensors like soil moisture sensors, raindrop sensors,water level sensors, and others to enable automation infarming.

The Automatic Farming Kit is developed to take growth ofAutomation in Agricultural sector with the help of Electroniccomponents and sensors like moisture sensor, raindrop sensor,temperature sensor, vibration sensor, water level detectionsensor, weather forecasting device, wind flow detector andsound sensor. also it take part

in in software and IT industrysby using programming languages like JAVA, Python, CPPetc. Agriculture is a perfect niche for innovations in the sphereof robotics: farmers usually have to deal with repetitive tasksin the field, and this work is primarily labor- intensive. Nowagricultural robots ("agrobots") cope with a wide range oftasks: harvesting, watering, seeding, etc. Ease of Use.

II. NEED OF AFK

Automatic Farming Kits are comprehensive systems thatincorporate various technological components to optimizeagricultural processes. These kits combine hardware andsoftware elements to automate tasks such as irrigation,fertilization, pest control, and monitoring of environmentalconditions. By integrating advanced sensors, these kits cancollect real-time data and make informed decisions, leading toincreased crop yields, reduced resource consumption, andimproved overall efficiency.

The world population is growing steadily, and now it hasreached 7.7 billion people. One question that comes to mindis, what are all these people going to eat? First and foremost,this question is addressed to the agriculture industry. Thegrowing population is hardly the only challenge facingmodern farmers. What about labor shortages and consumersasking for ecofriendly sustenance? The answer to all thesequestions is Automatic Farming Kit and smart farming.

The most important things of Automatic farming areenvironmental measurements and water management. Thecombination of traditional methods with latest technology asInternet of Things and wireless Sensor Networks can lead toagricultural modernization. The wireless Sensor Networkwhich collects the data from different types of sensors andsends it to the main server using wireless protocol. Our

SVERI College of Engineering, Pandharpur

Automatic farming system reduces the manual work andautomates the agricultural activities.

III.USE OF AFK

The main idea of this system is to automate the activitiesof farming by using the principle of mechanics;communication and electronics. There are two modules,namely a smart farm sensing system and movable smartirrigator that moves on mechanical bridge sliderarrangement. This system consists of moisture sensor,optocouplers, spectroscopy sensor which measures lightintensity and measured chlorophyll content whichevaluates the nutrient content in the crops. A crane consistsof the two main sensors and the Smart irrigator is mountedon the overhead crane through which crop growth can beanalyzed. Sensors triggers the optocoupler connected togreen manure, seeds, compost and water container.

IV.METHODOLOGY OF AFK

In the proposed system monitoring and controlling are donethrough sensors such as soil moisture sensor, PIR sensor, pHsensor, water flow sensor. To prevent tress, a microphone isused to record the sound of axe or other tools used for cuttingof trees. Here the data is transmitted through IoT. In thissystem the data is being processed by PIC16F877Amicrocontroller. The Internet of Things is regarded as the thirdway of information technology after Internet and mobilecommunication network, which is characterized more throughsense and measure.shows the block diagram of the proposedsystem model.

The working of this proposed technique is illustrated asfollows:

1) The soil moisture sensor senses and measures the moisturelevel in the soil.
2) The PIR sensor detects the animals and a high frequencysound signal is provided.
3) The ph sensor and water flow sensor is used to optimize thefertilizer usage.
4) These data are processed and the optimum water level willbe supplied to the field by automatically switching on thepower supply to the water pump.
5) These data will be transmitted to the user's mobile phonethrough Iot using a separate IP address for the givenmicrocontroller which is programmed to send the data givenby the sensor to the user through a web page showing the ivecondition of the field

V. COMPONENTS OF AFK

A) Arduino UNO Board:

Arduino Uno R3 is one kind of ATmega328P basedmicrocontroller board. It includes the whole thing required tohold up the microcontroller; just attach it to a PC with the helpof a USB cable, and give the supply using AC-DC adapter ora battery to get started. The term Uno means "one" in thelanguage of "Italian" and was selected for marking the releaseof Arduino's IDE 1.0 software. The R3 Arduino Uno is the3rd as well as most recent modification of the Arduino Uno.

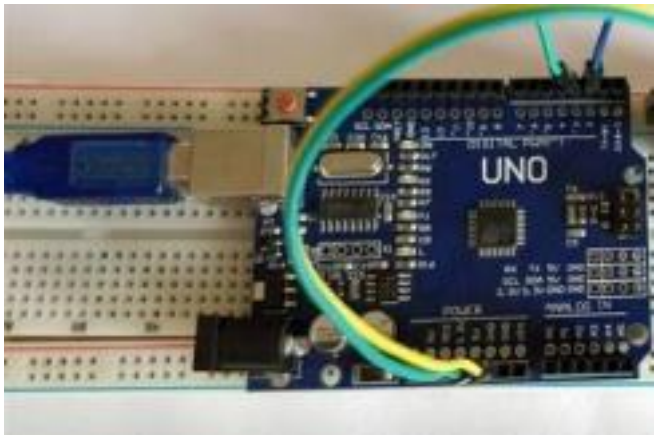

Fig. Arduino UNO Board

B) Soil Moisture Sensor:

Soil moisture plays an important role in the development ofweather patterns and agricultural applications. A soil moisturesensor measures the quantity of water contained in a material,such as soil on a volumetric basis. In this proposed researchsoil moisture sensor is used to know the exact soil moistureconditions on their fields. This helps farmers to generally useless water to grow a crop; they are able to increase yields andthe quality of the crop by improved management of soilmoisture during critical plant growth stages.

Fig. Soil Moisture Sensor

C) PIR Sensor:

In this proposed system Passive Infrared (PIR) sensors areused for the purpose of human and animal detection in thefield. This is a type most commonly encountered in motionsensing They are commonly used in automatic door openingsystem, security alarm systems .PIR sensors are used asmotion detectors in many applications such as Hospitals,grocery stores and libraries.

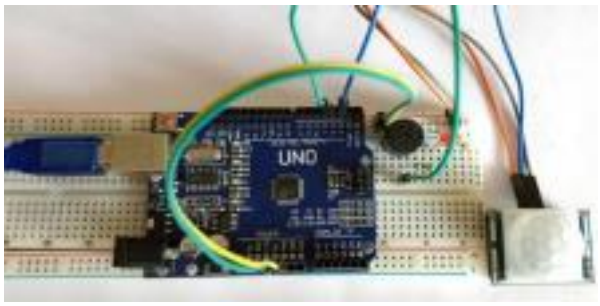

Fig. PIR Sensor

D) pH Sensor:

A pH sensor measures the hydrogen-ion activity in water based solutions, indicating its acidity or alkalinity expressedas pH. The pH meter is used in many applications rangingfrom laboratory experimentation to quality control. In thisproposed system pH sensors are used for soil, crop, and watertesting in agriculture to achieve high quality produce fromfarming operation. The output can be digital or analog, and thedevice can be battery-powered or rely on line power. With pHsensor we can measure the growing conditions and improveboth the health and yield from our crops.

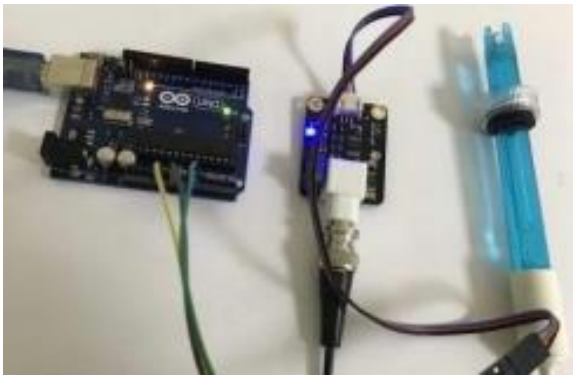

Fig. pH Sensor

E) Water Flow Sensor:

A water flow sensor consists of a plastic valve body, a waterrotor,and a hall-effect sensor. When water flows through therotor, rotor rolls. The speed of the flow sensor changes withdifferent rate of flow. The hall-effect sensor outputs thecorresponding pulse signal. In the proposed system the waterflow sensor is used to measure the amount of fertilizer mixedwith water. Through this the farmers can get the exact scenarioof fertilizers mixed with water and the usage of fertilizers canbe optimized. There are different types of applications such asgas meter, chemicals, process auto-control, medical, food andbeverages.

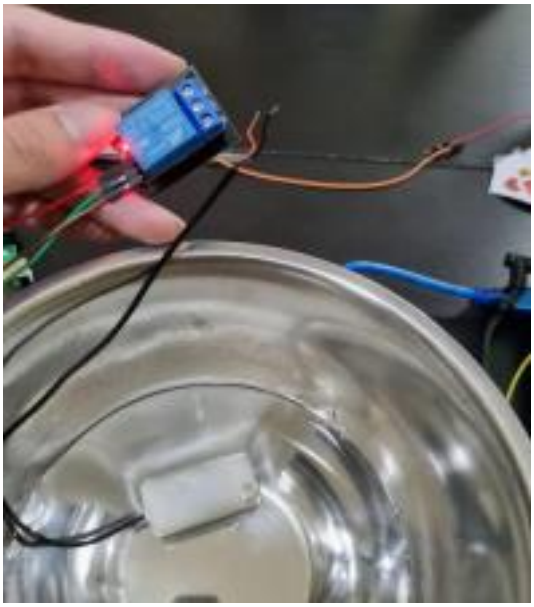

Fig. Water Flow Sensor

F) Raindrop Sensor:

Raindrop sensors detect the presence and intensity of rainfall.When integrated into Automatic Farming Kits, these sensorsprovide valuable information about natural watering events.By combining data from raindrop sensors with soil moisturedata, farmers can adjust irrigation schedules accordingly. Thisintegration helps prevent unnecessary watering during rainyperiods and reduces water wastage.

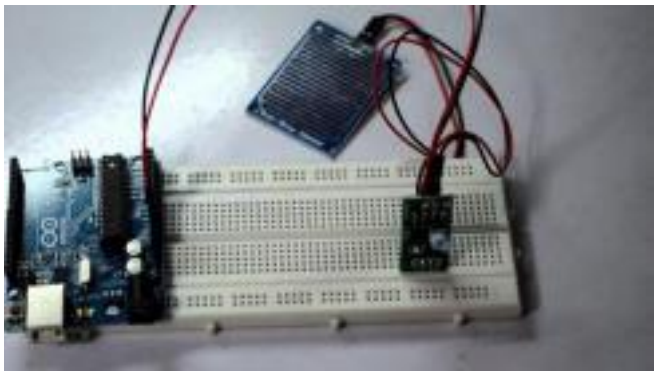

Fig. Raindrop Sensor

G) Water level sensors:

Water level sensors are essential for monitoring waterreservoirs, tanks, or irrigation channels. By incorporatingwater level sensors into Automatic Farming Kits, farmers canaccurately monitor water levels and automate the process ofrefilling or redirecting water.

Fig. Water level sensors

VI. ON FIELD SURVEY

1) On Field Survey 1 :

Name: Shitaram Pawar

Location: Gopalpur, Pandharpur-Mangalvedha Road,Gopalpur, Tal- Pandharpur-413304

Date : 06/10/2023

Time : 01:30 PM

Fig. On Field Survey 1

2) On Field Survey 2 :

Name: Ranjit Jagtap

Location: Anavali, Ranjani Road, Anavali,

Tal-Pandharpur-413304

Date : 06/10/2023

Time : 02:20 PM

Fig. On Field Survey 2

3) On Field Survey 3 :

Name: Babaso Dandage

Location: Ranjani, Sarkoli Road, Ranjani, Tal-Pandharpur-413304

Date : 06/10/2023

Time : 02:45 PM

Fig. On Field Survey 3 III. RESULTS

VII. BENEFITS

1. Increased Efficiency:

By automating critical farming processes through theintegration of advanced sensors, Automatic Farming Kits cansignificantly increase overall operational efficiency. Farmerscan optimize resource utilization, reduce manual labor, andmake data-driven decisions to enhance productivity.

2. Precision Farming:

The integration of advanced sensors enables precision farmingtechniques, where specific actions are taken based on real time data. This approach ensures that resources such as water,fertilizers, and pesticides are used efficiently, minimizingwaste and environmental impact.

3. Cost Savings:

Automated farming techniques can lead to cost savings forfarmers. By precisely controlling resource usage, optimizingirrigation schedules, and reducing manual labor, farmers canlower operational costs and achieve higher returns oninvestment.

4. Sustainable Agriculture:

Automatic Farming Kits contribute to sustainable agriculturepractices by promoting responsible resource management.Efficient water usage, reduced chemical application, andoptimized crop growth contribute to environmentalconservation and minimize ecological footprints.

Department, whose continuous advice and suggestionsshowed us the right path of doing the things in proper way. We feel indebted towards our Principal Dr. B. P. Ronge forproviding us the institutional facilities and supports.

VIII. CONCLUSION

After examining the survey papers on intelligent farming suchas IoT based monitoring system in smart agriculture, SmartFarming System using sensors for agricultural taskautomation, Sensor data collection and irrigation control onvegetable crop using smart phone and wireless sensornetworks for smart farm and Remote agriculture automationusing wireless link and IoT gateway infrastructure, a novelagricultural automation system using Internet of Things (IoT)is proposed. This system provides real time information aboutthe farmland and alerts the farmer in case of animal threats.The proposed system also prevent the trees from illegal cutdown. Some Common Mistakes.

IX. ACKNOWLEDGEMENT

Our hearts inflate with surge of glorious happiness as wepresent the research paper report on “Automation inAgriculture Sector using Advanced Sensors & Equipments”to Punyashlok Ahilyadevi Holkar Solapur University,Solapur.

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It is with sense of gratitude that we acknowledge the supportby Dr. S. B. Bhosale, Head, Mechanical Engineering

Department, whose continuous advice and suggestionsshowed us the right path of doing the things in proper way.We feel indebted towards our Principal Dr. B. P. Ronge forproviding us the institutional facilities and supports.

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Agile – Controlled Solar Metering System using IOT and Ubidots

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*Department of Electrical Engineering, Amrutvahini College of Engineering, Sangamner, Maharashtra, India

ABSTRACT
This project introduces an innovative solution: an Agile-Controlled Solar Metering System that utilizes IoT and the Ubidots platform for real-time monitoring and control of solar energy production and consumption. Traditional electricity meters often cause concern with high bills, requiring manual checks. With our smart energy meter using an ESP32 Wi-Fi module, users can monitor appliance load consumption in real-time from anywhere globally via smartphones. This IoT-based system provides convenience, allowing control over devices based on power consumption and budget management.
Keywords: Agile-Controlled, Solar Metering System, Ubidots IoT platform, Electricity meters

I. INTRODUCTION

The Internet of Things (IoT) serves as a catalyst for interactions between machines, humans, and the environment. This concept allows everyday devices to connect over the internet, facilitating remote analysis of connected devices. IoT establishes a crucial infrastructure for bridging the gap between the physical world and computer-based systems. With the proliferation of wireless devices in the market, the IoT concept gains significance. The system employs the ESP-32 Wi-Fi module to enable internet connectivity. The escalating demand for electricity for various purposes, such as agriculture, industries, households, and healthcare, poses challenges in managing electricity maintenance and requirements. To address these complexities and the increasing demand, there's a pressing need to conserve electricity. As the newer generations demand more electricity, technological advancements become essential. The proposed system represents a significant leap forward from traditional energy meters by leveraging IoT technology, providing a 180-degree technical shift. The system tackles issues like power theft, which contributes to economic losses for the country. The key objectives include monitoring, optimizing power usage, and reducing power wastage, ushering in a more efficient and advanced energy management system. The Internet of Things (IoT) catalysesinteractions between machines, humans, and the environment. This concept allows everyday devices to connect over the internet, facilitating remote analysis of connected devices. IoT establishes a crucial infrastructure
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II. DESIGN METHODOLOGY

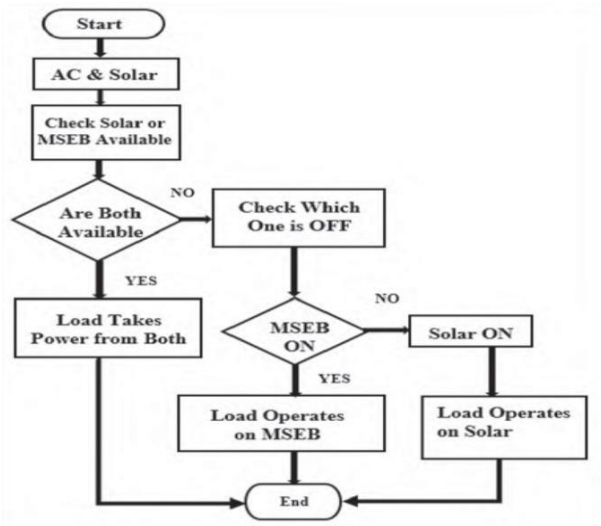

Figure1:Flow Chart

$V/Rpv = V/Rph – V/Rsat[q(I*Rpv + V/RpvRs/AKT – 1], V/Rph = \lambda/1000[V/Rsc + K1(t – 25)]$

where V/Rph is the photocurrent of the solar cell, the generated photovoltaic current is V/Rpv and the equivalent photovoltaic voltage is pv. I*R For a simplified model the shunt resistance Rsh is neglected because of its large value. Also, the small series resistance Rs is neglected. Therefore, the following equation can represent the PV characteristic

III.SYSTEM DESIGN

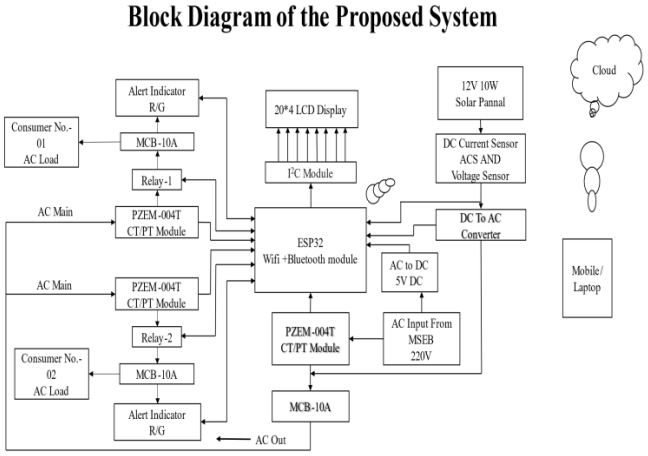

Figure2:Block Diagram

The system works as follows:

A. Solar Plate

Solar radiation may be converted directly into electricity by solar cells (photovoltaic cells). In such cells, a small electric voltage is generated when light strikes the junction between a metal and a semiconductor (such as silicon) or the junction between two different semiconductors. (See photovoltaic effect.) The power generated by a single photovoltaic cell is typically only about two watts. By connecting large numbers of individual cells together, however, as in solar- panel arrays, hundreds or even thousands of kilowatts of electric power can be generated in a solar electric plant or in a large household array.

B. DC Current Sensor(ACS712)

ACS712 Current Sensor Module - 30A can sense upto 30A of current flow. Sensing and controlling the current flow is a fundamental requirement in wide variety of applications, which includes over-current protection circuits, battery chargers, switching mode power supplies, digital watt meters, programmable current sources, etc.

C. DC Voltage Sensor:Voltage Input Range

DC 0-25V - This is the range of input voltages that the sensor can measure. It can accept voltages from 0V to 25V DC. Voltage Detection Range: DC 0.02445V - 25V - This specifies the range over which the sensor can detect and accurately measure voltages. It can measure voltages as low as 0.02445V (24.45mV) up to 25V.

D. DC TO AC Converter:Input Voltage

12V DC - This is the voltage level of the DC power source that the inverter accepts. Output Voltage: 220V AC - The inverter produces a sinusoidal or modified sine wave AC output voltage of 220 volts, which is compatible with standard household appliances and electronics in many regions.

E. ESP 32(Wifi + Bluetooth)

esp32 development board wifi+bluetooth, dual-coreesp 32 esp 32s esp 32 similar esp8266 esp32 is integrated with antenna and rf balun, power amplifier, low noise amplifiers, filters, and power management module. The entire solution takes up the least amount of printed circuit board area. This board is used with 2.4 GHz dual mode wi fi and Bluetooth chips by tsmc 40nm low power technology, power and rf properties best, which is safe, reliable, and scalable to a variety of applications.

F. AC Sensor=Voltage +Current + P.F + Frequency (PZEM-004T)

This document describes the specification of the PZEM-004T AC communication module, the module is mainly used for measuring AC voltage, current, active power, frequency, power factor and active energy, the module is without display function, the data is read through the TTL interface.

G. LCD Display

5V DC 20 x 4 Lines ASCII Character HD44780 LCD Display With BLUE Backlight Product Overview Product Description: o LCD display module with BLUE Backlight o SIZE : 20x4 (4 Rows and 20 Characters Per Row) o Can display 4-lines X 20-characters o Operate with 5V DC o Wide viewing angle and high contrast o Built-in industry standard HD44780 equivalent LCD controller o Commonly Used in: Student Project, Collage, copiers,

fax machines, laser printers, industrial test equipment, networking equipment such as routers and storage devices o LCM type: Characters ABOUT This is a basic 20 character by 4 line display BLUE Backlight . Utilizes the extremely common HD44780 parallel interface chipset (datasheet). Interface code is freely available. You will need 7 general I/O pins(If use in 4-bit Mode) to interface to this LCD screen. Includes LED backlight.

H. Ubidots

The proposed system can be used to display load energy usage reading in terms of Watts along with money drawn by the devices. The data would be accessed by each and every user from anywhere in the world. Ubidots.com is one such webpage which takes the help of the MathWorks MATLAB analytics to present the device information in a more detailed analysis in both description and visualization.Ubidots.com provides the user to add any number of channels to at least one account and in each account information are fed into 8 fields. An account may be assigned at least one division of an area and n channels are often created to a set of n meters within the locality. The analytics can be viewed by both the consumer and service provide.

I. Relay

The dual-channel relay module can be used to switch mains powered loads from the pins of a microcontroller. Since there are two channels on the same board, two separate loads can be powered. This is useful for home automation.

J. MCB

1) Current Rating: 10 amperes - The MCB is designed to trip and disconnect the circuit when the current exceeds 10 amperes.
2) Breaking Capacity: The breaking capacity indicates the maximum fault current that the MCB can safely interrupt without sustaining damage. It's typically expressed in kA (kiloamperes) and can vary depending on the specific MCB model. Common breaking capacities for MCBs range from 3 kA to 10 kA or more.

TABLE I COMPONENTS USED AND THEIR SPECIFICATIONS

Component	Specification
Solar Plate	10 watts
DC Current Sensor(ACS712)	Voltage: 4.5V ~ 5.5V DC Current Range: -30A ~ 30A
DC Voltage Sensor	0V to 25V DC.
DC TO AC Converter	Input Voltage: 12V DC Output Voltage: 220V AC
ESP 32(Wifi + Bluetooth)	dual core esp 32
AC Sensor	V :80-260V I: 0~10A
LCD Display	20*4
LED	Indicator
Load	100 W and 200W Bulb
Relay	Content: 1x 2 channel 5v relay module
MCB	10A

IV. RESULT AND ANALYSIS

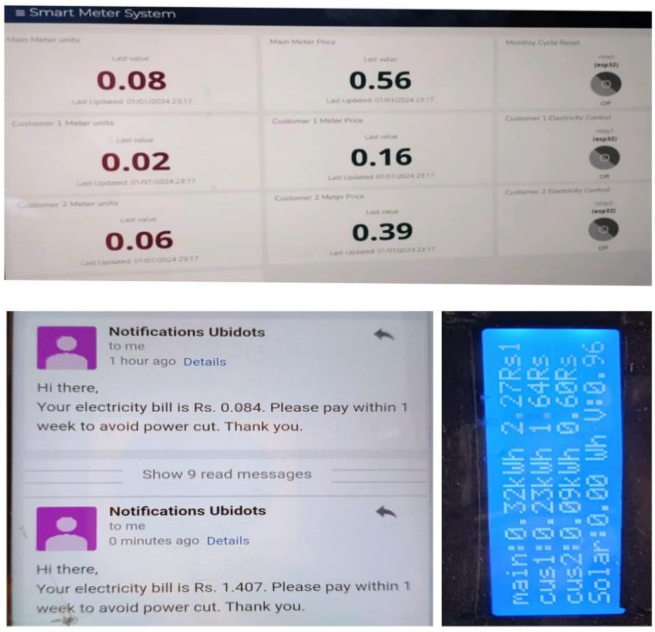

Figure 3 : OUTPUT On LCD And Ubidots

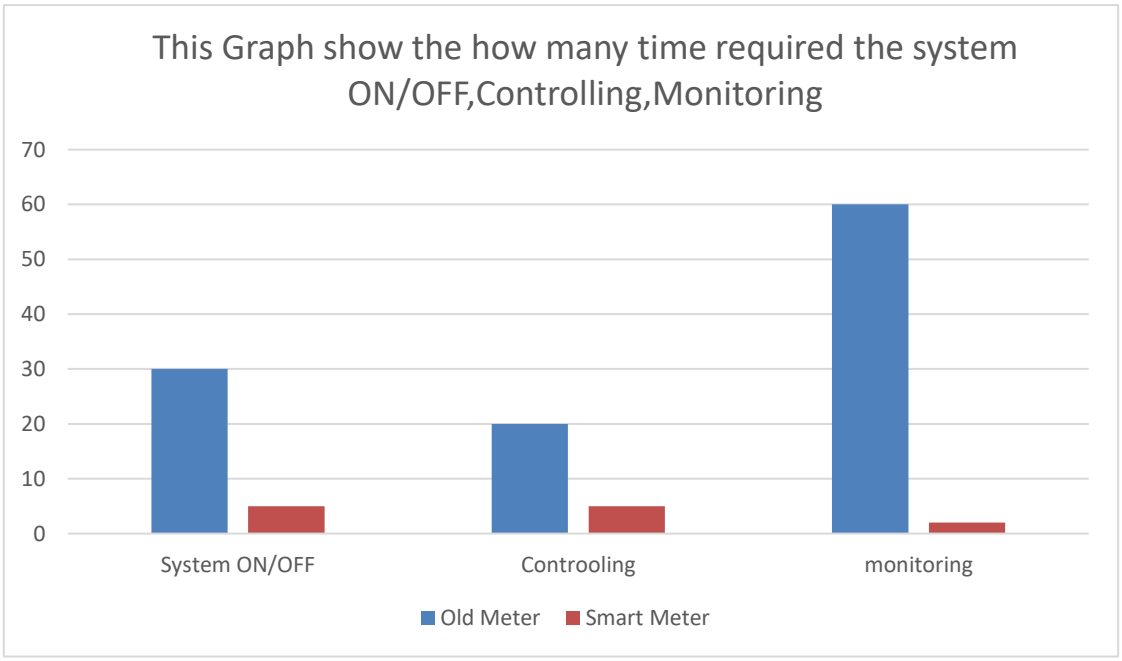

Figure 4 : Difference of Old Meter And Smart meter

A. System On/Off

- Old Energy Meter: Traditional energy meters typically don't have the capability to control the system on/off remotely.
- Smart Meter: Smart meters often come with remote switching capabilities, allowing utilities or homeowners to remotely turn the power supply on or off.

B. Controlling

- Old Energy Meter: Old energy meters do not have any controlling capabilities.
- Smart Meter: Smart meters can provide two-way communication between the utility and the consumer.

C. Monitoring

- Old Energy Meter: Traditional meters typically require manual reading by utility personnel or, in some cases, by the homeowner.
- Smart Meter: Smart meters offer real-time monitoring of energy consumption.

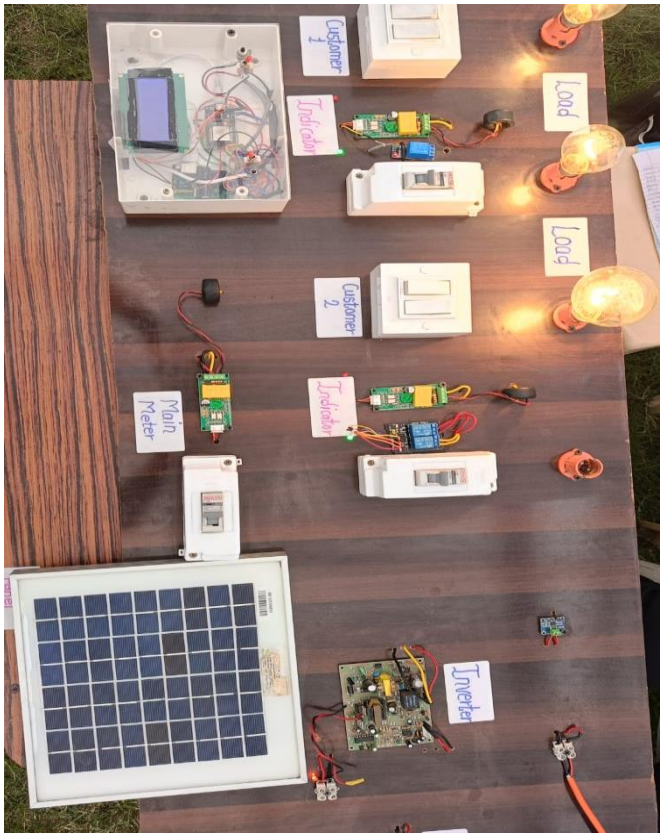

Figure5: Model

V. CONCLUSION

Energy Monitoring through IoT is an innovative and crucial application that is poised to play a significant role in the years to come. This application allows the remote control of home appliances from anywhere globally through cloud connectivity. The proposed project employs a current sensor to detect and display current information on the web using IoT. The system updates information approximately every 3 to 4 seconds, considering a slight delay due to the relay module's connection with appliances for home automation. In this new system, Wi-Fi technology is utilized to access and monitor the load consumption of appliances, empowering consumers to avoid unnecessary electricity usage. The project introduces an IoT system that enables consumers to monitor energy consumption, pay bills online, and receive SMS notifications in case of overdue electricity bills. Additionally, the system offers the advantage of home automation, enhancing the overall functionality and utility of the project.

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Investigative Study Car Wash and Kitchen Water in Concrete

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ABSTRACT

In construction industry, the cement concrete is most important and widely used material. The concrete is the conventional mixture of cement, sand, coarse aggregates and water in a mix proportion. The strength of concrete is more in the hardened state. Concrete is preferred and also easy in manufacturing process. For manufacture and curing of concrete, water is the most essential constituent. The main sources of water are river, lake, pond and well water etc. Due to rapid growth of industrialization and construction activity water is depleting day by day. Hence, we must take one step forward towards conservation or reuse of water in the construction industry. By reusing or recycling the water or wastewater in construction industry we can minimize water scarcity problem and wastewater disposal problems. The major source of wastewater is for domestic, industrial and commercial area. In the construction industry water is required in a large quantity as a curing waters for cement concrete structures. So an attempt has been made to study the effect of untreated kitchen wastewater on the strength characteristics of cement concrete as curing water's. For the present study the dissertation work is carried out on m30 grade of concrete, the curing of these specimens was carried out by using kitchen wastewaters for a period of 7, 14, and 28 days. An attempt is made to study the strength characteristics of m25 grade of concrete. This study will motivate and help for utilization of kitchen wastewater n the construction industry as curing water's effectively. Hence, we can reduce the water scarcity problems and also reduce the usage of potable water in the construction industry.

Keywords: Concrete, Kitchen Waste and Car Wash Water, Potable Water, etc,

I. INTRODUCTION

Water is an important component of concrete and plays an important role in its strength and durability. The quality of water used in mixing can affect the performance of the final product. This study provides an in-depth look at the relationship between water quality and concrete, as well as an understanding of how different water conditions affect the integrity of concrete in construction. Water is water that contains high mineral content, salt, chloride, sulphate and other impurities. These changes affect the chemical reaction during the hydration of the cement, ultimately affecting the strength, durability and life of the concrete. The presence of bacteria will affect the performance of the stone. For example, high levels of chloride or sulphate in water can accelerate the corrosion of steel bars in concrete, causing structural deterioration over time. On the other hand, water with

optimum pH and low TDS levels contributes to better cement hydration and increased strength. How does water quality affect performance? Our research will involve using different fluids to prepare concrete structures, simulating real-world construction situations. We will measure the compressive strength, tensile strength, durability and other relevant properties of concrete in different waters. to understand how to optimize water for mixing. This information will help improve composite design and improve the overall quality, durability and stability of concrete in construction.

II. EXPERIMENTAL PROGRAM

A. Water quality selection

Firstly, I have selected the kitchen water And Car wash water and After Treatment on it And After use in concrete. Identify and collect water samples representative of various water qualities in construction, including:

B. Clean water

- Water with different pH levels (acidic, neutral, alkaline)
- Different pH levels water with total dissolved solids (TDS) content
- Water containing chlorides, sulphates and organic compounds
- Water containing minerals at different points

C. Combination

According to the mixed model, use all water samples. Preparation Mixing creates a consistency consisting of cement, aggregates and additives. Use appropriate cement commonly used in construction. Prepare beams or prisms for bending strength and durability tests. Perform strength tests on cured concrete samples (e.g. 7 days, 28 days) using a universal testing device. Durability testing: Concrete samples will be subjected to rapid weathering tests (e.g., freeze-thaw cycles, chloride exposure) to evaluate durability. Density, porosity and water absorption. Check water quality (pH, TDS, contaminants) and concrete properties (strength, durability). > In order to evaluate the corrosion potential, corrosion tests for water quality were carried out on steel bars in concrete samples exposed to different environments.

D. Environmental considerations

Analysis of the environmental footprint of the use of different products Water quality together, taking into account factors such as water use, waste management and safety. Promote sustainable water management in construction. Recommendations for water quality in composite concrete design; Strategies to improve concrete strength, durability and environmental sustainability.

Figure1:Kitchen Water Before treatment

Figure2:Kitchen Water After treatment

Figure3:Car Wash Before treatment

Figure4:Car Wash After treatment

E. Objectives

- Property and tests on Treated and Untreated Water.
- Study of Strength property of the concrete casted with Treated and Untreated Wash Water.

F. Scope

- To check the compressive strength and durability in concrete.
- To improve the Strength of Concrete with Treated Water.
- To reduce cracks from the concrete.
- Can enhanced resistance to corrosion, fatigue, wear, and abrasion

III.METHODOLOGY

In this study, it was decided to Water sample selection: Identify the various types of water used in buildings, including Car wash and kitchen water, well water, and recycled water. Dissolved solids (TDS), chlorides, sulfates and organic pollutants. Design of composite materials (e.g. fly ash, slag). They poured concrete using molds of various sizes to create structures such as cubes (for strength testing) and beams (for flexural strength testing). Improving the structure in management to provide the same hydration and strength increase. Compressive strength of fixed stone cubes. degree test), density, porosity and water absorption. > Chloride Penetration Test: Concrete samples are exposed to chloride or salt spray to measure chloride penetration and corrosion. Resistance to sulphate attack.

Report collected data using statistical methods to determine the relationship between water quality (pH, TDS, bacteria) and concrete properties (strength, durability). and its impact on property.

A. Problem Statement

The quality of water used in concrete mixing is an important but often overlooked factor that can affect the strength and durability of concrete. However, there is a lack of understanding of how different water quality factors affect performance, especially in real construction environments. This knowledge gap creates many challenges and raises important questions.

IV. RESULTS

TABLE I RESULTS FOR COMPRESSIVE STRENGTH: - FOR TREATED KITCHEN WATER AND CAR WASH WATERX`

Sr. No.	Designation (Water sample)	Days	Compressive strengthIn N/mm²	Average In N/mm²
1	Normal Water (Tap Water)	7	24.16	24.63
			24.16	
			25.58	
		14	24.90	25.25
			25.41	
			25.46	
		28	28.30	29.60
			29.30	
			30.90	
2	Treated Kitchen Water	7	16.80	17.72
			17.32	
			19.06	
		14	20.89	20.65
			20.94	
			20.14	
		28	30.39	31.40
			31.56	
			32.26	
3	Treated Car Wash Water	7	16.12	17.34
			17.00	
			18.90	
		14	19.15	19.34
			19.33	
			19.54	
		28	28.10	28.64
			29.50	
			28.32	

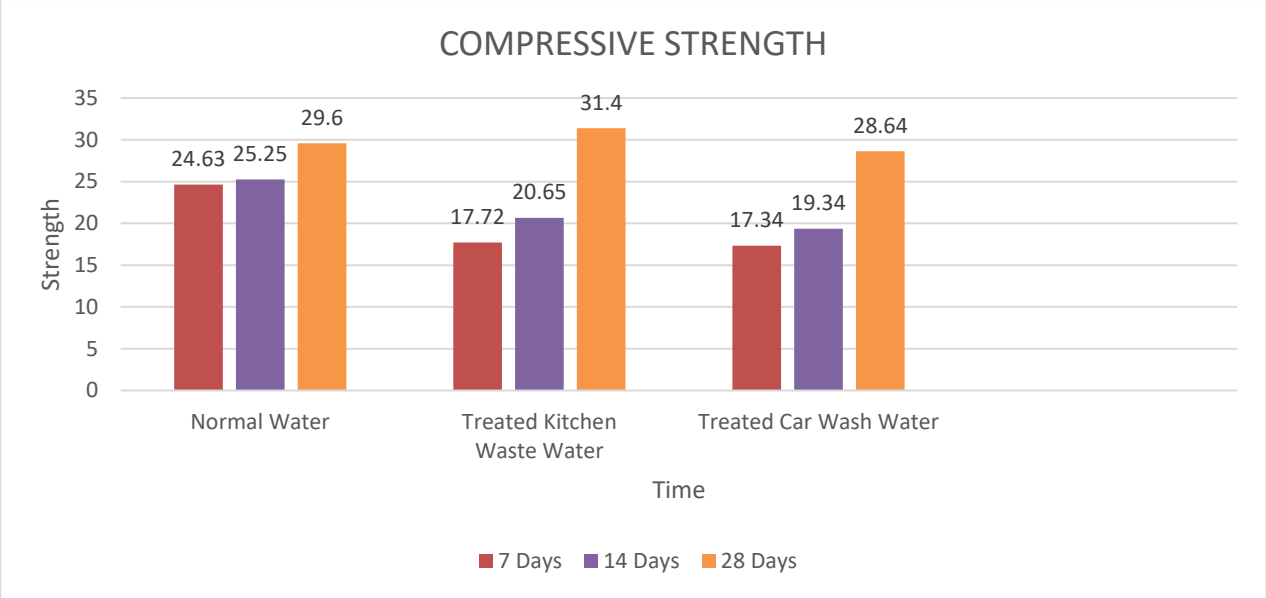

Figure5:Compressive strength

Figure6:Compressive Test

TABLE III RESULTS FOR SPLIT TENSILE STRENGTH: -FOR TREATED KITCHEN WATER AND CAR WASH WATER

Sr. No.	Designation (Water sample)	Days	Compressive strengthIn N/mm²	Average In N/mm²
1	Normal Water (Tap Water)	7	1.68	1.81
			1.83	
			1.94	
		14	2.18	2.3
			2.33	
			2.38	
		28	2.5	2.63
			2.6	
			2.8	
		7	1.83	1.92
			1.96	

2	Treated Kitchen Waste Water		1.99	
		14	2.13	2.17
			2.19	
			2.20	
		28	2.8	3.42
			3.48	
			3.98	
3	Treated Car Wash Water	7	1.77	1.85
			1.92	
			1.87	
		14	2.18	2.16
			2.06	
			2.24	
		28	3.15	2.93
			2.67	
			2.97	

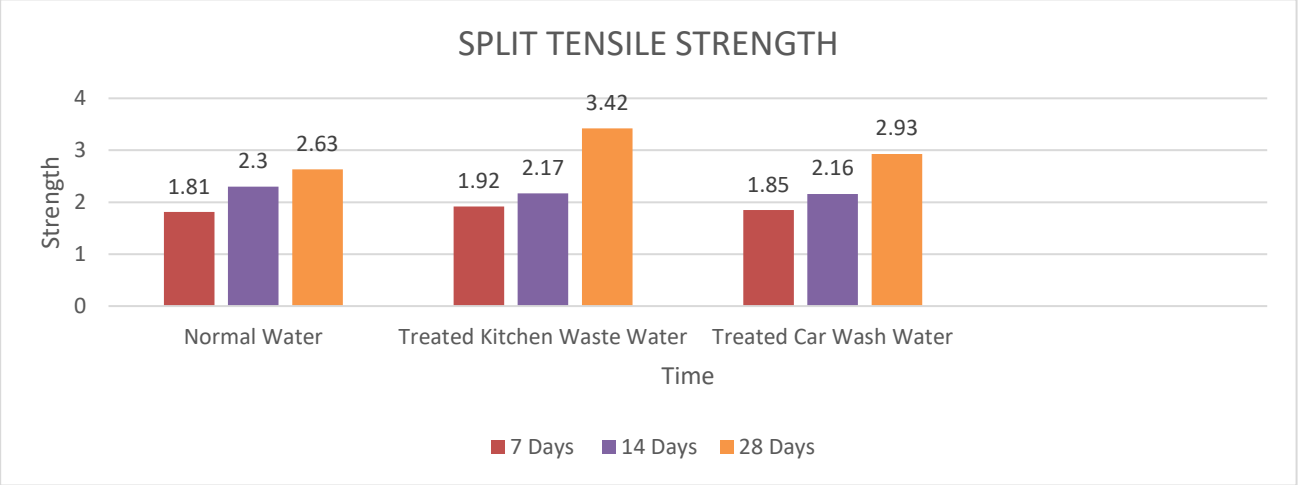

Figure7:Split Tensile Strength

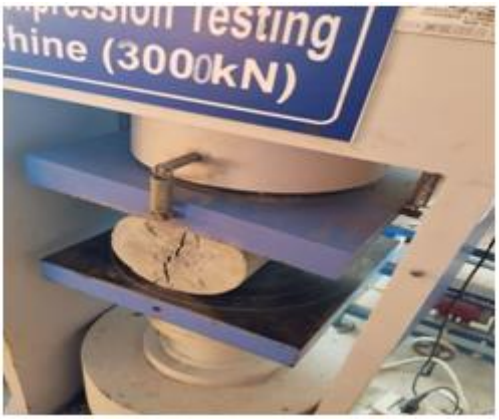

Figure8:Split Tensile Test

V. CONCLUSION

Fromtheexperimentalinvestigationfollowingconclusionscanbedrawn

- The experiment is giving empathies on using waste water to make the concrete in this experiment car wash water and kitchen waste water is used for casting the cubes to increase the strength of water. It is firstly treated and then used. The results obtained from both the waste waters are very similar to the normal water thus it is economical to use the waste water instead the normal water for casting the concrete cubes.
- From this experimental work we can conclude that kitchen waste water used for mixing of concrete structure shown considerable increase in a compressive strength for period of 28 days average is 31.40 N/mm^2
- From this experimental work we can conclude that Car wash water used for mixing of concrete structure shown considerable increase in a compressive strength for a period of 28 days average is 28.64 N/mm^2
- From this experimental work we can conclude that kitchen waste water used for mixing of concrete structure shown considerable increase in a split tensile strength for period of 28 days average is 3.42 N/mm^2
- From this experimental work we can conclude that car wash water used for mixing of concrete structure shown considerable increase in a split tensile strength for period of 28 days average is 2.93 N/mm^2
- From the present study we can conclude that the wastewater can be used in the construction industry with more efficiency, and also it can be used when there is scarcity of potable water.

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Innovative Self-Curing Concrete: Enhancing Durability through RCPT Analysis

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ABSTRACT

To check resistance to chloride ions penetration, we used Electrical resistivity techniques to give an indication of the relative permeability of concrete. The ASTM C 1202 (Standard Test Method for Electrical Indication of concrete's ability to resist chloride lon Penetration), more commonly known as the rapid chloride permeability test (RCPT) Self-compacting concrete (SCC) is a very fluid concrete and a homogeneous mixture. In this project, M40 grade of concrete mixes were made using IS10262:2019. Rapid Chloride permeability test (RCPT) determines the resistance to penetration of chloride ions. It is commonly used to evaluate the resistance of concrete to chloride ions ingress owing to its simplicity and rapidity. It is an electrical indication of concrete's ability to resist chloride ion penetration. It enables the prediction of the service life of concrete structures. Used for durability-based quality control purposes, the constant voltage is applied to a concrete specimen for 6 hours and the current passing through the concrete is recorded to find the coulombs.

Keywords: Rapid Chloride permeability test (RCPT).

I. INTRODUCTION

Rapid Chloride permeability test (RCPT) determines the resistance to penetration of chloride ions. It is commonly used to evaluate the resistance of concrete to chloride ions ingress owing to its simplicity and rapidity. It is an electrical indication of concrete's ability to resist chloride ion penetration. It enables the prediction of the service life of concrete structures. Used for durability-based quality control purposes, the constant voltage is applied to a concrete specimen for 6 hours and the current passing through the concrete is recorded to find the coulombs.

This test determines the electrical conductance of the different grades of concrete mixes and indicates its resistance to the penetration of chloride ions. It monitors the amount of electrical current passed via concrete specimens for a specified time. The movement of ions in a porous medium under a concentration gradient is called diffusion. It is often necessary to ascertain the impermeability of concrete to chloride ions as a quality control measure and assessment of improvements in properties of new concrete. RCPT is measured in Coulomb. Current is measured in Ampere. A Coulomb is an Ampere-second which means one Ampere passed through the concrete specimen in one second is one Coulomb, and the charge passed in 60 seconds would be 60 Coulombs. Higher the Coulomb, higher the permeability and vice versa.

II. MATERIAL

A. Cement

Cement is the binding materials used in building and civil engineering construction. Cements are finely ground powders that, when mixed with water, set to a hard mass. Setting and hardening result from hydration, which is a chemical combination of the cement compounds with water that yields sub-microscopic crystals or a gel-like material with a high surface area. Because of their hydrating properties, constructional cements, which will even set and harden under water, are often called hydraulic cements.

Figure1:Cement

B. Fine Aggregate

Fine aggregate is the essential ingredient in concrete that consists of natural sand or crushed stone. The quality and fine aggregate density strongly influence the hardened properties of the concrete. The concrete or mortar mixture can be made more durable, stronger and cheaper if you make the selection of fine aggregate on the basis of grading zone, particle shape and surface texture, abrasion and skid resistance and absorption and surface moisture.

Figure2:Fine Aggregate

C. Coarse aggregate

Around 70% to 80% of the total volume of the concrete is made up from course aggregates. In lots of construction applications, coarse aggregates perform an integral role, for instance, as a granular base under a slab and as a component in a mixture, such as asphalt or concrete mixtures. Course aggregates are generally categorised as per their shape and size. Depending on the shape they can be round, irregular, angular, flaky, and elongated. Apart from that, depending on the coarse aggregate size you can have gravels. cobble, and boulders in the category. From normal strength to high strength concrete.

Figure3:Coarse Aggregate

D. Super plasticizers

Superplasticizers (SPs) are also known as high range water reducers that are additive used in making high strength concrete. Plasticizers are chemical compounds that enable the production of concrete with approximately 15% less water content. Superplasticizers allow a 30% or more reduction in water content

Figure4:Super Plasticizers

III.RESULTS AND DISCUSSION

Concrete mix samples are tested for RCPT. The observations are taken at 30 minutes time interval and the test is performed for 6 hours, as per ASTM C1202.

A. RCPT of Concrete Mix (0% Superplasticizer)

TABLE I RCPT OBSERPATIONS FOR 1% CHEMICAL ADMIXTURE CONCRETE MIX

	SAMPLE 1		SAMPLE 2	
Time(min)	Current (Ma)	Temperature (Oc)	Current (Ma)	Temperature (Oc)
30	108	32	116	32
60	113	35	121	35
90	117	37	126	37
120	119	39	131	38
150	120	39	133	39
180	120	43	134	39
210	120	44	135	40
240	120	45	134	40
270	118	46	134	40
300	119	47	134	41
330	119	47	133	42
360	117	47	132	43

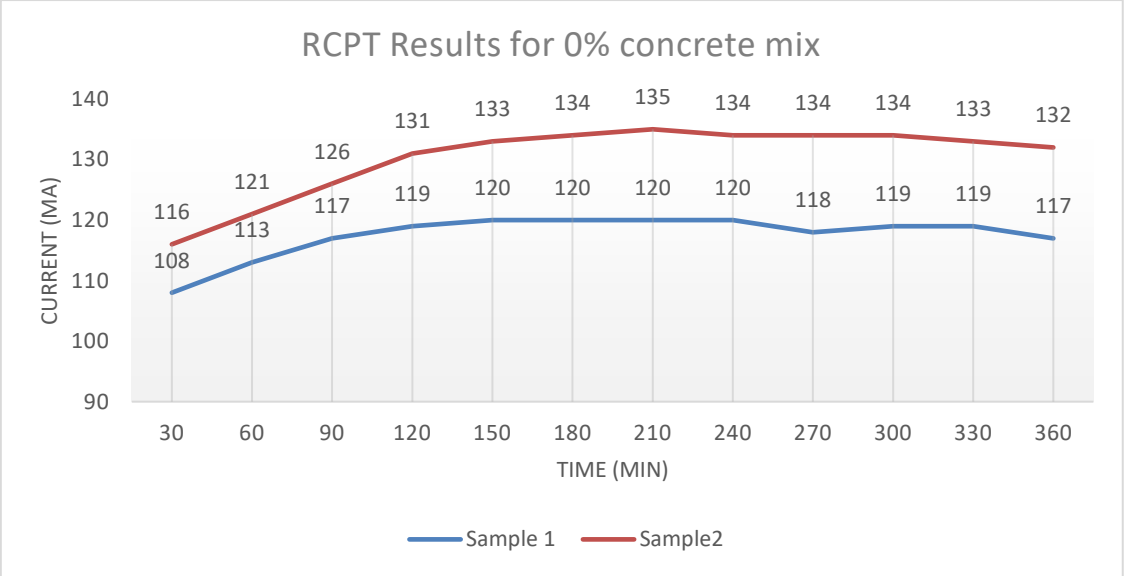

Figure5:RCPT Results for 0% Concrete Mix

For Sample 1.

Q900(108+2*

113+2*117+2+119+2*120+2 120+2*120+2*120 +2*118+2 119+2*119+117)=2335.5 C

Similarly, for sample 2,

Q-2590.2 C

Taking out average of the 2 results,

O=(2335.5+2590.2)/2

Q=2462.85 C→ Medium Chloride Ion Penetrability

B. 1% Chemical Admixture Concrete Mix

TABLE III RCPT OBSERVATIONS FOR 1% CHEMICAL ADMIXTURE CONCRETE

	SAMPLE 1		SAMPLE 2	
Time(min)	Current (Ma)	Temperature (Oc)	Current (Ma)	Temperature (Oc)
30	99	32	77	32
60	105	35	82	35
90	108	37	88	37
120	111	39	92	38
150	113	39	94	39
180	114	43	95	39
210	115	44	96	40
240	115	45	97	40
270	113	46	97	40
300	113	47	97	41
330	112	47	98	42
360	112	47	97	43

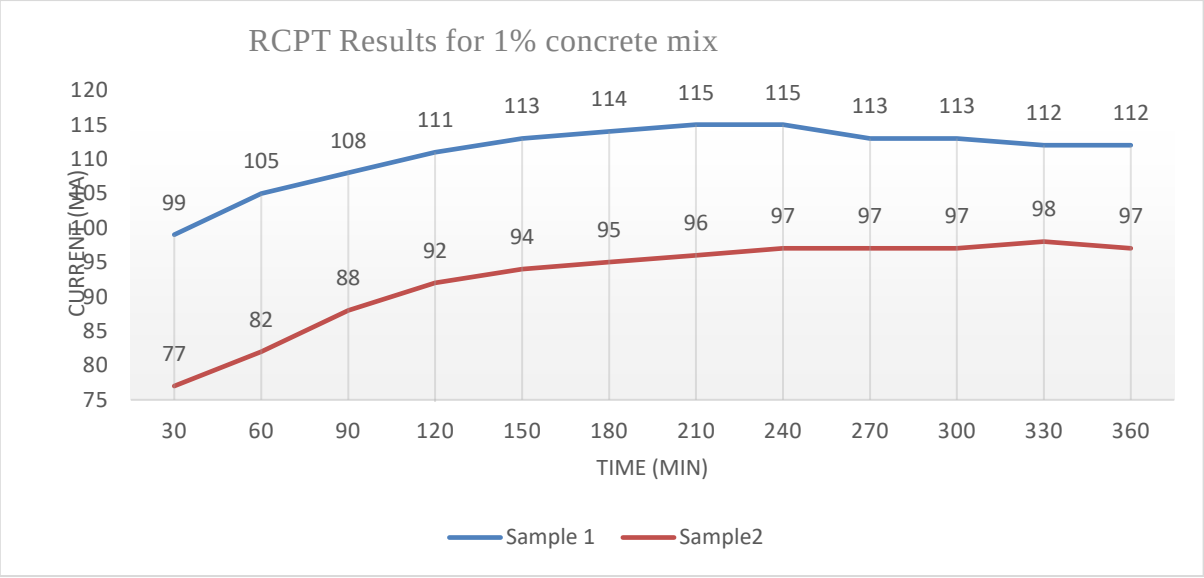

Figure6:RCPT Results for 1% Concrete Mix

As per ASTM C1202,

Q=900(I30+2I60+2I90+…+2I300+2I330+I360) * 10-3

For Sample 1,

Q = 900 (99 + 2*105 + 2*108 + 2*111 + 2*113 + 2*114 + 2*115 + 2*115 + 2*113 + 2*113 + 2*112 + 112) * 10-3

Q = 2204.1 C

Similarly, for sample 2,

Q = 1841.4 C

Taking out average of the 2 results,

Q = (2204.1+1841.4)/2

Q = 2022.75 C → Medium Chloride Ion Penetrability.

C. 1.5% Chemical Admixture Concrete Mix

TABLE IIIII RPCT OBSERVATIONS FOR NORMAL (1.5%) CONCRETE MIX

	SAMPLE 1		SAMPLE 2	
Time(min)	Current (Ma)	Temperature (Oc)	Current (Ma)	Temperature (Oc)
30	99	32	97	32
60	101	35	99	35
90	103	37	102	37
120	105	39	105	38
150	107	39	105	39
180	107	43	105	39
210	107	44	105	40
240	107	45	104	40
270	106	46	105	40
300	105	47	105	41
330	105	47	105	42
360	104	47	105	43

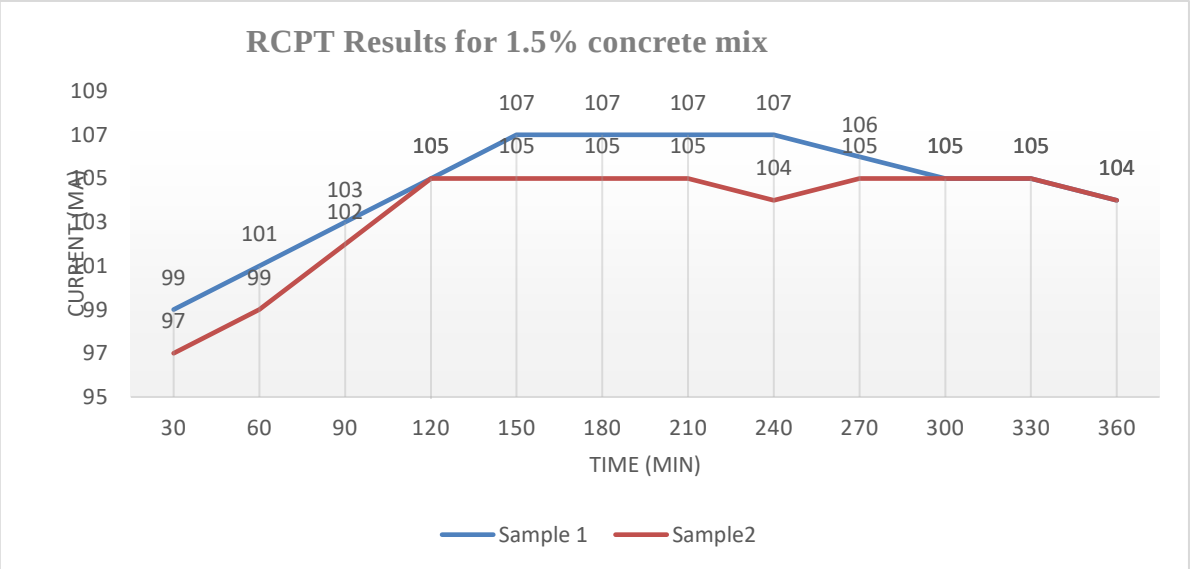

Figure7:RCPT Results for 1.5% Concrete Mix

As per ASTM C1202,

Q900(130+2100+2100 +21300+21330+1300) 10

For Sample 1.

Q=2078.1 C

Similarly, for sample 2,

Q2052.9 C

Taking out average of the 2 results,

Q(2078.1+2052.9)/2

Q2065.5 C→ Medium Chloride Ion Penetrability

D. 2%Chemical Admixture Concrete Mix

TABLE IVV RCPT OBSERVATIONS FOR 2% CHEMICAL ADMIXTURE CONCRETE MIX

	SAMPLE 1		SAMPLE 2	
Time(min)	Current (Ma)	Temperature (Oc)	Current (Ma)	Temperature (Oc)
30	93	32	84	32
60	96	35	87	35
90	98	37	91	37
120	101	39	94	38
150	103	39	95	39
180	104	43	95	39
210	104	44	94	40
240	104	45	94	40
270	103	46	93	40
300	104	47	93	41
330	103	47	93	42
360	103	47	92	43

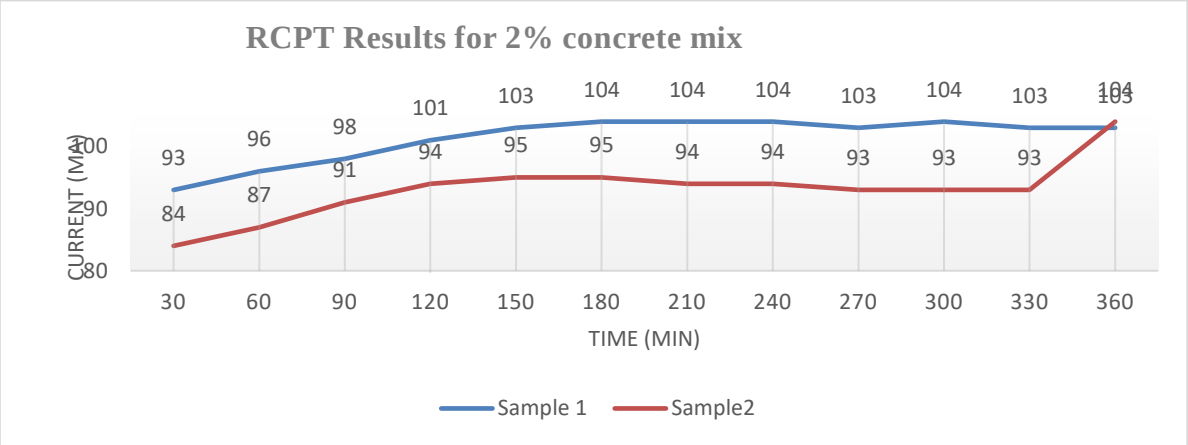

Figure8:RCPT Results for 2% Concrete Mix

As per ASTM C1202, Q900(130+2160+2150++21300+21330+1360)*103

For Sample 1.

Q=2192.4 C

Similarly, for sample 2,

Q=1830.6 C

Taking out average of the 2 results,

Q 2011.5C→ Medium Chloride Ion Penetrability6

E. RCPT Summary

TABLE V RCPT SUMMARY

Concrete Mix	Charge (Coulombs)	Chloride Ion Penetrability
0% Replacement	2462.85	Medium
1% Replacement	2022.75	Medium
1.5% Replacement	2065.5	Medium
2% Replacement	2011.5	Medium

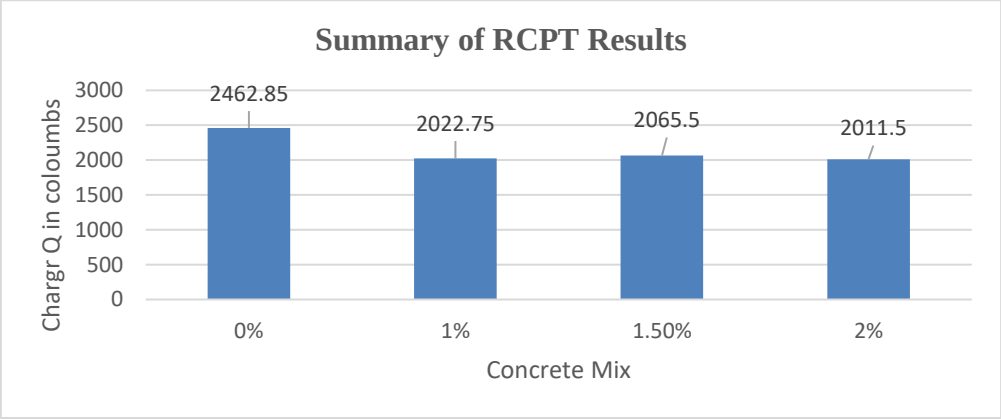

Figure9:Summary of RCPT Results

Figure10:

Self-Consolidating Concrete (SCC) mixes exhibit enhanced resistance to the penetration of chloride ions. In general, the inclusion of superplasticizer in concrete reduces its susceptibility to chloride ion penetration.
Concrete mixes that incorporate aluminium powder and concrete mixes containing aluminium powder cured in saline water are more prone to corrosion compared to self-compacting concrete. Furthermore, between the two samples, the one cured in saline water displays higher readings indicating increased susceptibility to corrosion compared to the sample cured in normal water.

IV. CONCLUSION

The charge transferred values for different replacement percentages of cement by superplasticizer in RCPT were 2462.85C (0%), 2022.75C (1%), 2062.5C (1.5%), and 2011.5C (2%), indicating medium chloride ion penetration.
Self-Compacting Concrete (SCC) mixes exhibit greater resistance to chloride ion penetration compared to normal concrete mixes, implying that a higher concentration of superplasticizer reduces susceptibility to chloride ion penetration.
The concrete mix with 2% replacement of aluminium powder displayed a charge transferred value of 2486.7C, while the sample with aluminium powder cured in saline water exhibited a charge transferred value of 3028.5C. The presence of aluminium powder increases the porosity of concrete, thereby rendering it more susceptible to chloride ion penetration.
The mix containing aluminium powder and cured in saline water demonstrates a more than 25% increase in charge transferred in RCPT compared to the normal concrete mix.

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Efficient Strategies for Gray Water Reuse in Construction: Economical Approaches

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ABSTRACT

Water is one of the most abundant resources. India is suffering from the worst water crisis in its history and around 700 million people face problem of water shortage, approximately 200000 people die every year due to inadequate access to clear water .As due to increase in population , water demand has also increase which has led to the idea of using grey water as a source of water .Grey water is a waste water generated from household, office buildings and streams .This includes water from kitchen, showers, sinks etc. the best alternative and cost effective process in rural areas is the reuse of grey water. With the help of proper treatment grey water can be put to good use. By applying proper and economical treatment grey water can be reused for other purposes. As there are some low-cost technologies which will help to treat the grey water. Discharge of household greywater into water bodies can lead to an increase in contamination levels in terms of the reduction in dissolved oxygen resources and rapid bacterial growth. Therefore, the quality of greywater has to be improved before the disposal process

Keywords: Greywater, Economical, Household, Water, (Water from Bathroom, Kitchen, etc.)

I. INTRODUCTION

Water shortage problems have become one of the most urgent problems of the 21st century. Some researchers have suggested that water shortage will become more serious than oil shortage in the future. Significant 50–80% of the household wastewater can be classified as greywater. Biological treatment techniques are highly efficient compared to physical and chemical. On-site greywater reuse is highly advantageous and can positively impact the environment. Policymakers & governmental agencies of water scarcity regions should promote such systems. Current building standards & codes underutilizing the benefit of those systems. Wastewater can also refer to groundwater that is contaminated due to a leaking septic tank or agents such as insecticide, petroleum products.

Blood, or cleaning liquids. Often, contaminated water can also be run through the municipal filtration system and be prepared for use once again. However, the nature of the contaminants may require additional measures before the water is suitable for use once more. Along with the use of chemicals to treat wastewater, the uses of environmentally friendly methods are sometimes employed. The building sectors are remarkably the largest consumers of fresh water in the world; thus, the reclamation and reuse of greywater for non-potable purposes helps to reduce a significant amount of water consumed within a building Grey water contains chemical contaminants, physical contaminants and microorganisms. Grey water may contain chemicals from soap, dyes, and bleaches. It may also contain bacteria, viruses, protozoa. So, it is very important to treat grey water by using low-cost technologies. Wastewater originating from households is divided into greywater and black water, based on its composition. Greywater is wastewater discharged from showers, bathtubs, washing machines and kitchen sinks, while black water is toilet wastewater. The advantage of recycling grey water is that it is a plentiful water source with a low pathogen and organic content. To il- lustrate, grey water represents 50–70% of total consumed water but contains only 30% of the organic fraction and 9–20% of the nutrients, thereby making it a good source for water reuse.

A. Objective Of The Work

- To study about the waste greywater sources.
- To prepare a proposal of a treatment unit which can clean water.
- To Provide clean and reusable water for flushing, garages, and gardens etc.by Economical technique.

B. Importance of quality management in Construction Industry

The importance of properly established and managed quality control and quality assurance systems and other quality documents for the achievement of company business objectives cannot be ignored. Identifying potential critical factors that affect the quality performance of small-scale contractors before the commencement of projects will ensure client satisfaction at the completion of project. The aim of quality management is to do things at first time, eliminating waste and rework. To achieve this, it is necessary focus on "processes". A process is a task or a series of tasks. A process might be the vibration of fresh concrete, the preparation of drawing, or the way in which the quality manager acts with a client and with other members of construction projects.

C. Discussion

- pH is within the as per MPCB limit.
- The number of total solids was high before treating but after treatment value is within limit.
- The value BOD3 was also more than limits before treating but after treatment value is within the limit.
- The value of COD was also more than limits before treating but after treatment value is within the limit.
- The value of Dissolved Oxygen is less than required limit hence this water if disposed in water bodies will be harmful for aquatic organisms.
- Therefore, this treated water can be used for cleaning, washing, flushing, and gardening
- Hence the plants used in Phytocide bed worked effectively and had less maintenance.

II. METHODOLOGY

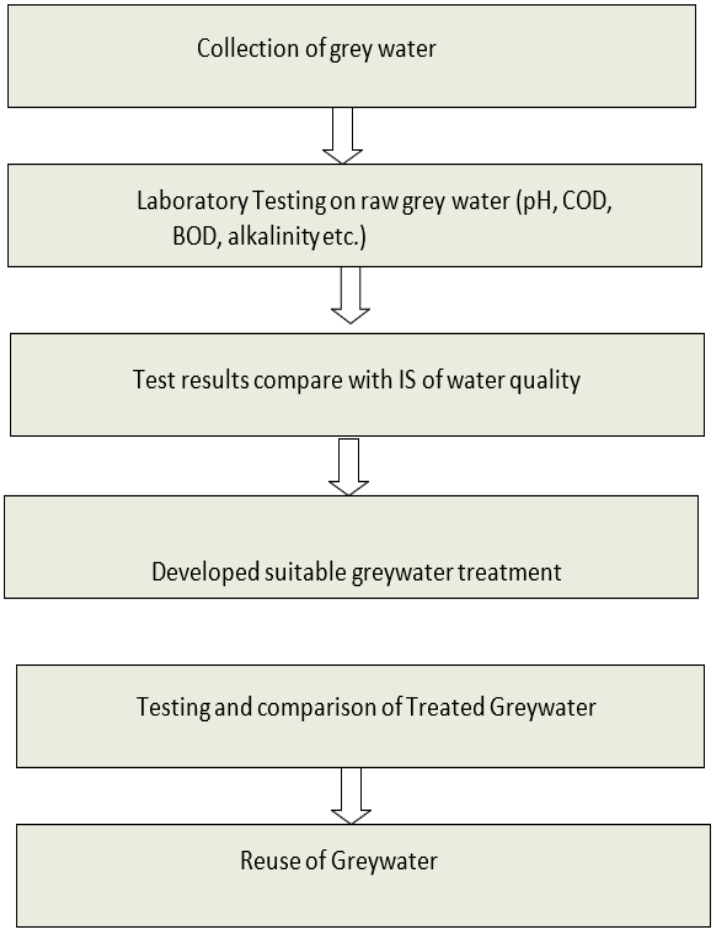

Figure1:Methodology

III.EXPERIMENTAL RESULTS

TABLE I EXPERIMENTAL RESULTS OF WATER

Parameters	Sample1		Sample2		Sample3	
	RawGreyWater	TreatedWater	RawGreyWater	TreatedWater	RawGrey Water	TreatedWater
pH	8.4	7.06	8.54	8.02	9.03	7.09
Hardness(mg/L)	248	205	267	170	371	110
TDS(mg/L)	420	340	440	329	460	390
TSS(mg/L)	159	95	182	88	198	82
Chloride(mg/L)	41	31	48	28	66	25
Turbidity NTU)	45	4.9	58	3.8	85	3.2

DO(mg/L)	2.2	8	2.5	10	2.7	12
BOD(mg/L)	112	65	123	42	138.82	147.79
COD(mg/L)	303	110	322	145	339	158

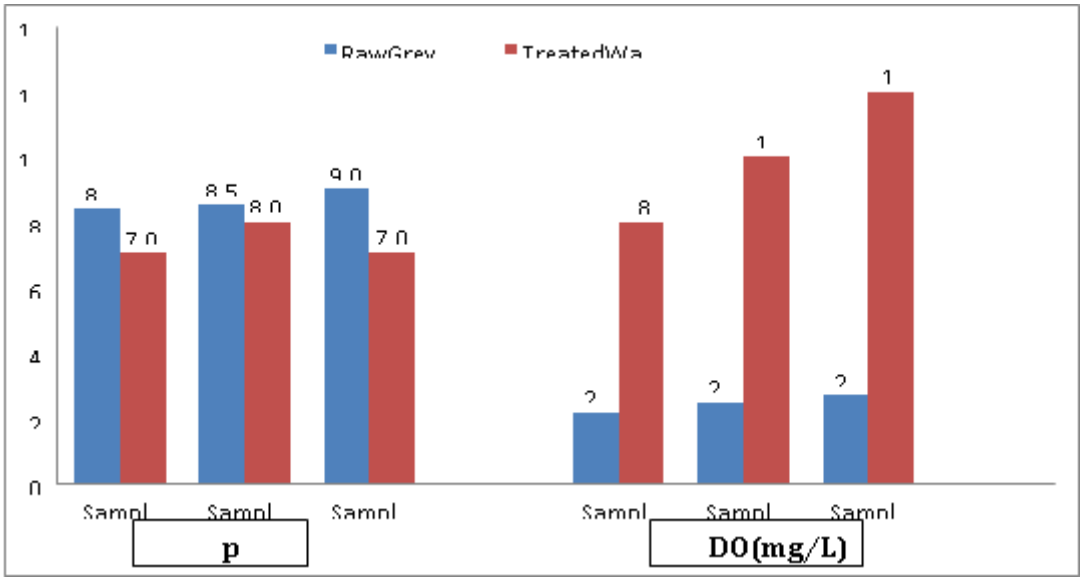

Figure2:Graphical representation of PH & DO

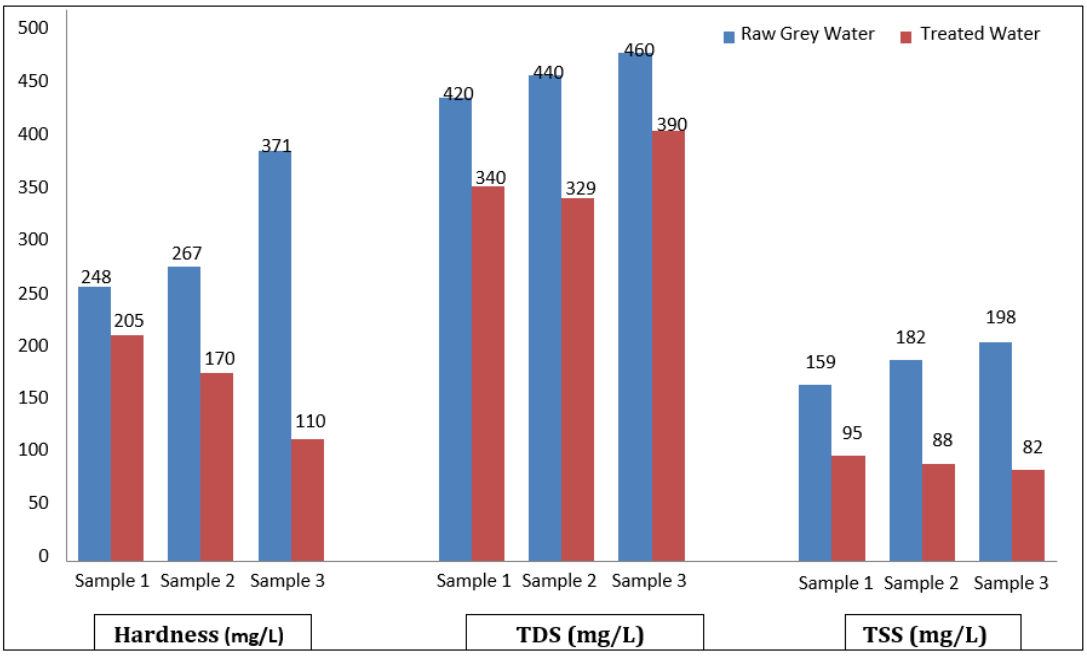

Figure3:Graphical representation of Hardness, TDS & TSS

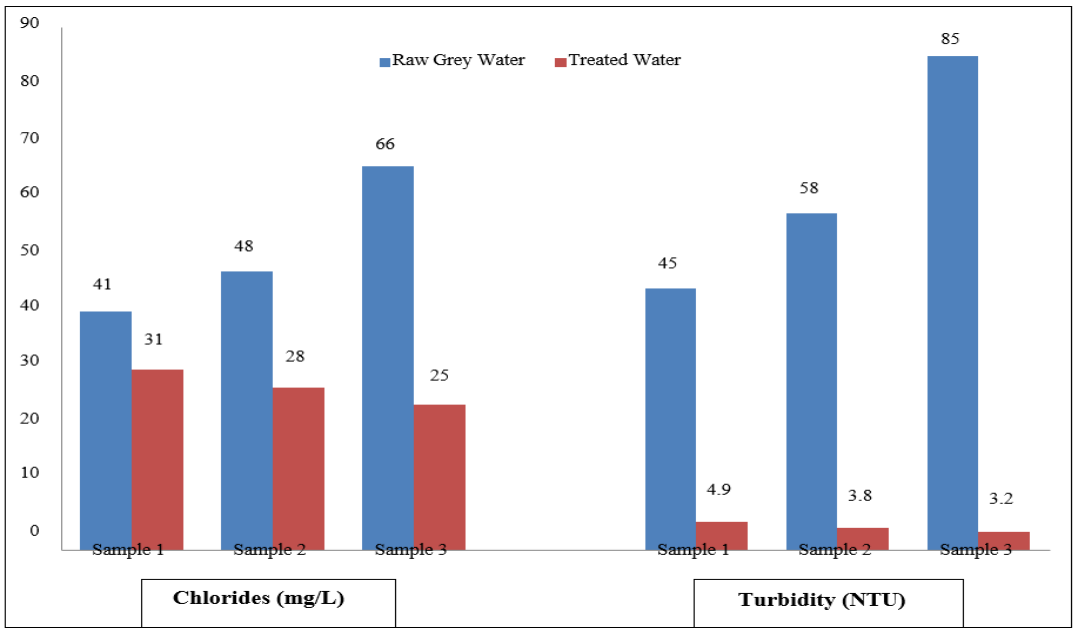

Figure4:Graphical representation of Chlorides & Turbidity

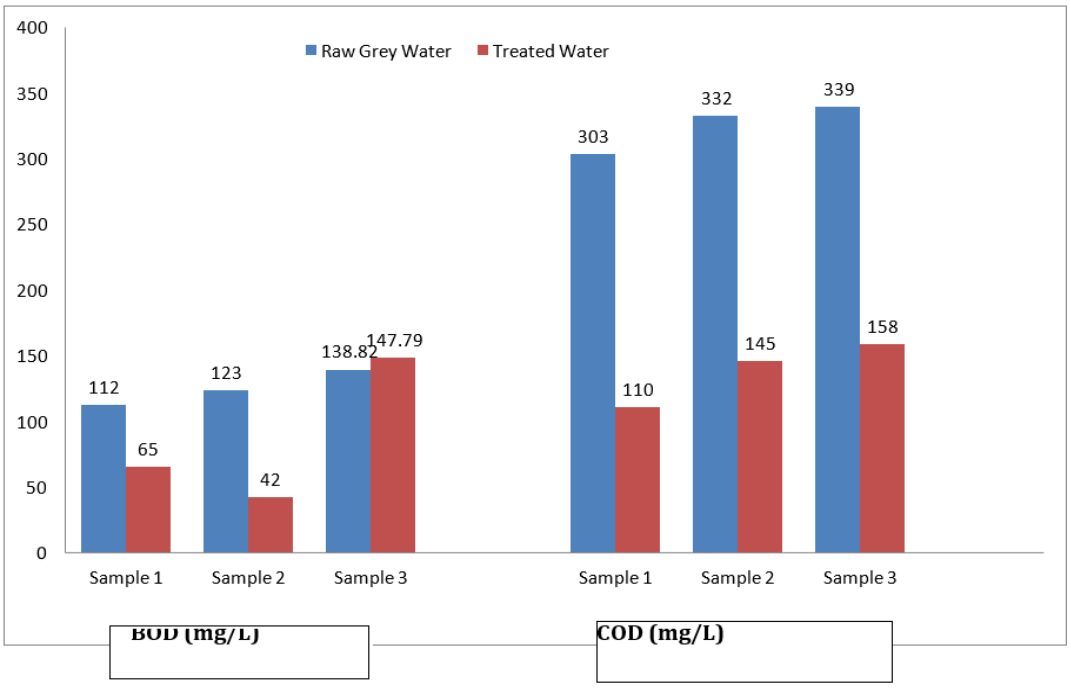

Figure5: Graphical representation of BOD& COD

IV. CONCLUSION

This study demonstrated that the designed sub-surface horizontal flow constructed wetland system could be used for treatment of the society waste water. A constructed wetland system can be an effective treatment facility for campus waste water.

Regarding the performance achieved, the sub-surface horizontal flow constructed wetland was able to reduce further the level of the main physicochemical pollution parameters. The plants do play an important role in the treatment.

The treatment level was affected by not only by the change of seasons, but also by the variation in influent quality and quantity.

The overall experimental results demonstrated the feasibility of applying sub- surface horizontal flow constructed wetland unit to treat Society waste waters. Thus, the root zone treatment can be utilized independently or as an addition to conventional treatment for complete treatment of waste water.

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Economical Method of Reuse of Gray Water in Construction

A. A. Burungale, R. B. Ghogaare, V. S. Bere, S. V. Jadhav
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ABSTRACT
Water is one of the most abundant resources. India is suffering from the worst water crisis in its history and around 700 million people face problem of water shortage, approximately 200000 people die every year due to inadequate access to clear water .As due to increase in population , water demand has also increase which has led to the idea of using grey water as a source of water .Grey water is a waste water generated from household, office buildings and streams .This includes water from kitchen, showers, sinks etc. the best alternative and cost effective process in rural areas is the reuse of grey water. With the help of proper treatment grey water can be put to good use. By applying proper and economical treatment grey water can be reused for other purposes. As there are some lowcost technologies which will help to treat the grey water. Discharge of household greywater into water bodies can lead to an increase in contamination levels in terms of the reduction in dissolved oxygen resources and rapid bacterial growth. Therefore, the quality of greywater has to be improved before the disposal process

Keywords: Greywater, Economical, Household, Water, (Water from Bathroom, Kitchen, etc.)

I. INTRODUCTION

Water shortage problems have become one of the most urgent problems of the 21st century. Some researchers have suggested that water shortage will become more serious than oil shortage in the future. Significant 50–80% of the household wastewater can be classified as greywater. Biological treatment techniques are highly efficient compared to physical and chemical. On-site greywater reuse is highly advantageous and can positively impact the environment. Policymakers & governmental agencies of water scarcity regions should promote such systems. Current building standards & codes underutilizing the benefit of those systems. Wastewater can also refer to groundwater that is contaminated due to a leaking septic tank or agents such as insecticide, petroleum products,blood, or cleaning liquids. Often, contaminated water can also be run through the municipal filtration system and be prepared for use once again. However, the nature of the contaminants may require additional measures before the water is suitable for use once more. Along with the use of chemicals to treat wastewater, the uses of environmentally friendly methods are sometimes employed. The building sectors are remarkably the largest consumers of fresh water in the world; thus, the reclamation and reuse of greywater for non-potable purposes helps to reduce a significant amount of water consumed within a building Grey water contains chemical contaminants, physical contaminants and microorganisms. Grey water may contain chemicals from soap, dyes, and bleaches. It may also contain bacteria, viruses, protozoa. So, it is very important to treat grey water by using lowcost technologies. Wastewater originating from households is divided into greywater and

black water, based on its composition. Greywater is wastewater discharged from showers, bathtubs, washing machines and kitchen sinks, while black water is toilet wastewater. The advantage of recycling grey water is that it is a plentiful water source with a low pathogen and organic content. To il- lustrate, grey water represents 50–70% of total consumed water but contains only 30% of the organic fraction and 9–20% of the nutrients, thereby making it a good source for water reuse.

A. Problem Statement

The Grey water from many societies is directly discharged into drainage without any treatment and it is wasted also pollute the streams it goes, but this water can be treated and can reusable to the day to day use. For that we have to use some economical methods.

B. Objective Of The Work

- To study about the waste greywater sources.
- To prepare a proposal of a treatment unit which can clean water.
- To Provide clean and reusable water for flushing, garages, and gardens etc by Economical techniques

C. Scope Of Study

The main purpose of this report is to present the current state of the greywater management. We are implementing economical and easy to use methods to clean greywater and testing is to be done before and after treatment for quality, for this method we are planning to create basic m model for Society for treatment of Greywater.

D. Importance of quality management in Construction Industry

The importance of properly established and managed quality control and quality assurance systems and other quality documents for the achievement of company business objectives cannot be ignored. Identifying potential critical factors that affect the quality performance of small-scale contractors before the commencement of projects will ensure client satisfaction at the completion of project. The aim of quality management is to do things at first time, eliminating waste and rework. To achieve this, it is necessary focus on "processes". A process is a task or a series of tasks. A process might be the vibration of fresh concrete, the preparation of drawing, or the way in which the quality manager acts with a client and with other members of construction projects.

E. Discussion

From the above table we can observe that all the value of

- pH is within the as per MPCB limit.
- The number of total solids was high before treating but after treatment value is within limit.
- The value BOD3 was also more than limits before treating but after treatment value is within the limit.
- The value of COD was also more than limits before treating but after treatment value is within the limit.
- The value of Dissolved Oxygen is less than required limit hence this water if disposed in water bodies will be harmful for aquatic organisms.
- Therefore, this treated water can be used for cleaning, washing, flushing, and gardening.
- Hence the plants used in Hydroid bed worked effectively and had less maintenance.

II. METHODOLOGY

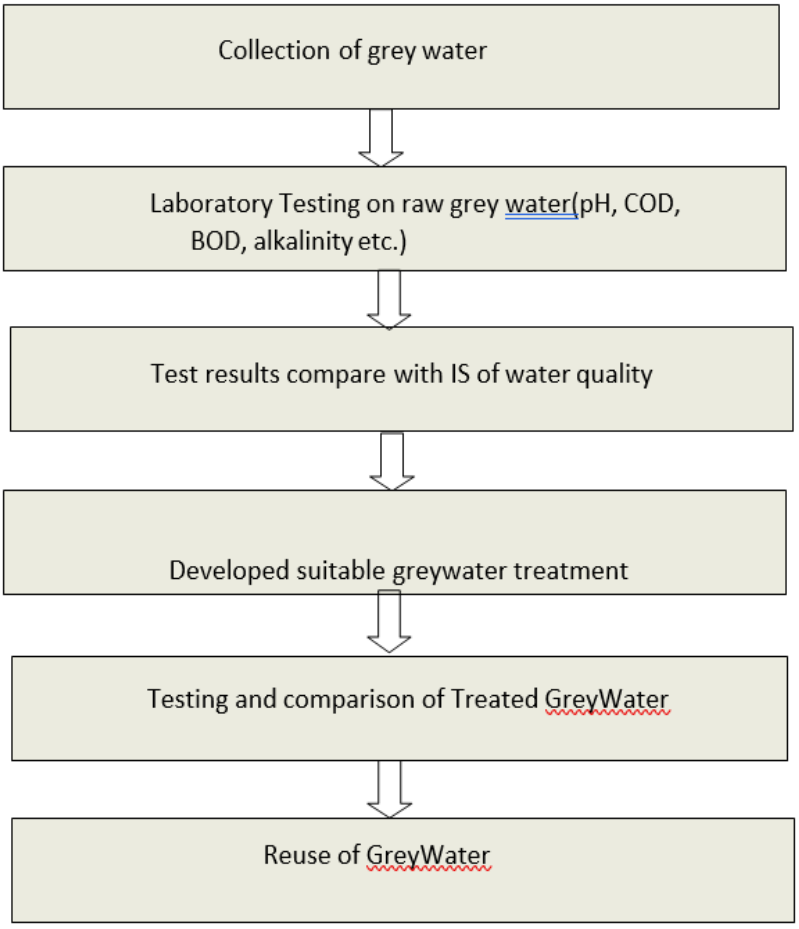

Figure1:Methodology

A. General

We studied the composition and sources of grey water. Visit various site and collect the grey water for testing. Now, we are going to do laboratory test and analyse all parameters of grey water like pH, COD, BOD etc. After knowing the all test result we are selecting the beneficial methods to treat the grey water and to conduct various suitable test on treated greywater. The working processes of the selected methods are as follows:-

III.RESULT

TABLE I TEST RESULTS ON GREY WATER

Parameters	Sample1		Sample2		Sample3	
	RawGreyWater	TreatedWater	RawGreyWater	TreatedWater	RawGrey Water	TreatedWater
pH	8.4	7.06	8.54	8.02	9.03	7.09
Hardness(mg/L)	248	205	267	170	371	110

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BOD(mg/L)	112	65	123	42	138.82	147.79
COD(mg/L)	303	110	322	145	339	158

A. Graphical Representation

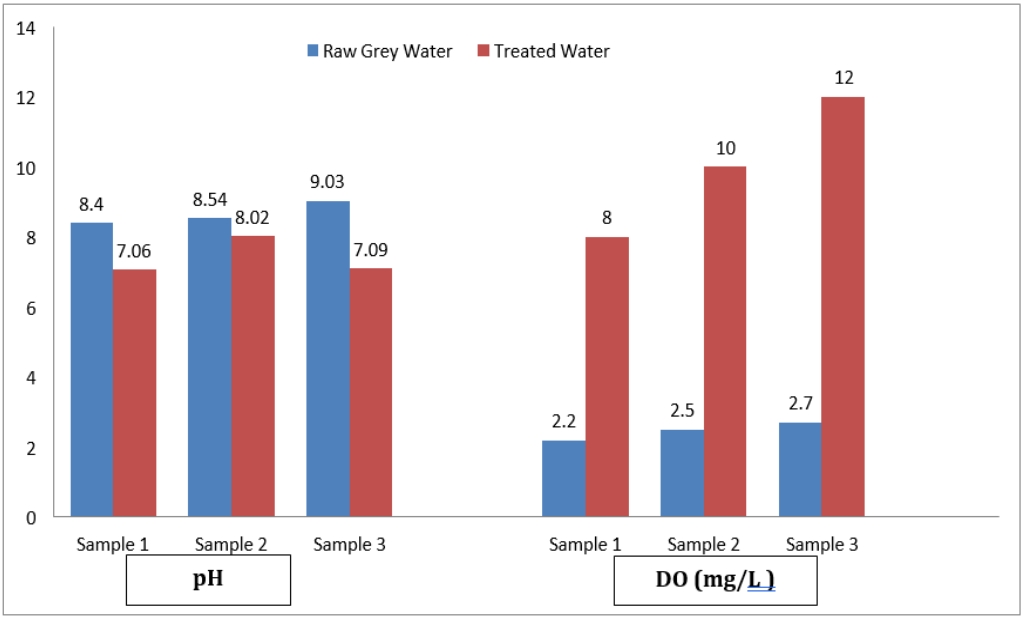

Figure2:Graphical Representation(a)

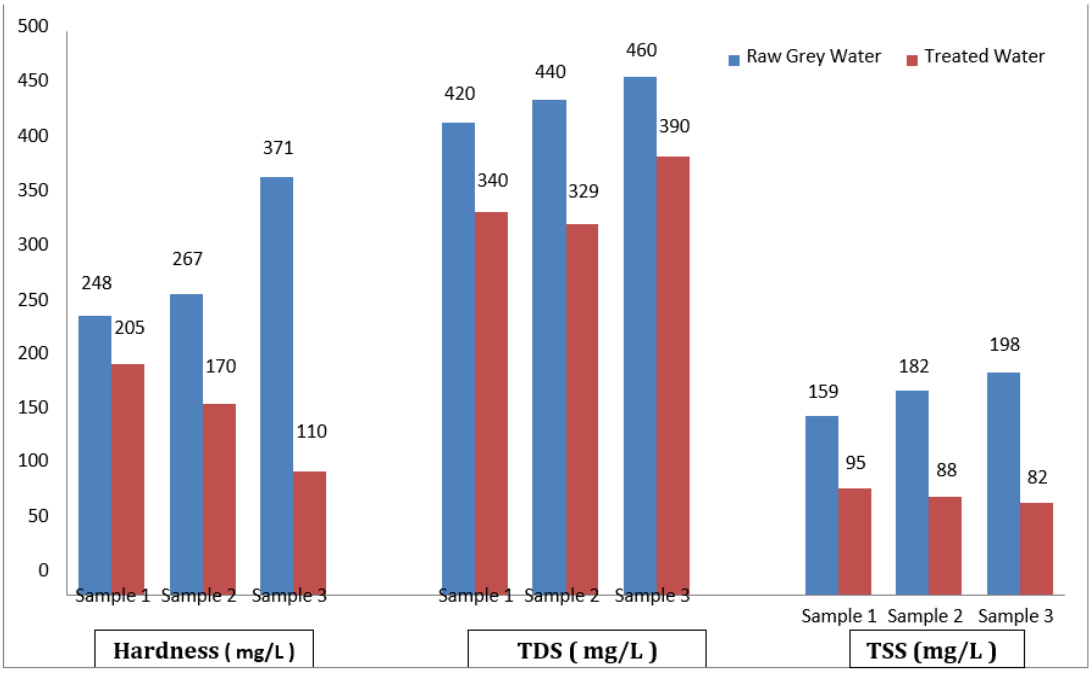

Figure3:Graphical Representation(b)

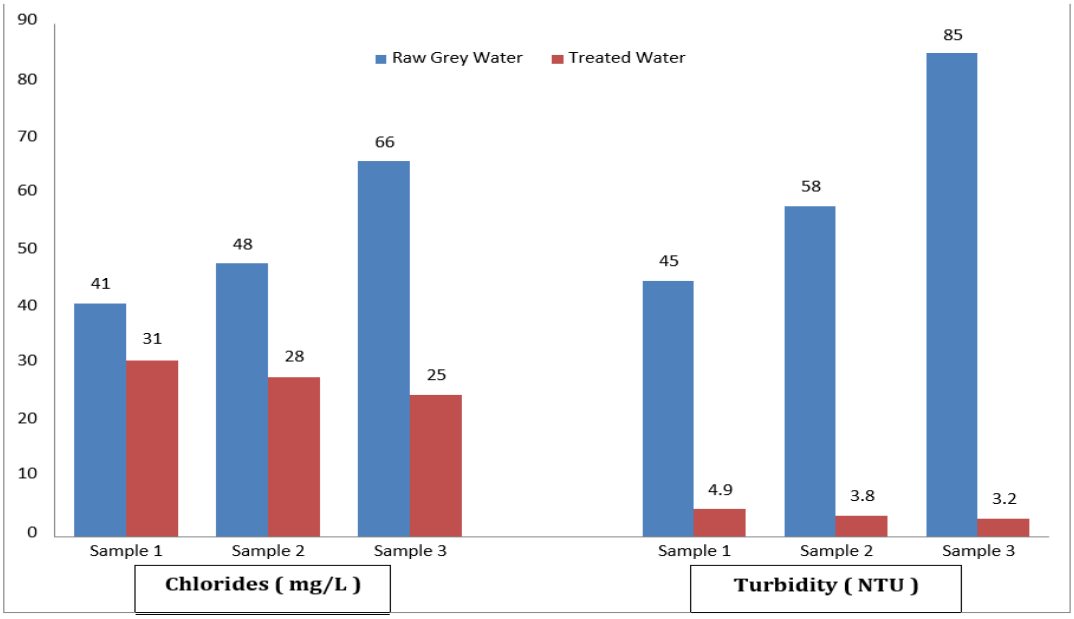

Figure4:Graphical Representation(c)

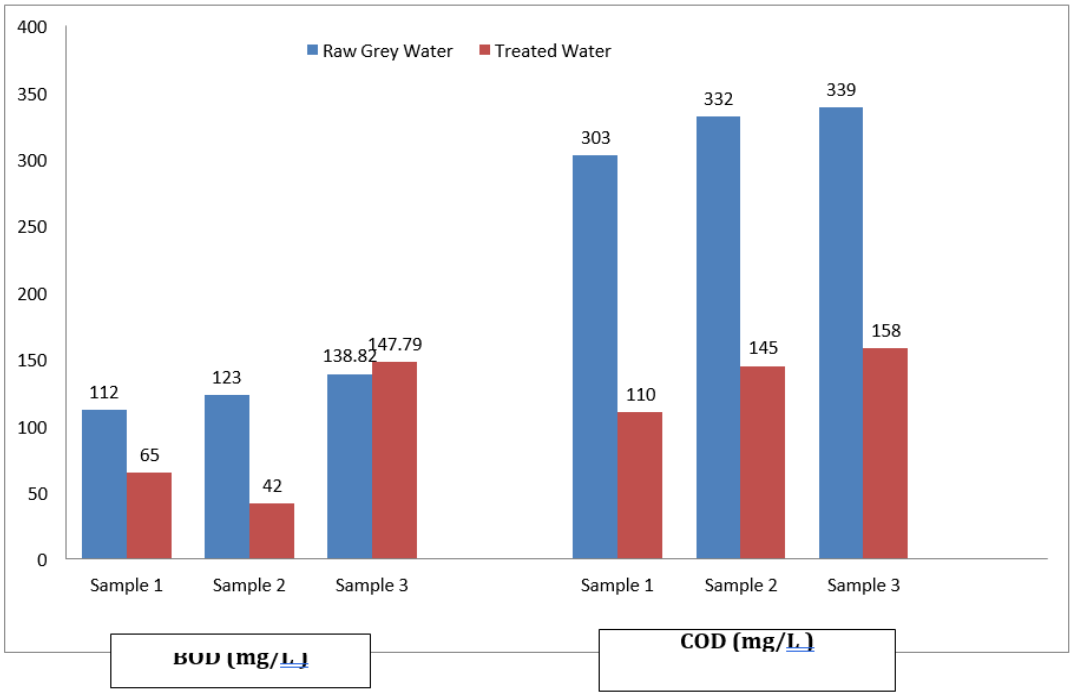

Figure5:Graphical Representation(d)

IV. CONCLUSION

- This study demonstrated that the designed sub-surface horizontal flow constructed wetland system could be used for treatment of the society waste water. A constructed wetland system can be an effective treatment facility for campus waste water.

- Regarding the performance achieved, the sub-surface horizontal flow constructed wetland was able to reduce further the level of the main physicochemical pollution parameters. The plants do play an important role in the treatment.
- The treatment level was affected by not only by the change of seasons, but alsoby the variation in influent quality and quantity.
- The overall experimental results demonstrated the feasibility of applying sub- surface horizontal flow constructed wetland unit to treat Society waste waters. Thus the root zone treatment can be utilized independently or as an addition to conventional treatment for complete treatment of waste water.

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Behaviour of Cold Formed Z-Section with Sag Rod in Pre-Engineered Building

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ABSTRACT
Pre-Engineered Building (PEB) concept is a new conception of multi-story building construction. This methodology is versatile not only due to its quality pre-designing and prefabrication, but also due to its light weight and economical construction. The concept includes the technique of providing the best possible section according to the optimum requirement. This concept has many advantages over the Conventional Steel Building (CSB) concept of buildings with roof truss. Pre-Engineered Buildings are metal building systems in which all the structural elements are factory-made and then assembled at the site in accordance to the design. In earlier days, these buildings were made cold form rolled steel. Cold formed rolled steel sections have higher thickness starting form 5mm or 6 mm.Thispaper is a study on PEB concept. The study is achieved by designing a typical frame of a proposed building using response spectrum method and analyzing frames using the structural analysis software ETABS 2016

Keywords: ConcretePre-Engineered Building, ETABS, Z- section, Cold formed steel (CFS).

I. INTRODUCTION

In India, construction industries contribute a large part to the development of the Indian economy. The construction industries play a very important role in the development of the Indian economy. For fast growth, structure engineering discovered the PEB concept. Instead of multiple suppliers, PEB has a single supplier which provide complete component including steel framework, cladding, and roofing component. According to specification, all components are erected on the site by using the bolted connection. PEB design is done by software.Steel is a material which has high strength per unit mass. Hence it is used in construction of structures with large column-free space. Most of the cold form Structures require this criterion. Apre-fabricated building and is usually characterized as multistory buildingstory steel structures with or without mezzanine floors. The enclosures of these structures may be brick masonry, concrete walls or GI sheet coverings. The walls are generally non-bearing but sufficiently strong enough to withstand lateral forces caused by wind or earthquake. The designing of cold form includes designing of the structural elements including column and column base, sag rods, tie rods etc. A combination of standard hot-rolled sections, cold-formed sections, profiled sheets, steel rods, etc. are used for the construction of industrial steel structures. Industrial buildings can be categorized as Pre-Engineered Buildings (PEB) and Conventional Steel Buildings (CSB), according to the design concepts. The

paper starts with the discussion of methods adopted in the study. Introduction to PEB systems and CSB systems are then described followed by the details of case study. Loads and the load combinations adopted for carrying out the analysis of the structure is well defined in the further portions. A section depicting the importance of the software used and the software procedure followed is included. Final portion explains the results obtained from the software analysis of the case study and the inferences from the literature studies. The paper aims at developing a perception of the design concepts of PEB structures and its advantages over CSB structures.

A. Application of PEB

The most application of Pre-Engineered Building are as follows:

1) Industrial: Factories, Workshops, Warehouses, Cold stores, Car parking sheds, Slaughter houses, Bulk product storage.
2) Commercial: Showrooms, Distribution centres, Supermarkets, Fast food restaurants, Offices, Labor camps, Service station, Shopping centres, Schools, Exhibition halls, Hospitals, Theatres/auditorium, Sports halls.
3) Institutional: Schools, Exhibition halls, Hospitals, Theatres, Sport halls.
4) Recreational: Gymnasium, swimming pool enclosures, Indoor tennis courts.
5) Aviation &Military: Aircraft hangers, Administration buildings, Residential bar

B. Pre Engineered Building

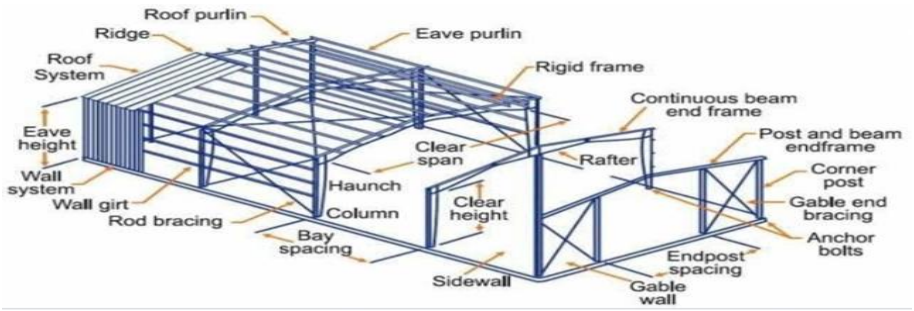

Figure1:Pre Engineering Truss Components

C. Advantages of PEB

There are many advantages of Pre Engineered Buildings, which are as followLower cost is due to the saving in design, manufacturing and on site erection cost.Quick Erection is as all the members are Pre Manufactured& skilled Labor is used for connections of different components.

- Low Maintenance due to use of standard quality of paints over steel members, which increases the ability to withstand & finally the maintenance cost will be low as compare to conventional Steel building.
- Quality control is the main advantage as all the structural member are engineered beforehand, standards of different codes also taken into consideration & these components are made in factory under the supervision of Quality Control Engineer.
- Minimizing time of construction due to the use of software for design of the structure components.
- Warranty on PEB mostly warranty period of 20 years given by manufactures for PEB.
- Larger Spans buildings can be supplied to around 80M clear spans.
- Lower cost is due to the saving in design, manufacturing and on site erection cost.

- Quick Erection is as all the members are Pre Manufactured& skilled labor is used for connections of different components.
- Low Maintenance due to use of standard quality of paints over steel members, which increases the ability to withstand & finally the maintenance cost will be low as compare to conventional Steel building.
- Quality control is the main advantage as all the structural member are engineered beforehand, standards of different codes also taken into consideration & these components are made in factory under the supervision of Quality Control Engineer.
- Minimizing time of construction due to the use of software for design of the structure components.
- Warranty on PEB mostly warranty period of 20 years given by manufactures for PEB.
- Larger Spans buildings can be supplied to around 80M clear spans.

D. Disadvantages of PEB

- PEB have many advantages in the field of Industrial structure but there are some disadvantages of Pre-Engineered Buildings, which are as follows,
- Insulation Cost as insulating the building to an agreeable benchmark will furthermore add to your construction costs.
- Corrosion Sensitive as if the quality of steel used or paint used for coating of steel members is not of good quality,then it can damage the structure and thus reduces the life of structure.
- Appearance of steel Sections can be unattractive when left exposed.

E. Project Statement

The study will give more knowledge which result into benefits for future implementation with the help of pre-fabricated cold form building actual Analysis. To study the effect of cold form structural behaviour.

F. Objective Statements

- Analysis of G+2 story building with IS401.Design of cold form building using ETABS 2016.
- Study base shear result using pre-fabricated section with IS 1893-2016 Criteria for earthquake resistant design of structures.
- Calculate displacement due to earthquake loading and wind loading.
- Determine story force at various story levels in G+2 story building.

II. LITERATURE REVIEW

Several investigators studied the influence of cold form structural buildings. They performed the studies by changing various parameters of cold form section and found that due to the flexibility structural forces are altered. Some of noteworthy configuration of researchers in this field is discussed below.

Mrunal S. Hatwar1, Vaishali Mendhe2 & Dr. Ramesh Meghrajani3 (2020)studied low cost ministry of housing, 1.77 million number of peoples don't have one of basic amenities i.e. house. Basically Cold Formed Steel are Pre-Engineered Building structures which can enhance easy and faster mode of construction which can overcome this concern. These structures are designed using semi rigid connections which makes the system earthquake resistant in addition to the safety, durability, performance and long-term low operational costs for the 50-year design life of a typical low rise residential house.

HumanaazArifQureshi, Dr. Kuldeep R. Dabhekar, AmolShahakar (2019)Analysed structural engineering, the Pre- Engineering Building (PEB) is a system that provides economical and less time-consuming design and construction of the building. From the past few years, by the use of PEB design, we get optimizing the design of the structure.

Kanchan S Takale (2018)StudiedZ profile has a complex deformation behavior and the severe buckling issues leads to reduction in strength of the member. Lateral torsional buckling is the governing deformation leading to overall distortion of the member. It is important to eliminate or delay these buckling problems to achieve higher sustainability of the structure.

Kanchan S Takale (2017)studied Pre-Engineered Buildings are metal building systems, in which all the structural elements are factory-made and then assembled at the site in accordance to the design. In earlier days, these buildings were made from wood and later in hot rolled steel. Hot rolled steel sections have higher thickness starting form 5mm or 6 mm.

Mr. Aditya P. Mehendale (2016)Buildings& houses are the basic requirements of any human being. There are several changes in construction technology since the beginning. The basic requirements of construction nowadays are best aesthetic look, fast, economical & high quality. Pre- engineered building is best option for these all requirements

Swati Wakchaure and N.C. Dubey (2016) discussed Pre-Engineered Building (PEB) design of structures has helped in optimizing design. The construction of PEB in the place of Conventional Steel Building (CSB) design concept resulted in many advantages as the members are design as per bending moment diagram and thus reducing the steel requirement. In this study, an industrial structure PEB Frame & CSB Frame is analysed and designed according to the Indian standards, IS 800-1984, IS 800-2007. In this study, a structure with length 80m, width 60m, with clear height 11.4m and having R-Slope 5.71 Degree for PEB & 18 Degree for CSB is considered to carry out analysis& design for 2D frames.

III.RESEARCH METHODOLOGY

Earthquake motion causes vibration of the structure leading to inertia forces. Thus, a structure must be able to safely transmit the horizontal and the vertical inertia forces generated in the super structure through the foundation to the ground. Hence, for most of the ordinary structures, earthquake-resistant design requires ensuring that the structure has adequate lateral load carrying capacity. Seismic codes will guide a designer to safely design the structure for its intended purpose.Seismic codes are unique to a particular region or country, In India, IS 1893 is the main code that provides outline for calculating seismic design force, this force depends on the mass and seismic coefficient of the structure and the latter in turn depends on properties like seismic zone in which it rests, and its ductility. Part of IS1893:2016 deals with assessment of seismic loads on various structures and building. Whole the code centres on the calculation of base shear and its distribution over height. Depending on the height of the structure and zone to which it belongs, type of analysis i.e., static analysis or dynamic analysis is performed.

A. Response spectrum method

This method is applicable for those structures where modes other than the fundamental one affect significantly the response of the structure. In this method the response of multi degree of freedom system is expressed as the superposition of modal response, each modal response being determined from the spectral analysis of single

degree of freedom system, which is then combined to compare the total response. Modal analysis of the response history of structure to specified ground motion; however, the method is usually used in conjunction with a response spectrum.

B. Seismic Base Shear

According to IS 1893 (Part-I): 2002, Clause 7.5.3 the total design lateral force or design seismic base shear (VB) along any principal direction is determined by

Vb= Ah. *W

Ah is the design horizontal acceleration spectrum

W is the seismic weight of building

C. Design Horizontal Acceleration Spectrum Value

For the purpose of determining the design seismic forces, the country (India) is classified into four seismic zones (II, III, IV, and V). Previously, there were five zones, of which Zone I andII Are merged into Zone II in fifth revision of code. According to IS 1893: 2016 (Part 1), Clause6.4.2 Design Horizontal Seismic Forces Coefficient Ah for a structure shall be determined by following expression

Ah = (z/2) *(I/R) *(sa /2g)

Where,

- Z = Zone Factor Seismic Intensity
- I= Importance Factor
- R= Response Reduction Factor

TABLE I SEISMIC ZONES OF INDIA SHOWING TENTATIVE PERCENTAGE OF LAND AREA

Seismic Intensity	Low	Moderate	Severe	Very Severe
Zone	II	III	IV	V
Z	0.10	0.16	0.24	0.36

India has been divided into four seismic zones. Zone II and Zone III are major zones covering more percentage of land area in India. Eastern India has higher seismic intensity. It fails under zone V. North-East India falls under zone IV. Geographical statistics of India show that almost 54 % of the land is vulnerable to earthquakes. Table 3.1 & Fig.3.2 shows various seismic zones of India with tentative percentage of land area.

I = Importance factor is used to obtain the design seismic force depending on the functional use of the structure, characterized by hazardous consequences of its failure, its post.Earthquake functional need, historic value, or economic importance (IS 1893-2016 cl.no.6.4.2/table6/pg.no.18).

R = Response reduction factor depending on the perceived seismic damage performance of the structure characterized by ductile or brittle deformations which is shown in Table 3.2 (IS 1893-2016 cl.no.6.4.2/Table7/pg.no.23).

Sa/g = Average response acceleration coefficient (dimensionless value). The value of Sa/g is obtained from fig.3.3 from IS: 1893 (Part 1): 2016.

TABLE II RESPONSE REDUCTION FACTOR R FOR BUILDING SYSTEMS

Sr. No.	Lateral Load Resisting System	R
1	Ordinary RC Moment Resisting Frame (OMRF)	3.0
2	Special RC Moment Resisting Frame (SMRF)	5.0
3	Ductile Shear Wall With SMRF	5.0

IV. PARAMETRIC INVESTIGATION

A. Introduction

In this title of parametric investigation, a detailed study and analysis of pre-fabricated building using IS codes has been presented. Study has been done on cold form structure. Analysis of all the above-mentioned structures has been carried out by using Indian Standard with response spectrum Method. Cost effectiveness of structures has also been studied only from material point of view.

B. Problem Formulation

G+2 storied pre-fabricated building, moment resisting space frame have been analysed using professional software. Model (G+2) of structural frame with regular shear wall and dumbbell shaped shear wall is analysed by response spectrum Method. The pre-fabricated plan dimensions of buildings are shown in table below. The plan view of building, elevation of different frames is shown in figuresbelow

Figure2:Cold formed Z-sections

C. Load case and load combination

Unless otherwise specified, all loads listed, shall be considered in design for the Indian Code following load combinations shall be considered,

D. Load combination

- 1.5DL+1.5LL
- 1.2DL+1.2LL + 1.2EX
- 1.2DL+1.2LL- 1.2EX
- 1.2DL+1.2LL+1.2EY
- 1.2DL+1.2LL -1.2EY
- 1.2DL+1.2LL+1.2WLX
- 1.2DL+1.2LL-1.2WLX
- 1.2DL+1.2LL+1.2WLY
- 1.2DL+1.2LL-1.2WL

E. All Screenshot

1) 3D line models:

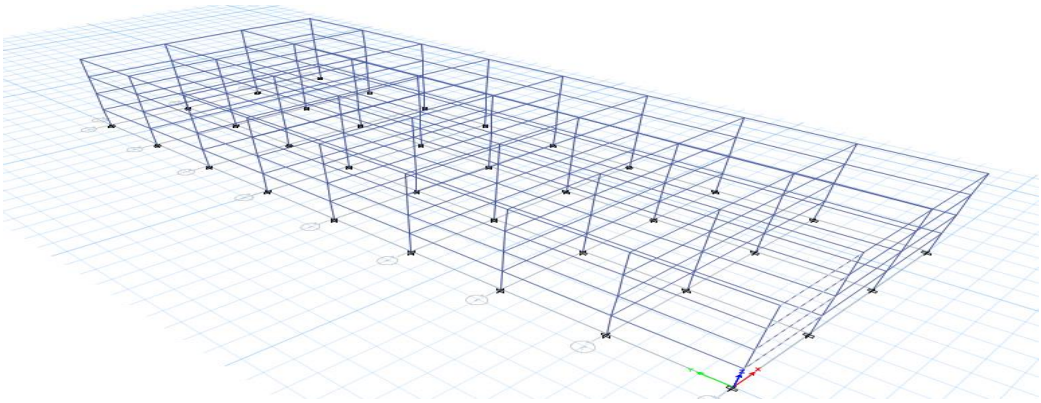

Figure3:3D line model

2) 3D rendering models:

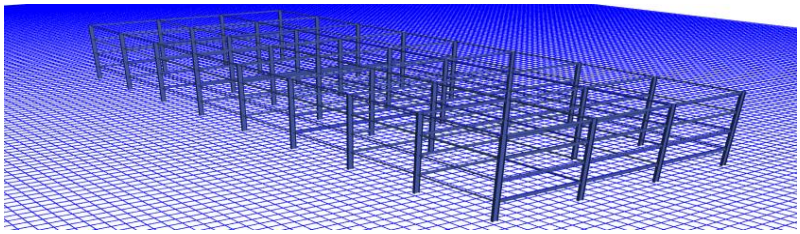

Figure4:3D rendering model

V. RESULTS

A. Base shearresults

TABLE IIII SEISMIC BASE SHEARS

Auto Seismic - IS 1893:2002								
Load Pattern	Z	Soil Type	I	R	Period secrecy Used	Coeff Used	Weight kNUsed	Base kNShear
EQ+X	0.16	II	1	5	1.1	0.019785	16307.8989	322.6484
EQ-X	0.16	II	1	5	1.1	0.019785	16307.8989	322.6484
EQ+Y	0.16	II	1	5	1.845	0.011794	16307.8989	192.3318
EQ-Y	0.16	II	1	5	1.845	0.011794	16307.8989	192.3318

TABLE IIIV EARTHQUAKE DISPLACEMENT RESULTS

Diaphragm Center of Mass Displacements						
Story	Load Case/Combo	UX (m)	UY (m)	RZ rad	X (m)	Y (m)
Story4	EQ+X	0.013357	0	0	12	32
Story3	EQ+X	0.008053	0	0	12	32
Story2	EQ+X	0.003296	0	0	12	32
Story1	EQ+X	0.000331	0	0	12	32

Base	EQ+X	0	0	0	12	32

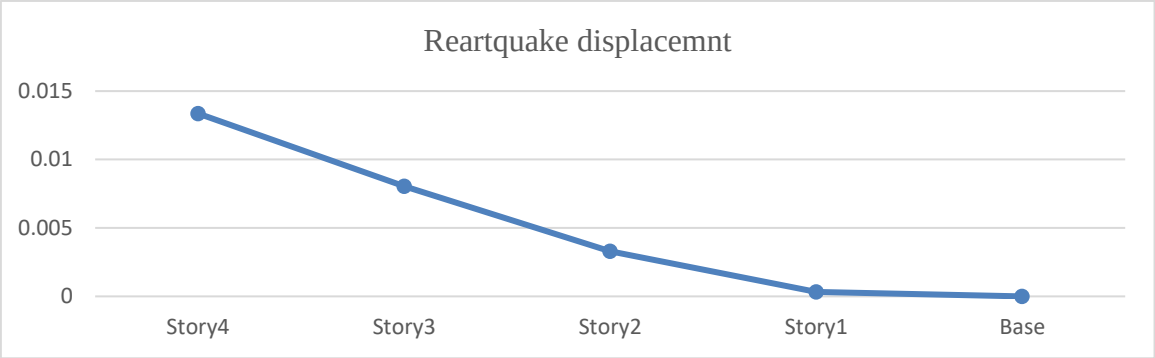

Figure5:Earthquake Displacement Vs. Story

B. Wind Displacement Results

TABLE V WIND DISPLACEMENT

Diaphragm Centre of Mass Displacements							
Story	Load Case/Combo	UX (m)	UY (m)	RZ rad	X (m)	Y (m)	Z (m)
Story4	W L+X	0.016108	0	0	12	32	10.2
Story3	W L+X	0.010087	0	0	12	32	7.2
Story2	W L+X	0.004367	0	0	12	32	4.2
Story1	W L+X	0.000473	0	0	12	32	1.2
Base	W L+X	0	0	0	12	32	0

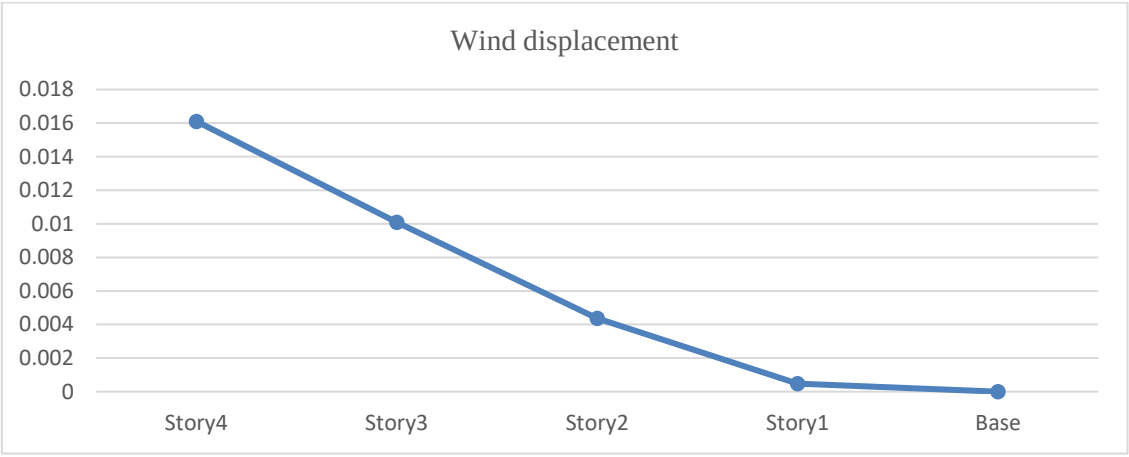

Figure6:Wind Displacement Vs. Story

C. Story Force Result

TABLE VI STORY FORCE

Story Forces						
Story	Load Case/Combo	Location	PkN	VXkN	MXkN-m	MYkN-m
Story4	1.5(DL+LL)	Bottom	7487.9803	0	239615.3689	-89855.7634

Story3	1.5(DL+LL)	Bottom	14975.9606	0	479230.7379	-179711.5267
Story2	1.5(DL+LL)	Bottom	22463.9408	0	718846.1068	-269567.2901
Story1	1.5(DL+LL)	Bottom	29816.8666	0	954139.7305	-357802.3989

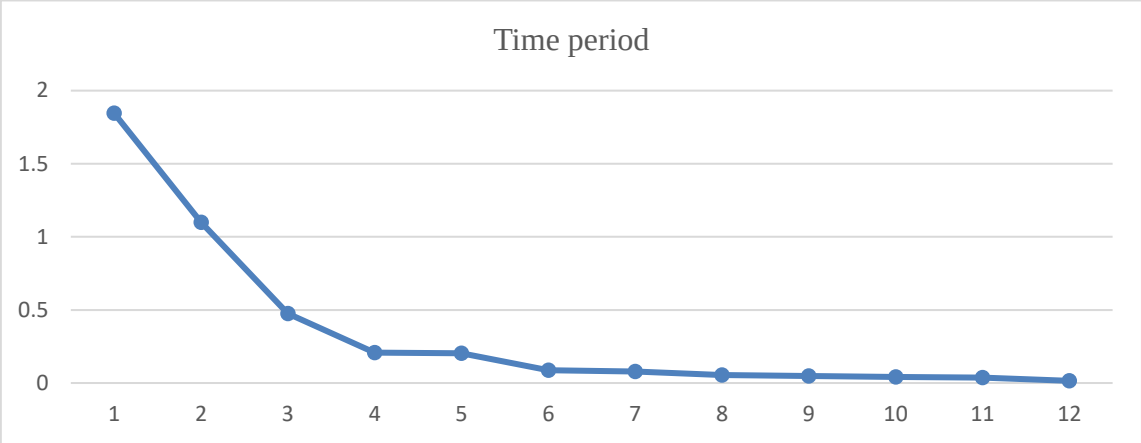

Figure7:Modal Time Period Vs. Mode Shape

VI. CONCLUSION

In the present study, analysis of cold formed pre-fabricated structural building with zone III has been carried out for 3 story. The buildings are analyses for earthquake load (zone III). it has been made on different structural parameters viz. base shear, Earthquake displacement and wind displacement story force and modal time period etc. Based on the analysis results following conclusions have been drawn

- Analysis of cold form building at zone IIIwith medium soil. The base shear in x- direction, is maximum as compare to base shear in Y-direction.
- Building analysis in dynamic analysis method with zone III, earthquake displacement results indicate that pre-fabricated building safe in earthquake displacement.
- Pre-fabricated building analysis in response spectrum method with zone III at medium soil, wind displacementresults indicate that pre-fabricated building safe in wind displacement.

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Innovative Solutions for Sustainable Pavements: Plastic Coated Aggregates in Bituminous Mixes

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ABSTRACT

Plastic pollution poses a serious threat to the environment, contributing to soil, water, and air pollution. Implementing stringent regulations governing the production and usage of plastics can mitigate the toxic effects of plastics on human health and the environment. The study focuses on the "Utilization of Plastic Coated Aggregates in Bituminous Mix for Flexible Pavement." The project aims to preserve road infrastructure through a systematic approach to ensure optimal performance and longevity, considering future maintenance scenarios. In today's context, pavements endure various loads, leading to distresses such as rutting, fatigue cracking, and temperature-induced cracking. Given the environmental challenges, a blanket ban on plastics may not be feasible. Therefore, leveraging plastic as an innovative technology strengthens road construction and extends road lifespan. Plastic recycling is paramount and demands serious attention. Plastics constitute a significant portion of solid waste and persist for centuries in landfills or the ocean. Hence, maximizing plastic recycling efforts can alleviate landfill burdens, conserve energy, and safeguard the environment.

Keywords: Waste Plastic, Flexible Pavement, Marshall Stability, Crushing value.

I. INTRODUCTION

As the global population expands, the volume and diversity of waste generated also increase. Much of the waste generated today will persist in the environment for centuries, including non-degradable materials like plastic, leading to pollution.

Innovative approaches to waste management include utilizing recycled plastic in concrete and road construction, offering a solution to the challenge of disposing of large quantities of recycled plastic. Reusing plastic in the concrete industry is regarded as one of the most viable applications for recycling plastic materials.

Research efforts worldwide are exploring new and innovative ways to utilize waste materials effectively. Numerous studies and research projects conducted by highway agencies, private organizations, and individuals focus on assessing the feasibility, environmental impact, and performance of incorporating waste plastic into highway construction.

These studies aim to align societal needs for safe and economically sound waste disposal with the goals of the environmentally conscious highway industry, which seeks better and more cost-effective construction

materials. This collaborative effort seeks to address waste management challenges while promoting the development of sustainable infrastructure.

In general, in concrete the failure occurs due the fatigue cracking the concrete which formed from modifier, it causes less cracking due its durability.Polymer modified bitumen is emerging as one of the important construction of flexible moment. The polymer modified bitumen show better properties for road construction and plastic waste can find its use in this process and this can help solving problem of pollution. The better binding property of plastic in its molten state has helped in finding out a method of safe is disposal of waste plastic.Road surface with neat bitumen can use cause bleeding in hot climate may develop crack and in cold climate possess fewer loads bearing capacity and can cause serious damage because higher axial load in present condition due to rapid infrastructure development. India has to raise transportation system it higher level both terms of length and quality. The use waste in hot bituminous mix to enhance pavement performance, protect and provide low cost roads.

II. LITERATURE REVIEW

This research paper tries to shed light on the use of PCA in asphalt mix and study the performance of PCA using different testes. Use of disposed plastics waste is the need of the hour. The studies on the thermal behaviour and binding property of the molten plastics promoted a study on the preparation of plastics waste – bitumen blend and its properties to find the suitability of the blend for road construction. A modified technique was developed and the stone aggregate was coated with molten plastics and the plastics waste coated aggregate (PCA) was used as the raw material for flexible asphalt concrete. PCA showed better binding property, it had less water absorption and also the sample showed higher Marshall Stability value.The continuous increase in road traffic in combination with insufficient maintenance due to paucity of funds has resulted in deterioration of road network in India. To improve this process there are several types measures which are proven to be effective, like securing adequate funds for proper maintenance, effective and improved roadway design, use of better quality materials and use of effective and modern construction techniques. During last three decades in many countries around the world it has been tested that modification of the bituminous binder with polymer additives enhances the properties and life of asphalt concrete pavements. The present investigation was carried out to propose the use of plastic coated aggregate (PCA) in bituminous mix of flexible pavements in order to improve their performance and also to give a way for safe disposal of plastic wastes to provide a solution to threat of environmental pollution as well. There are two processes available for mixing of waste plastic in bituminous mixes namely wet and dry process. In this study the dry process was used for bituminous concrete mixes.

Objective

- To avoid disposal of plastics waste by incineration and land filling etc.
- To coat the aggregates with the waste plastic materials and check the properties of coated aggregate .
- To check the properties of bituminous mix specimen.
- To check the properties of bituminous mix specimen due to coating of waste plastic materials.
- To evaluate properties of Plastic coated aggregates (PCA) and comparing it to conventional aggregates.

III.METHODOLOGY

A. General

Waste plastic bags were collected from roads, garbage trucks, dumpsites and compost plants, rag pickers, waste-buyers at Rs 5-6 per kg. Household plastic was also collected for the project work, like empty milk bags, used plastic bags etc. the collected plastic waste was sorted as per the required thickness. Generally, polyethylene of 60 micron or below is used for the further process. Less micron plastic easily mixable in the bitumen at higher temperature (160'C -170'c).it is clean by de-dusting or washing if required. Collected plastic was cut into fine pieces sieve and retaining at 2.36mm sieve were sieved through 4.75 mm sieve and retaining at 2.36 mm sieve was collected. Firstly, Bitumen was heated up to the temperature about 160'C-170'C. the mixture was stirred manually for about 20-30 minutes. In that time period temperature was kept constant about 160-170'C.

B. Flow chart

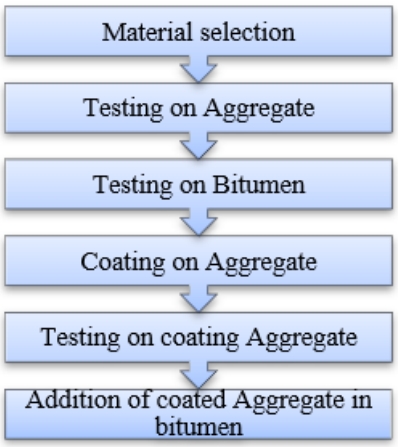

Figure1:Flow Chart

C. Material selection

- Aggregate: The coarse aggregate used is procured from a local crushing unit having 10-12mm nominal size. The coarse aggregate procured from quarry was sieved through 12.5mm and retained on 10mm sieve size.
- Bitumen: The grade of bitumen is 60-70.
- Plastic: Waste plastic glass are used of 50-60 micron.

D. Testing on Aggregate

- Water Absorption Test
- Aggregate Impact Value Test
- Aggregate Crushing Value Test
- Los Angeles Abrasion Test

E. Testing on Bitumen

- Specific gravity test
- Ductility test

- Softening point
- Flash point & fire point

F. Coating on Aggregate

The waste plastic bags, cups shredded to the required size of 2.5 mm. The Aggregate is heated to 170 C. The shredded waste plastic was sprayed over the hot aggregate. Plastic got softened and coated over aggregate.

G. Testing on coating Aggregate

Then after coating Aggregate the testing on coating Aggregate is done.

H. Addition of coated Aggregate in bitumen

The Bitumen is heated to 160 C. The coated aggregate mixed over the hot bitumen and properly mixed.

IV. RESULT AND DISCUSSION

A. Water absorption test

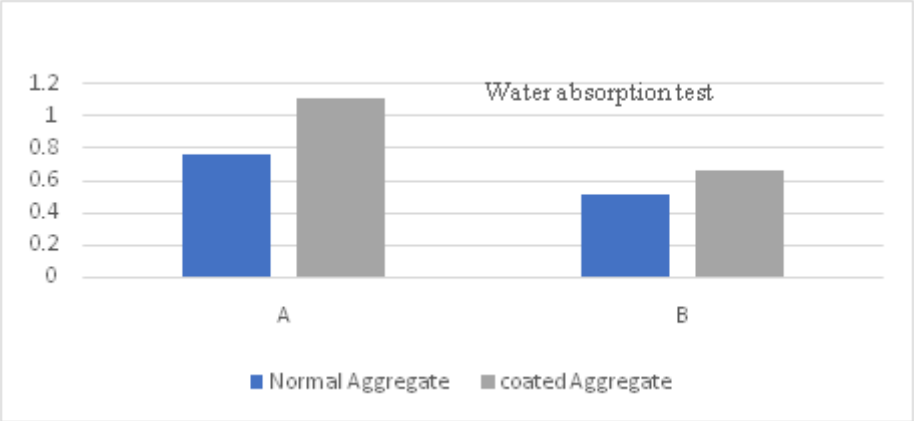

Figure2:Water absorption test

TABLE I WATER ABSORPTION PLASTIC COATED AGGREGATES

Sr.no	Type of aggregate	Wt. Ofsurface saturated dry sample w1 gm	Wt. of oven dry sample w2 gm.	% water W.A.=(w2-w1 w2/B X 100)	Average % of water
1.	A	1989	1974	0.76	0.63%
2.	B	1980	1970	0.51	

TABLE III WATER ABSORPTION PLASTIC COATED AGGREGATES

Sr.no	Type of aggregate	Wt. Ofsurface saturated dry sample w1 gm	Wt. of oven dry sample w2 gm.	% water W.A.=(w2-w1 w2/B X 100)	Average % of water
1.	A	1990	1968	1.11	0.885%
2.	B	1995	1982	0.66	

B. Impact value test

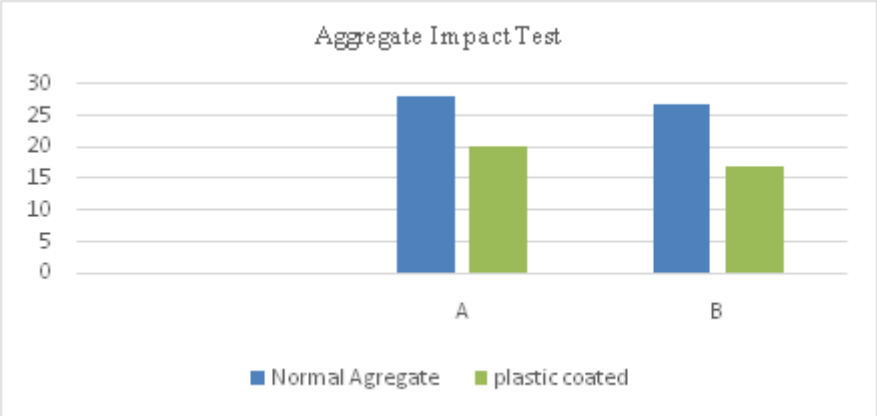

Figure3:Impact value test

TABLE IIIII IMPACT VALUE OF NORMAL AGGREGATES

Sr no.	Item	Test 1	Test2
1	Weight of oven dried sample (W1)gm	642	641
2	Weight of fraction passing 2.36mm Is sieve (W2)	58	59
3	Weight of retained 2.36mm Is sieve (W3)	584	582
4	Impact value = (W2/W1) X 100	9.03	9.20
5	Average impact value	9.15%	

TABLE IVV IMPACT VALUE OF NORMAL AGGREGATES

Sr no.	Item	Test 1	Test2
1	Weight of oven dried sample (W1)gm	636	646
2	Weight of fraction passing 2.36mm Is sieve (W2)	53	51
3	Weight of retained 2.36mm Is sieve (W3)	583	595
4	Impact value = (W2/W1) X 100	8.33	7.89
5	Average impact value	8.11%	

C. Crushing value test

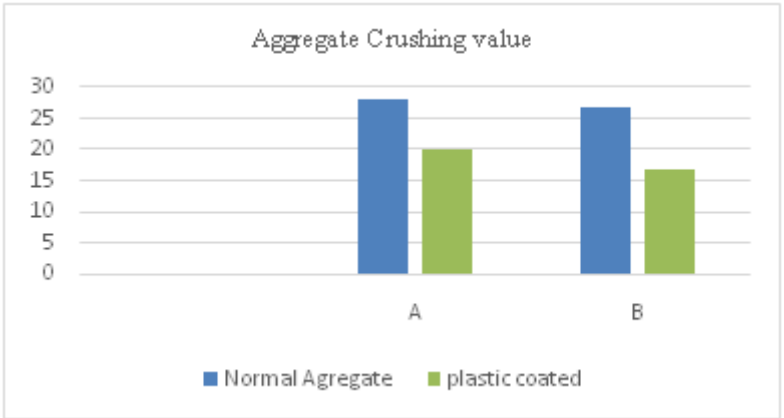

Figure4:Crushing value test

TABLE V CRUSHING VALUE OF NORMAL AGGREGATES

Sr no.	Item	Test 1	Test2
1.	Total wt. of dry sample taken =W1 gm	3000	3000
2.	Weight of portion passing 2.36mm sieve = W2 gm	540	600
3.	Aggregate crushing value = (W2/W1) x 100	18%	20%
4.	Mean aggregate crushing value =	19%	

TABLE VI CRUSHING VALUE OFPLASTICCOATED AGGREGATES

Sr.no	Items	Test 1	Test 2
1.	Total wt. of dry sample taken =W1 gm	3000	3000
2.	Weight of portion passing 2.36mm sieve = W2 gm	404	420
3.	Aggregate crushing value = (W2/W1) x 100	13%	14%
4.	Mean aggregate crushing value =	13.5%	

D. Los Angeles abrasion test

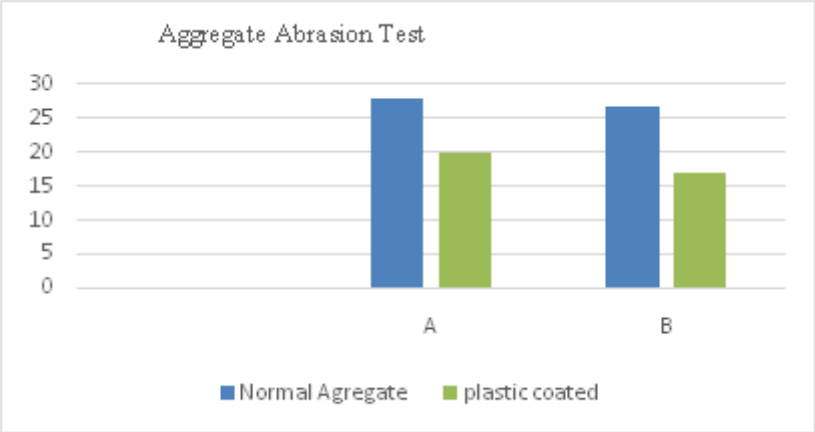

Figure5:Los Angeles abrasion test

TABLE VII ABRASION VALUE OF NORMAL AGGREGATES

Sr.no	Items	Test 1	Test 2
1.	Total wt. of dry sample taken =W1 gm	1.250	1.250
2.	Weight of portion passing 2.36mm sieve = W2 gm	350	335
3.	Aggregate abrasion value =(W2/W1) x 100	28%	26.8%
4.	Mean aggregate abrasion value =	27.4%	

TABLE VIII ABRASION VALUE OF PLASTICCOATED AGGREGATES

Sr.no	Items	Test 1	Test 2
1.	Total wt. of dry sample taken =W1 gm	1250	1250
2.	Weight of portion passing 2.36mm sieve = W2 gm	250	210
3.	Aggregate abrasion value =(W2/W1) x 100	20%	16.8%
4.	Mean aggregate abrasion value =	18.4%	

E. Marshall Stability Test

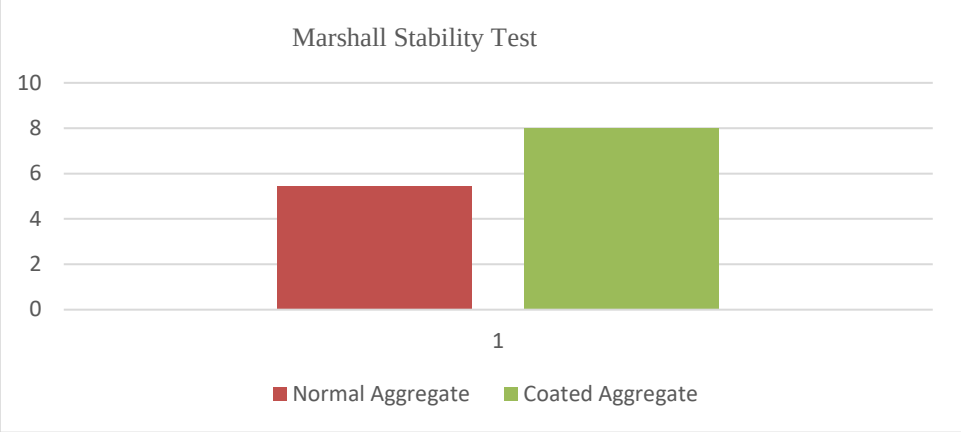

Figure6:Marshall Stability Test

TABLE IX MARSHALL STABILITY TEST OF BITUMEN

Sr No	Wt of Aggregate (Kg)			% Bitumen	Wt. of Bitumen (Kg)	Specific Gravity			
	Coarse Aggregate	Fine Aggregate	Filler			Coarse Aggregate	Fine Aggregate	Filler	Bitumen
1	2895	450	225	3	108	2.61	2.46	2.41	0.99
2	2895	450	225	4	144	2.61	2.46	2.41	0.99

Sr No	% Bitumen by Weight of Total Aggregate Mix	Weight of specimen (g)		Gt	Gm	Vv	Vb	VMA	VFB	Stability		Flow
		In air	In water							Obs	Carr	
1	3	1197	654.4	2.40	2.17	9.18	6.28	16.16	35.1	799		9
2	4	1163	647.5	2.42	2.21	6.67	8.58	16.75	43.3	717		9.6

TABLE X MARSHALL STABILITY TEST PLASTIC COATED AGGREGATES

Sr No	Wt of Aggregate (Kg)			% Bitumen	Wt of Bitumen (gm)	Specific Gravity			
	Coarse Aggregate	Fine Aggregate	Filler			Coarse Aggregate	Fine Aggregate	Filler	Bitumen
1	1200	0	225	4	57	2.61	2.46	2.41	0.99
2	1200	0	225	5	72	2.61	2.46	2.41	0.99

Sr No	% Bitumen by Weight of Total Aggregate Mix	Weight of specimen (g)		Gt	Gm	Vv	Vb	VMA	VFB	Stability		Flow
		In air	In water							Obs	Corr	
1	4	1197	654.4	2.40	2.17	9.18	6.28	16.16	35.1	799		9
2	5	1163	647.5	2.42	2.21	6.67	8.58	16.75	43.3	717		9.6

TABLE XI TESTING RESULT

Aggregate type	Water absorption	Impact value	Crushing value	Abrasion value
Normal Aggregate	0.63%	9.20%	19%	27.40%
Coated Aggregate	0.885%	8.11%	13.5%	18.40%

Discussion

- The crushing value reduces from 19 to 13.5 % for normal and plasticcoated aggregate. The value was reduced by 40%. Lower the aggregate crushing value higher is the strength.
- The aggregate impact value of plasticcoated aggregate was reduced by 9.20 to 8.11 % than the normal aggregate. It is the higher toughness of plasticcoated aggregate.
- Loss Angeles abrasion value indicates the hardness of the aggregate.
- The abrasion value of plasticcoated aggregate were 27.40% less than the normal aggregate.
- The stability of modified bitumen (10% bitumen replaced by plastic) is higher than the normal bitumen.

V. CONCLUSION

The plastic mixed with bitumen and aggregate is used for better performance for the roads. The polymer coated on the aggregate reduces the voids and moisture absorption. This results in the reduction of ruts and there is no pothole formation. The plastic pavement can be withstand heavy traffic and are durable than flexible pavement.

- It shows that with the increase of waste plastic in the bitumen increase the properties of aggregate and bitumen.
- Use of waste plastic in flexible pavements shows good result when compared with conventional flexible pavements.
- This has added more value in minimizing the disposal of plastic waste as an eco-friendly technique.
- Coating of polymer on the surface of the aggregate has resulted in many advantages, which ultimately helps to improve the quality of flexible pavement

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Soil Improvement Using Molasses

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ABSTRACT
Nowadays, rapid and continuous development characterizes every aspect of the construction industry. Roads, in particular, play a crucial role in the advancement of our nation. While numerous methods and technologies exist for soil stabilization, the utilization of molasses, bagasse, and fly ash stands out as cost-effective and readily available materials. Although these raw materials may pose environmental challenges, their proper incorporation into soil stabilization renders construction practices more eco-friendly. This method of stabilization holds promise for the future, especially considering the potentially harmful effects of rapid industrialization. By employing bagasse, fly ash, and molasses, soil stabilization can be achieved in a safe and environmentally sustainable manner.
Keywords: molasses, soil, plasticity index.

I. INTRODUCTION

Road plays a very important role in the development of the country. In the case of a developing country development of roads is considered as the development of the country. Road pavements, today, are one of the most important infrastructures for a developing country like India. Any damage to the same causes a lot of inconvenience to the traffic, physical harm to the commuters, and many such problems that are not unavoidable. In days to come, the axle loads and traffic intensity are likely to exceed the capabilities of soil used in the construction of road pavements, if the use of the soil is assumed inevitable then certain modifications will be essential in the future to bring its capabilities to meet the demand of increasing axle loads and traffic intensity. One such modification is the improvement in the strength of soil by using molasses. The molasses is available in enough quantity in Maharashtra state as there is much sugarcane produced. The sugarcane factory produces 10 tons of sugar and 4 tons of molasses after processing 100 tons of sugar cane. The molasses is used as binding material in the stabilization of soil. [1]

II. MATERIALS

A. Soil
The locally available soil is used at Dhangwadi, Tal. Bhor, Dist. Pune. The percentages of molasses vary in soil samples.

B. Molasses

It is a by-product of the sugarcane industry. The molasses syrup left from the final crystallization stage is called molasses. The molasses used is from Rajgad Sarkari sakhar karkhana Bhor.

TABLE I PROPERTIES OF SOIL. [2]

Sr. no	Property	Result
1	Specific gravity	2.59
2	**Particle size analysis**	
3	Gravel content% (20 to4.75mm.)	18.23
4	Sand content % (4.75 to 0.075mm)	64.86
5	Silt and clay content % (below 0.075mm.)	16.91
6	**Atterberg's Limits: %**	
7	Liquid limit	32.16
8	Plastic limit	22.56
9	Plasticity index	12.87
10	Maximum dry density (gm./cm3)	1.48
11	Optimum Moisture Content (%)	21.42

TABLE III PHYSICAL PROPERTIES [2]

Sr. no	Physical properties	Molasses
1	Color	Dark brown
2	Specific gravity	1.2
3	Viscosity (cp at 200C)	1450
4	PH	4.2
5	Litters/tone	714
6	Appearance	Syrupy Liquid
7	Gallons/tone	157

III.SAMPLE PREPARATION AND TESTING RESULTS

A. Procedure

To improve the properties of soil in subgrade and subbase using industrial wastes various laboratory tests are carried out. In the present experimentation work the soil is improved by adding industrial waste in different percentages. The effect of the Addition of industrial waste on the strength behaviour of the soil is studied by varying percentages of industrial waste by weight of the sample.[1]

B. Planning for Laboratory tests

Locally available soil which was proposed to be used in the road at subgrade or sub-base was modified by mixing molasses in different proportions. The mix of locally available soil and molasses is designated as SM. Table 3: Details of Soil Mix and the Symbols Used For Them.[2]

TABLE IIIII

Symbols	Proportion Local Soil: Molasses
SM0	100:0%
SM1	95: 5%
SM2	94.5: 5.5%
SM3	94 : 6.0%
SM4	93.5: 6.5%
SM5	92.5 : 7.5%

The laboratory test conducted on locally available soil and molasses mixes in decided proportion. The different tests conducted are

- Grain size analysis
- Specific gravity
- Consistency limits
- Standard Proctor test

C. Consistency Limits

Consistency means the relative ease with which the soil can be deformed and this term is mostly used for fine-grained material. Atterberg's limits are divided in four parts

- Liquid state
- Plastic state
- Semi-solid state
- Solid state.

The effect of Molasses addition in varying proportions with local soil has been studied and the difference in Consistency limits for various mixes are shown in Table 5 and Fig.1. It is observed that as the percentage of molasses increases the liquid limit of soil mix is increased.

TABLE IVII EFFECT OF MOLASSES ADDITION ON ATTERBERG'S LIMIT FOR SM0 TO SM6 [2]

Sr.No.	Properties	Soil + Molasses Mix					
		SM0	SM1	SM2	SM3	SM4	SM5
	Proportion Soil: Molasses	100: 0	95:5%	94.5:5.5%	94:6.0%	93.5:6.5%	92.5:7.5%
	Atterberg's limits: (%)						
1	Liquid Limit	32.78	34.16	35.06	38.02	47.12	SM0
	Plastic Limit	21.56	24.09	25.22	28.93	38.79	41.23
	Plasticity index	11.22	10.7	9.84	9.09	8.33	7.93

The table no 4 shows changes in consistency limits due to addition of molasses in various percentages. Variations of consistency limits indicate changes in properties of soil.

D. Compaction Behavior for Soil + Molasses

The Standard Proctor's test for soil with molasses mixes is performed and presented in Table 6. Different curves for molasses percentage and max. Dry density for various combinations is presented in Fig.1. Similarly, the effect of the addition of molasses with soil for OMC is presented in Fig.2

TABLE VV EFFECT OF MOLASSES ADDITION ON MAXIMUM DRY DENSITY FOR SOIL [2]

Sr.No.	Properties	Soil + Molasses Mix					
		SM0	SM1	SM2	SM3	SM4	SM5
	ProportionSoil: Molasses	100: 0	95:5%	94.5:5.5%	94:6.0%	93.5:6.5%	92.5:7.5%
1	Maximum Dry Density(gm./cm3)	2.06	2.74	2.7	2.78	2.83	2.6

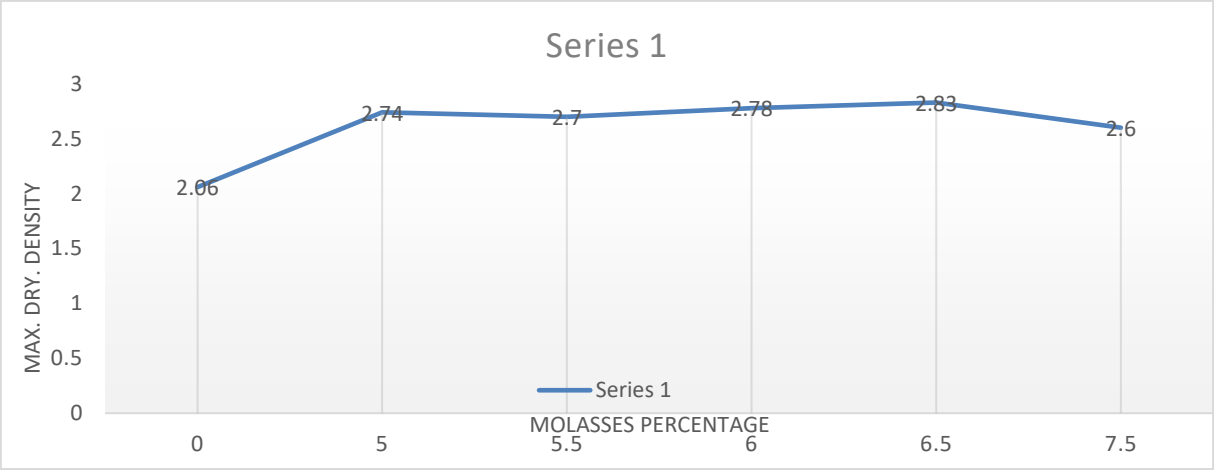

Figure1:Different Curves for Molasses Percentage and Max. Dry Density [1]

TABLE V EFFECT OF MOLASSES ADDITION ON OPTIMUM MOISTURE CONTENT FOR SOIL. [2]

Sr.No.	Properties	Soil + Molasses Mix					
		SM0	SM1	SM2	SM3	SM4	SM5
	ProportionSoil: Molasses	100: 0	95:5%	94.5:5.5%	94:6.0%	935:6.5%	92.5:7.5%
2	Optimum Moisture Content (%)	6.2	9.1	12	14.4	17.36	25.72

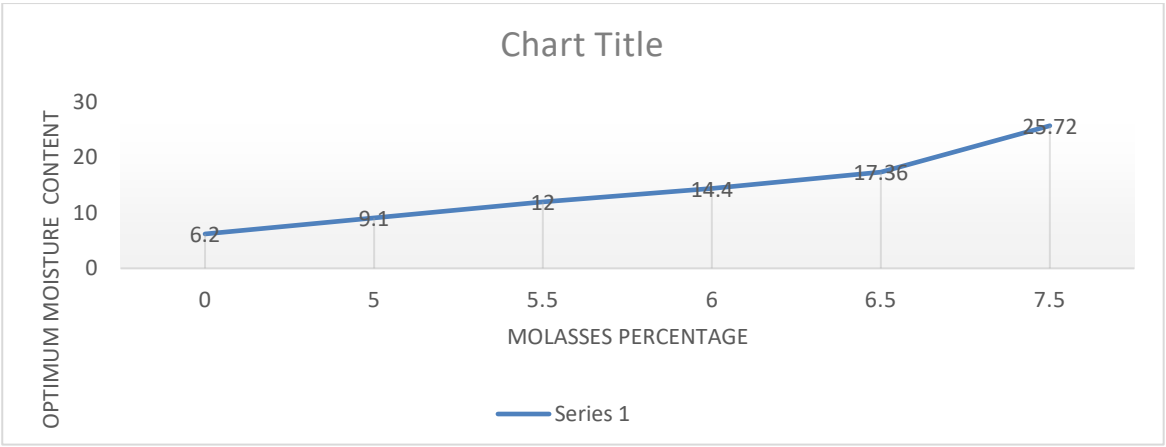

Figure2:Different Curves for Molasses Percentage and Optimum Moisture Content. OMC [1]

TABLE VI EFFECT OF MOLASSES ADDITION ON OPTIMUM MOISTURE CONTENT FOR SOIL. [2]

Sr. No.	Properties	Soil + Molasses Mix					
		SM0	SM1	SM2	SM3	SM4	SM5
	Proportion Soil: Molasses	100: 0	95:5%	94.5:5.5%	94:6.0%	935:6.5%	92.5:7.5%
1.	Maximum Dry Density (gm./cm3)	2.06	2.74	2.7	2.78	2.83	2.6
2.	Optimum Moisture Content (%)	6.2	9.1	12	14.4	17.36	25.72

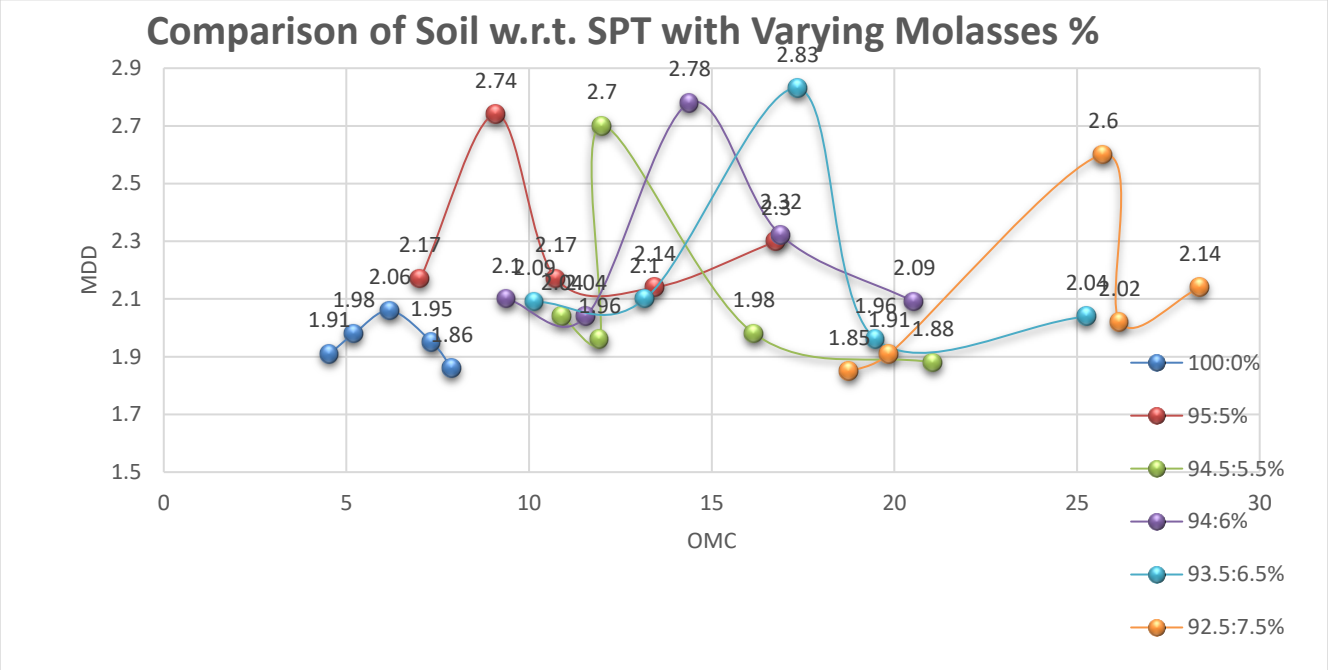

Figure3:Effect of Molasses Addition on Dry Density (MDD) and Moisture Content (OMC). [2]

E. Economy in Using Molasses

Industrial wastes are used for constructing different layers of road pavements. Utilization of industrial waste for stabilization of subgrade depends on the interaction between industrial wastes and embankment soil. If the type of soil available in the area is found to beflexible to pozzolanic action industrial wastes are added. This characteristic improves the engineering qualities of the soil like density, and decreases the Plasticity index of soil. The main feature of molasses utilization in road Construction is the remarkable cost savings aspect Industrial wastes is important in the formulation of pavement specifications. With this economy can be achieved and utilization of industrial wastes in bulk quantities for road construction. Many Civil Engineering Companies are involved in the construction of roads using an innovative technology called a bio-enzymatic, Terrazyme (molasses) soil stabilizer. Sugar waste molasses is a liquid.

IV. CONCLUSION

The use of industrial by-products like molasses in soil stabilization for locally available material near road construction shows sincere results in experimentation. The density of soil increases as the percentage of molasses increases up to some limits. We obtain the max density of soil at 6.5% of molasses percentage. The plasticity index of soil decreases as the percentage of molasses increases. As we know ρ= m/v the results of

experimentation indicate that the density of the locally available soil increases with an increase in molasses percentage. The mass of soil solids is constant the volume of soil reduces to attain the required strength of sub-base or base coarse.The volume of soil reduced means the quantity of material required for the construction of the same quality of sub-base or base course is also reduced. Molasses gives the saving in quantity of material with economical and superior results. Industrial by-products are reused in construction and it helps to solve the problem of disposal of industrial by-products.

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Seismic Analysis of Different Plan Configuration of Multi-Storied Building in Various Types of Soil Using ETABS

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ABSTRACT
ETAB is most precisely software used in market for seismic analysis of multistory building and for design purpose. These project analyzed seismic calculation and design of different plan configuration of multistoried building in various types of soil using ETAB software. These project calculate lateral forces (Q) acting on the structure. The value of zone factor (Z) importance factor (I) response reduction factor (R) and fundamental natural period (Ta) are taken from the region, seismic zone, soil condition structure type and structure type condition. The horizontal and vertical forces are calculated as product of seismic coefficient. The weight of structure (W) is applied to the structure. The stability, deformation, stress, and strain of each structural member are calculated against horizontal and vertical forces by adding vertical load due to weight of the structure for analysis of SF and BM of beam and column ETAB is most precise software. So these project analyzed the comparative seismic study obtain from manual design as per IS 1893: 2016 and ETAB software's. The analysis and design of structure is done and the result obtained from manual design and software are compared and conclusion from them is computed.
Material which have property is linear static and dynamic analysis are performed. These analysis are carried out by considering different Soil parameter. By taking three different types of soils namely Hard, Medium and Soft .Different response like story drift, displacements base shear are plotted for different zones and different types of soils.
Keywords: seismic analysis, ETAB software, displacements, base shear'

I. INTRODUCTION

For producing a structure capable of resisting all applied load without failure during its intended life need structural analysis and design. Site investigation is process of collect information and evaluating condition of site for the purpose of designing and constructing the foundation a site for the purpose of designing and constructing foundation for a structure. Structural engineering are facing challenging for doing most economical design with accuracy in solution over its design life time. So, in now days there are no of software available for analyzing and designing practically act structural forces ETABS, STAADPRO, SAP AND RAM etc. Many design companies use these software for their project design purpose so, these project analyzed the result

obtained between comparative seismic analysis of multistoried using manually design and ETAB software separately.

The height of each story is taken as 3.1 m. making total height of structure 31 m. for another case structure is modeled using IS 1893 and ETAB software. Design of structures for earthquakes is different from that for any other natural phenomenon, like wind and wave. An earthquake to impose displacement on the structure, while winds and waves apply force on it. The displacement imposed at the base of the structure during an earthquake causes inertia forces developed at base of structure which are responsible for destroyed in the structure. From the analysis. More the mass of structure, the higher is the inertia force. Design of structures for earthquakes is different from that for any other natural phenomenon, like wind and wave. An earthquake imposes displacement on the structure, while winds and waves apply force on it. The displacement imposed at the base of the structure during an earthquake causes inertia forces to be generated in it, which are responsible for damage in the structure. As a consequence of this, the mass of the structure being designed assumes importance; the more the mass, the higher is the inertia force.

Hence our project aims Seismic analysis and design of different plan configuration of multi- storeyed building in various types of soil using ETAAB

II. LITERATURE REVIEW

Balaji.U and Selvarasan M.E (2016) worked on analysis and design of multi-storeyed building under static and dynamic loading conditions using ETABS. In this work a G+13 storey residential building was studied for the earth quake loads using ETABS. They assumed that material property to be linear, static and dynamic analyses were performed. The non-linear analysis was carried out by considering severe seismic zones and the behaviour was assessed by considering type II soil condition. Different results like displacements, base shear were plotted and studied.

Geethu(2016) made a comparative study on analysis and design of multi storied building by STAAD.Pro and ETABS softwares. They provided the details of both residential and commercial building design. The planning was made in accordance with the national building code and drafted using Auto CAD software. They concluded that while comparing both software results, ETABS software shows higher values of bending moment and axial force.

Chandrashekar(2015) analyzed and designed the multi-storeyed building by using ETABS software. A G+5 storey building under the lateral loading effect of wind and earthquake was considered for this study and analysis is done by using ETABS. They have also considered the chances of occurrence of spread of fire and the importance of use of fire proof material up to highest possible standards of performance as well as reliability. They suggested that the wide chances of ETABS software which is very innovative and easier for high rise buildings so that time incurred for designing is reduced.

Varalakshmi V (2014) analyzed a G+5 storey residential building and designed the various components like beam, slab, column and foundation. The loads namely dead load and live load were calculated as per IS 875(Part I & II)-1987 and HYSD bars i.e. Fe 415 are used as per IS 1986-1985. They concluded that the safety of the reinforced concrete building depends upon the initial architectural and structural configuration of the total building, the quality of the structural analysis, design and reinforcement detailing of the building frame to achieve stability of elements and their ductile performance.

B. Srikanth and V. Ramesh (2013) comparative study of seismic response for seismic coefficient and response spectrum methods. In this thesis, the earthquake response of symmetric multi-storied building by two methods are studied. The methods include seismic coefficient method as recommended by IS Code and modal analysis using response spectrum method of IS Code in which the stiffness matrix of the building corresponding to the dynamic degrees of freedom is generated by idealizing the building as shear building. The responses obtained by above methods in two extreme zones as mentioned in IS code i.e. zone II and V are then compared. Test results Base Shears, Lateral Forces and Storey Moments are compared.

Mayuri D. Bhagwat In this work dynamic analysis of G+12 multistoried practiced RCC building considering for Koyna and Bhuj earthquake is carried out by time history analysis and response spectrum analysis and seismic responses of such building are comparatively studied and modeled with the help of ETABS software. Two time histories (i.e. Koyna and Bhuj) have been used to develop different acceptable criteria (base shear, storey displacement, storey drifts).

Wakchaure M.Rhas investigated that study the effect of masonry walls on high rise building. Linear dynamic analysis is done on high rise building with different arrangement is carried out. Analysis is done on G+9 R.C.C. framed building. Earthquake time history is applieds to the models. Equivalent strut method is used to calculate the width of strut. Various cases of analysis are taken. Analysis is carried out by software ETABS. Base shear, storey displacement, story drift is calculated and all models are compared.

L.G.Kalurkar The design and analysis of multistoried G+5 building using composite structure at earthquake zone-3. A three dimensional modeling and analysis of the structure are carried out with the help of ETAB software. Equivalent Static Method of Analysis and Response spectrum analysis method are used for the analysis of both Composite and RCC structures. The results are compared and found that composite structure more economical.

Mohammed Rizwan Sultan (2015)The most important objective of this study is to grasp the behaviour of the structure in high seismic zone and also to evaluate Storey overturning moment, Storey Drift, Displacement, Design lateral forces. During this purpose a 15 storey-high building on four totally different shapes like Rectangular, L-shape, H-shape, and C-shape are used as a comparison. The complete models were analysed with the assistance of ETABS 9.7.1 version. In the present study, Comparative Dynamic Analysis for all four cases have been investigated to evaluate the deformation of the structure. Results & Conclusion: The results indicates that, building with severe irregularity produces more deformation than those with less irregularity particularly in high seismic zones. And conjointly the storey overturning moment varies inversely with height of the storey. The storey base shear for regular building is highest compare to irregular shape buildings.

III.METHODOLOGY

The project aims at comparative study on seismic analysis and design of R.C.C Moment Resisting Space Frame has analysed and designed ETAAB Software referring IS:456, IS:1893 Part-I (2002) and detailing is made according to IS:13920-1993. Various methods of seismic analysis

To achieve the objectives of the study that is to analyse and design commercial building using ETABS and by manual method, which meets the basic requirements such as safety, durability, economy, aesthetic appearance, feasibility, practicability and acceptability. It has been proposed to follow the following methodology.

- Finalization of plan with different configuration.
- Analysis & design manually for validation.

- Design different plan configuration by using ETAB software.
- Compare result obtained by manually and software design.
- Compare result obtained by different plan configuration.

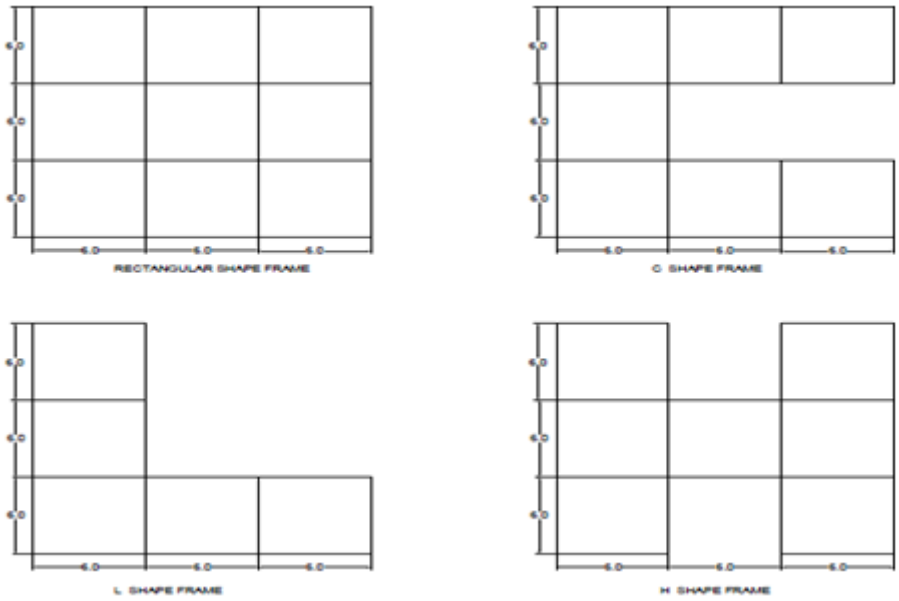

Figure1:Finalization Of Plan With Different Configuration.

IV. RESULT AND ANALYSIS

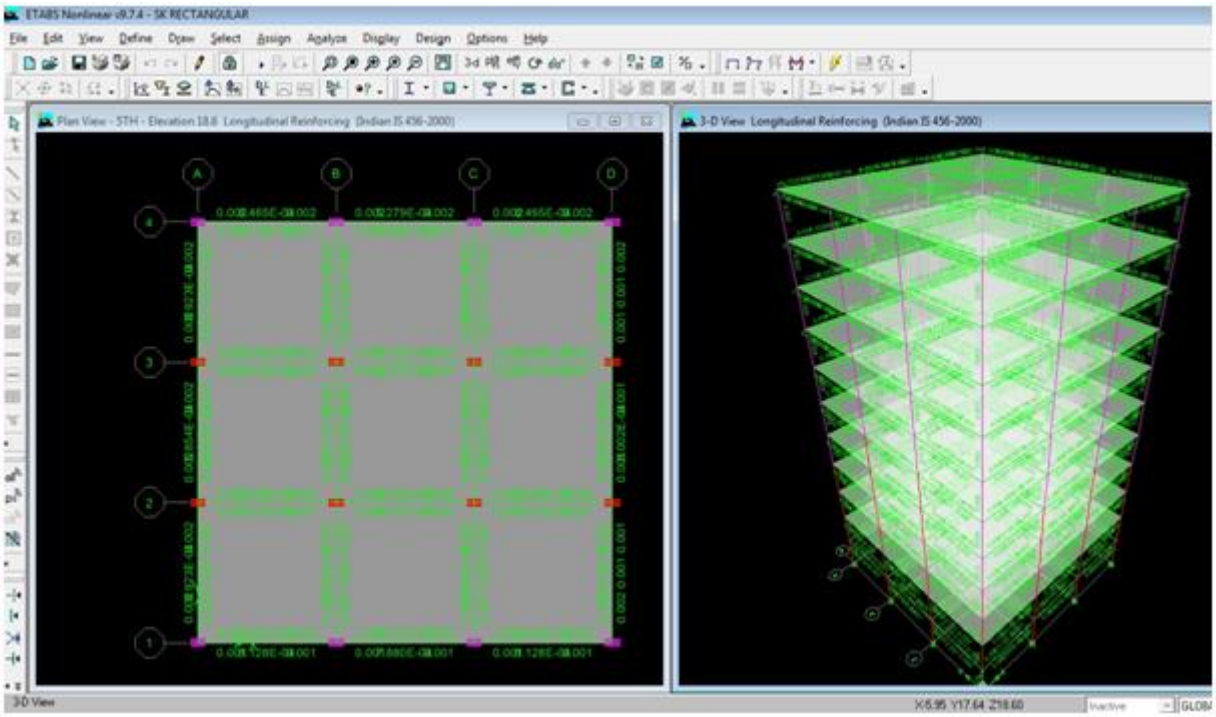

Figure2:Rectangular Frame

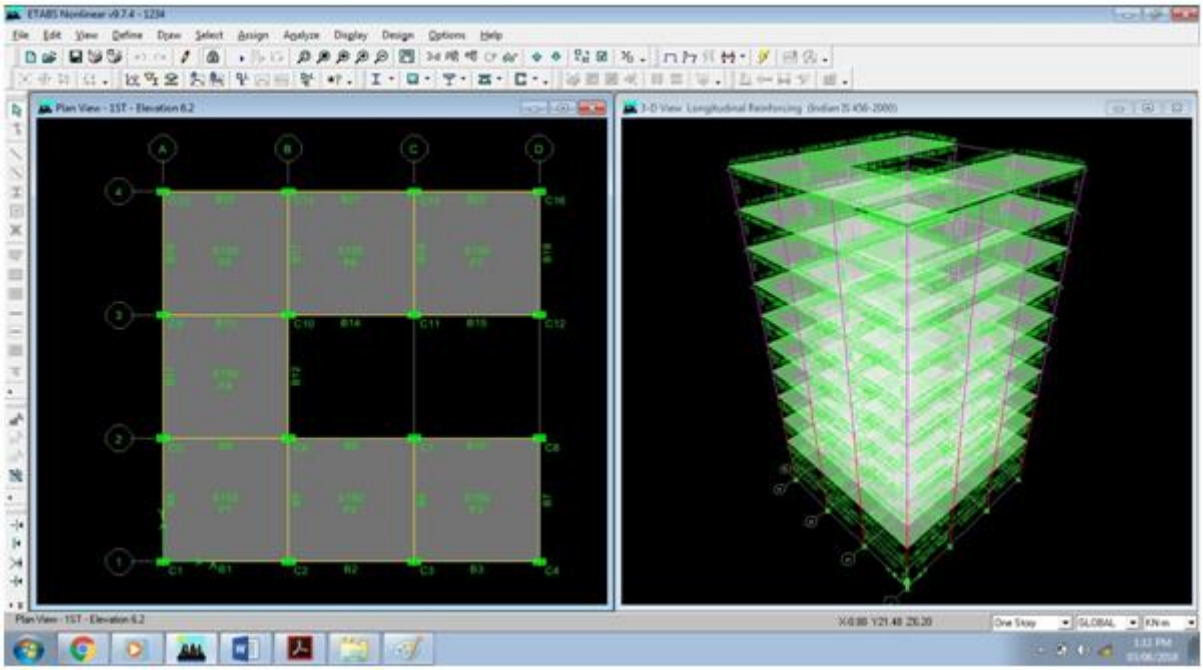

Figure3:C - FRAME

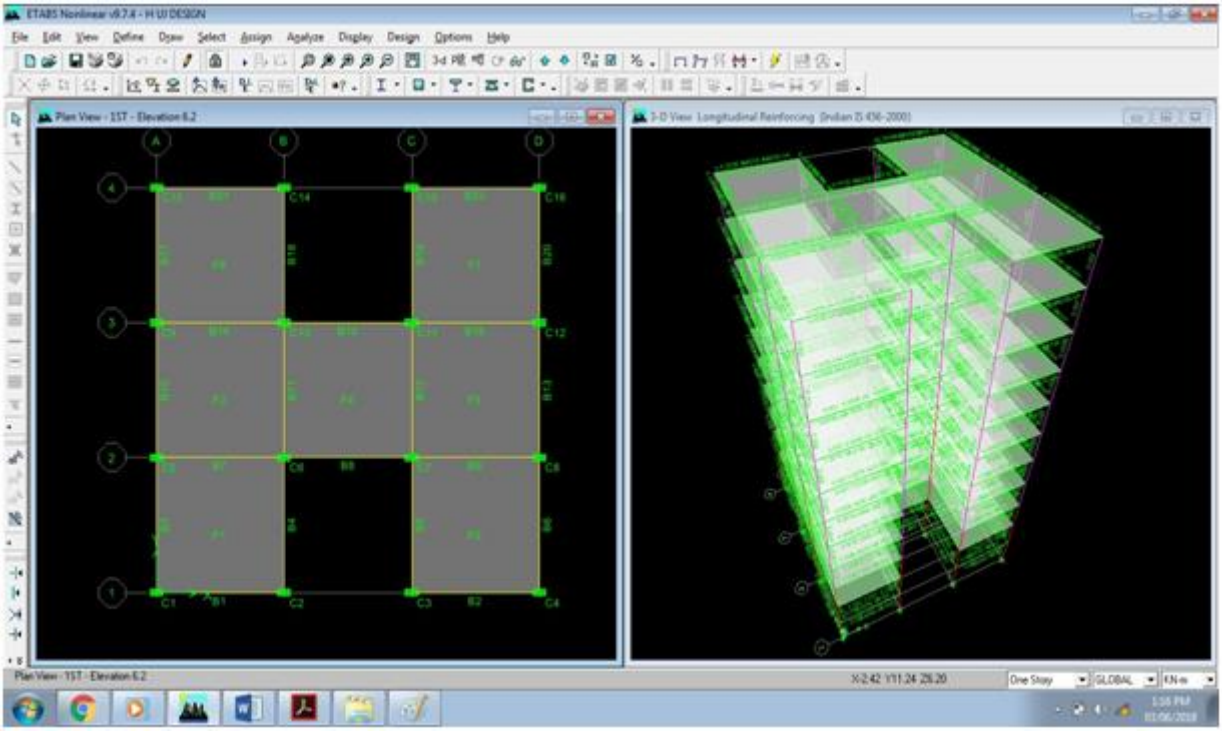

Figure4:H – FRAME

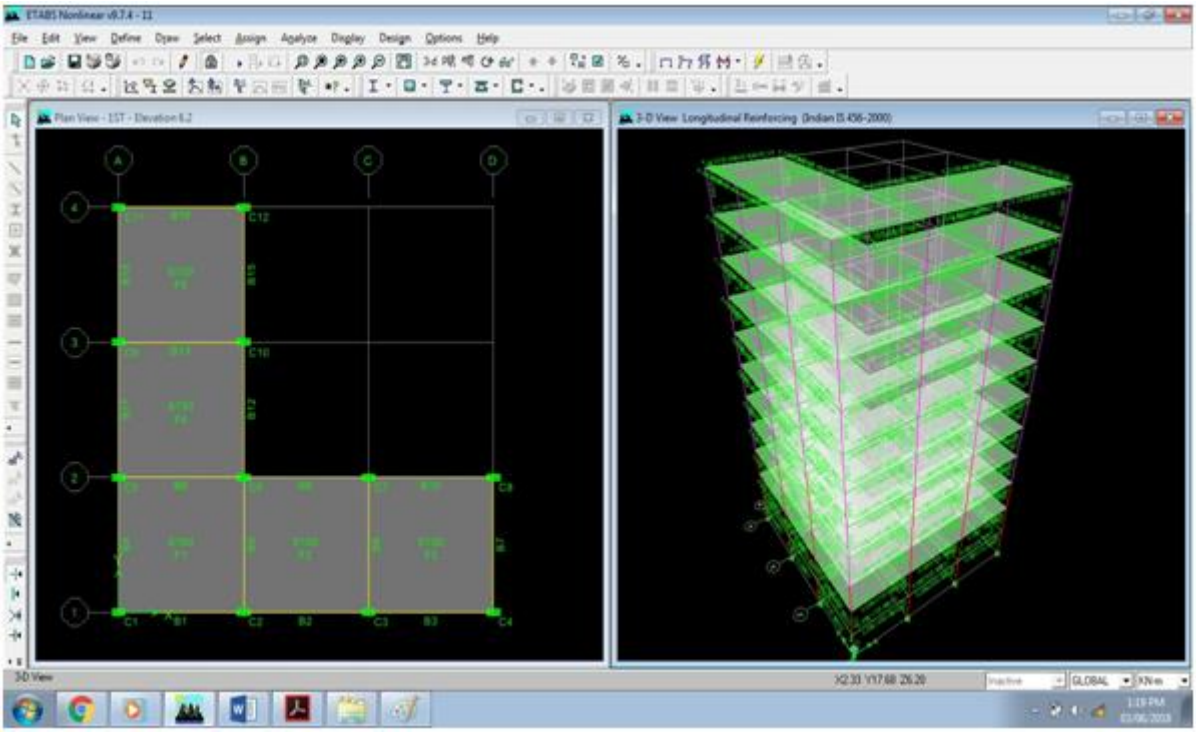

Figure5:L – FRAME

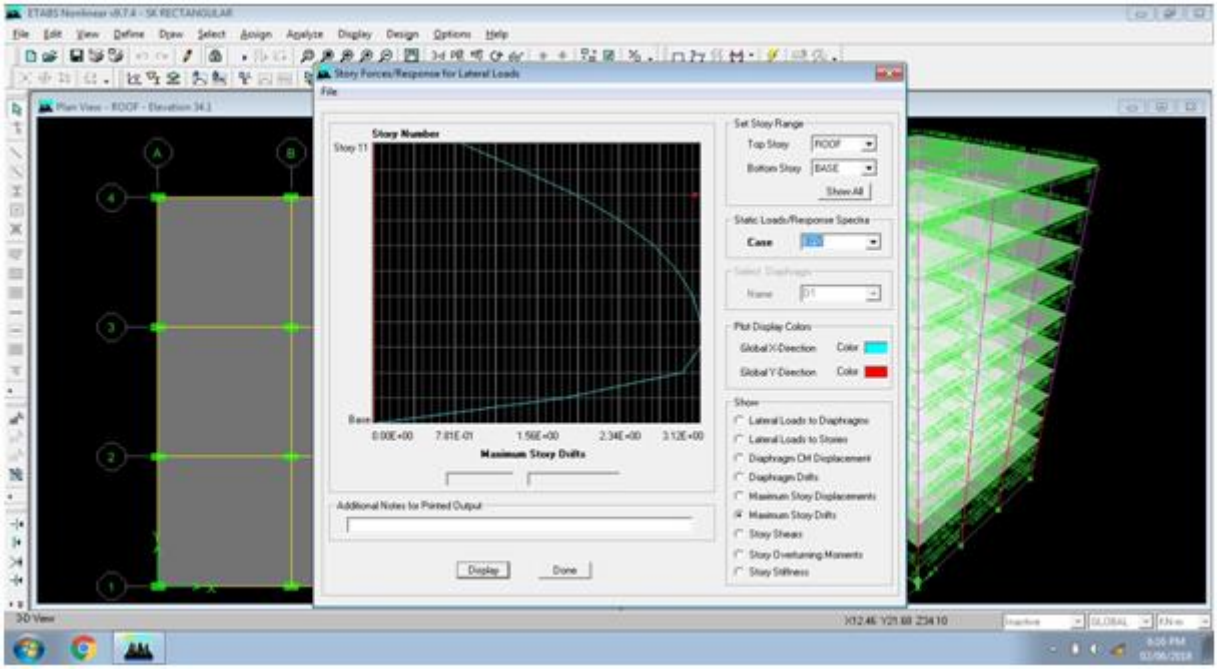

Figure6:Maximum story drift for Rectangular frame – EQX Graph

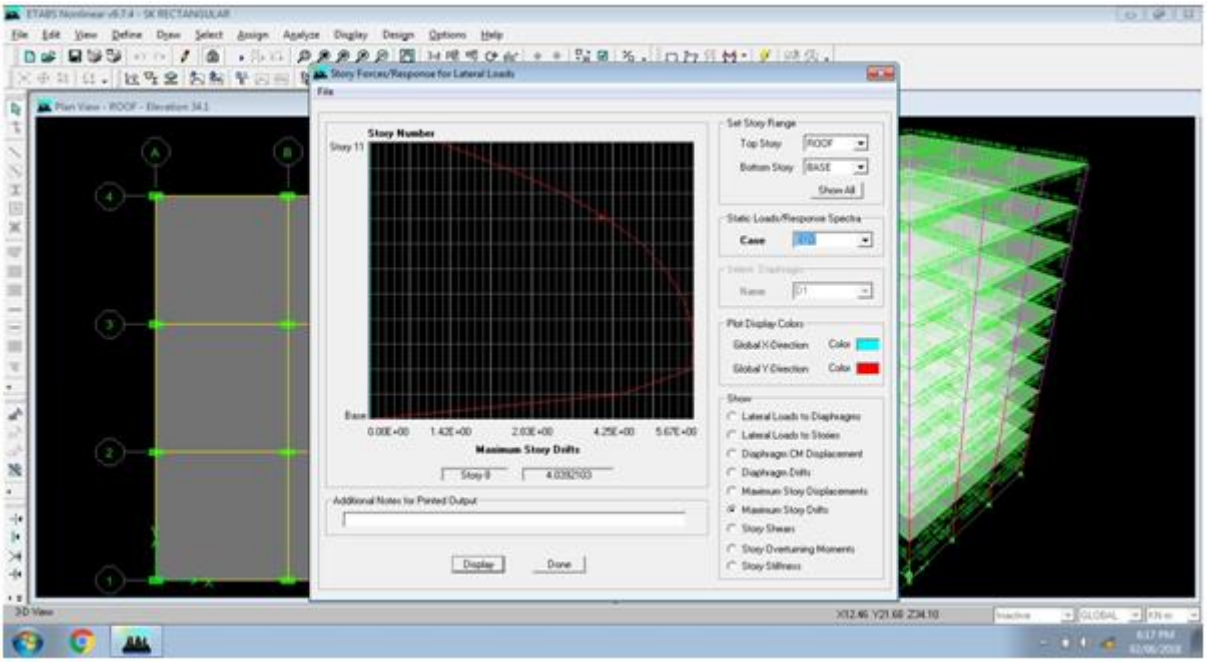

Figure7:Maximum story drift for Rectangular frame – EQY Graph

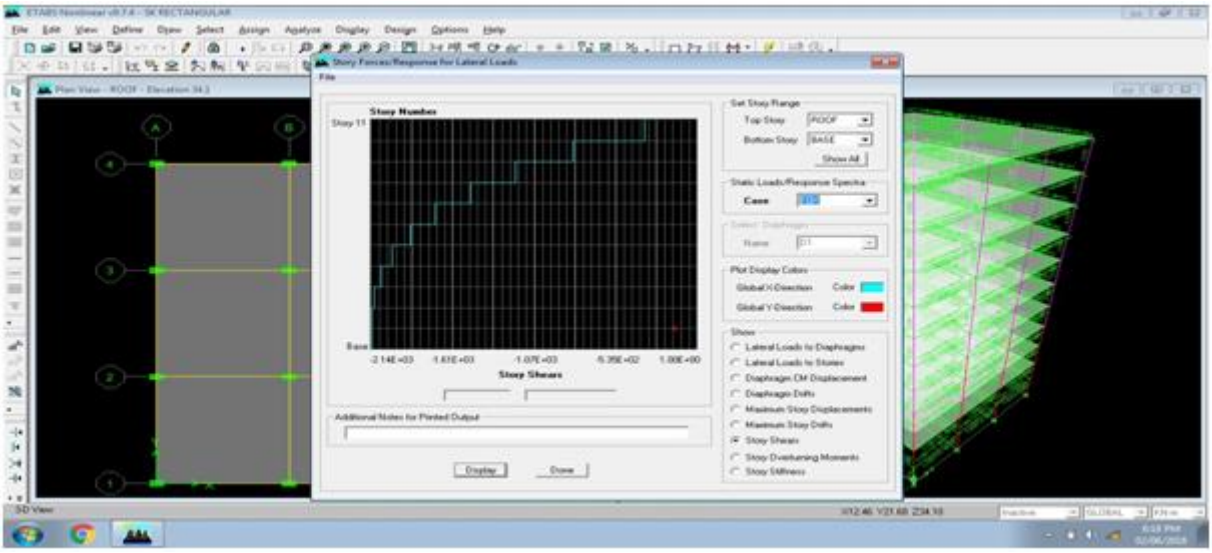

Figure8:Story Shear for Rectangular frame – EQX Graph

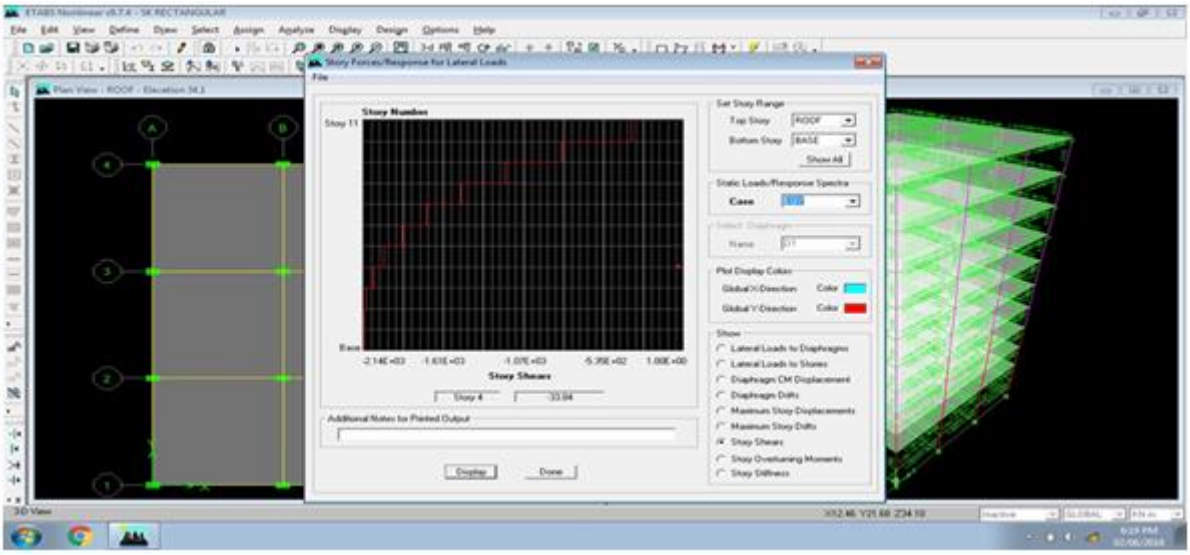

Figure9:Story Shear for Rectangular frame – EQY Graph

TABLE I COMPARISON OF RESULTS OBTAINED BY ETABS SOFTWARE FOR DIFFERENT PLAN CONFIGURATION: FOR STORY DRIFT (FOR DRIFT X)

FloorNo.	RectangularModel(M1)	H-Model(M2)	L-Model(M3)	C-Model(M4)
Roof	0.848186	1.072405	1.253884	0.739860
9th	1.409269	1.610242	1.759169	1.227517
8th	1.934563	2.119215	2.259814	1.683702
7th	2.356300	2.528448	2.662096	2.050108
6th	2.675342	2.833478	2.958033	2.327333
5th	2.902063	3.042988	3.155672	2.524358
4th	3.048416	3.167624	3.265199	2.651567
3rd	3.124196	3.215668	3.294504	2.717484
2nd	3.123220	3.178053	3.233706	2.716770
1st	2.942870	2.957159	2.943547	2.560105
Parking	1.831598	1.781286	1.679696	1.593485

V. CONCLUSION

- Seismic behaviour of the beam column junction RC moment resisting frame is carried out, but study on RCC moment resisting frame for various seismic zones and for different soil parameters.
- In the proposed work a RCC moment resisting frame is analysed and designed using ETAB for different seismic parameters and optimum design for zones by varying seismic soil parameters is do.
- It has been observed that the higher values obtained by base shear and top storey displacement.
- Analysis was done by using ETABS software and successfully verified manually as per IS 1893-2016.
- Usage of ETABS software minimizes the time required for analysis and design.

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Waste Tyre Crumb Rubber Particle as a Partial Replacement to Coarse Aggregate in Concrete

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ABSTRACT

Concrete is known for its brittleness, with its tensile strength usually only reaching about one-tenth of its compressive strength. To enhance its properties, conventional concrete is commonly reinforced with steel bars. These reinforcements primarily serve to boost energy absorption and toughness while also augmenting the concrete's compressive strength.

The management of waste tires is a significant worldwide issue, as their improper disposal leads to environmental and health hazards. This project delves into the exploration of a diverse array of physical and mechanical characteristics of concrete incorporating recycled tire aggregates. Waste tires are crushed into coarse particles of varying sizes and employed to substitute coarse aggregates in concrete. Incrementally, coarse scrap tire aggregates are introduced at 10%, 15%, and 20% proportions to replace conventional coarse aggregates. The objective of this study is to ascertain the optimal utilization of these waste materials as coarse aggregates in concrete composites. The investigation extends to assessing the compressive strength of different concrete mixtures incorporating these waste components.

Hence,weinthisprojecthaveaimedtostudytheeffectivenessofrubberassubstitutefor coarse aggregate and utilize the crumb rubber tires in concrete, to minimize globalwarming.Aggregatepropertiesviz,specificgravity,waterabsorption,weretobeconducted to ascertain the properties concrete specimens were to be casted and tested forconcrete mix with various percentage of replacement (10%,15% &20%) and its viabilityforreplacementarediscussed in this project.

Keywords:

I. INTRODUCTION

Scrap tires from various vehicles accumulate continuously in landfills worldwide. Once the lifespan of two-wheeler tires ends, their storage and disposal pose a significant challenge for municipal authorities. In response to this issue, many countries have prohibited the dumping of waste tires in landfills, necessitating a viable and eco-friendly solution for their disposal. Various methods have been employed, such as using tires as fuel, applying ground rubber for playgrounds or sports surfaces, incorporating them into new rubber products, and integrating them into asphalt rubber modified concrete. In civil engineering, these tires find use in road and landfill construction, septic tank installations, among other applications, before the remaining tires are ultimately sent to landfills. Utilizing waste tire rubber particles in concrete offers an efficient means of

repurposing rubber, providing enhanced environmental benefits through its incorporation into concrete structures.

By partially substituting waste tire crumb rubber particles for coarse aggregate in concrete, the waste tire rubber enhances the engineering properties of the concrete. Each of these waste materials contributes distinct effects to both the fresh and hardened concrete properties. Incorporating waste products into concrete not only renders it cost-effective but also addresses disposal challenges. Repurposing bulky waste is deemed the most environmentally sound approach to waste management. Therefore, an effort has been made to replace coarse aggregate in concrete, reducing the reliance on river sand and yielding environmental advantages. Additionally, this substitution is expected to decrease concrete costs, particularly those associated with cement, which typically represents over 27% of the total concrete cost.

II. METHODOLOGY

A. Aim

The purpose of this experimental investigation was to investigate the effect of M25 grade concrete on strength characteristics in mixes containing varying proportions of waste tyre in concrete.

B. Mainobjectives

- ToinvestigatetheeffectofmixScraptirewiththepartiallyreplacedincoarseaggregateproportion onstrength of concrete.
- Tofindouttheinfluenceofdifferentreplacementratiosofrecycledmaterialsonthestrengthofthe designedconcrete.
- To achieve strength results with maximum economy by using scrap tire as acombinedmaterial withcoarseaggregate.
- TheuseofcrumbrubberinconcretemixisverymuchbeneficialtoenvironmentalConcernandtosolvetheproble mrelatedtodisposalofwastetirerubberthroughoutthe world.

C. Materials required for Concrete

1) Cement: Cement in general can be defined as a material which possesses very good adhesive andcohesive properties which make it possible to bond with other materials to form compactmass.
2) Types of cement:Asper IS:456-2000,thecementusedshall heanyofthefollowing andthe typeselectedshouldbeappropriatefor the intended use:

- 33GradeordinaryPortlandcementconformingtoIS 269
- 43GradeordinaryPortlandcementconformingtoIS8112
- 53GradeordinaryPortlandcementconformingtoIS 12269
- RapidhardeningPortlandcementconformingtoIS8041
- PortlandslagcementconformingtoIS455
- Portlandpozzolanacement (flyash based)conformingtoIS1489 (Part 1)
- Portlandpozzolanacement(claimed claybased) conformingtoIS 1489(Part 2)
- HydrophobiccementconformingtoIS8043

III.RESULTS

TABLE I

	7Days			28Days		
	CTMREADING (KN)	CUBESCOMPRESSIVE STRENGTH (N/MM2)	AVERAGE	CTMREADING (KN)	CUBESCOMPRESSIVESTRENGTH (N/MM2)	AVERAGE
0%	478.72	21.30	20.31	675.51	30.01	29.58
	440.52	19.59		688.91	30.62	
	452.72	20.10		632.32	28.11	
10 %	364.48	16.22	16.34	539.53	23.95	23.97
	367.51	16.35		546.91	24.31	
	370.94	16.47		532.75	23.66	
15 %	241.45	10.79	10.79	399.95	17.76	17.31
	248.72	11.04		380.57	16.95	
	237.41	10.54		386.73	17.19	
20 %	188.70	8.39	8.40	244.48	10.85	10.93
	191.17	8.48		249.61	11.08	
	189.31	8.40		245.44	10.91	

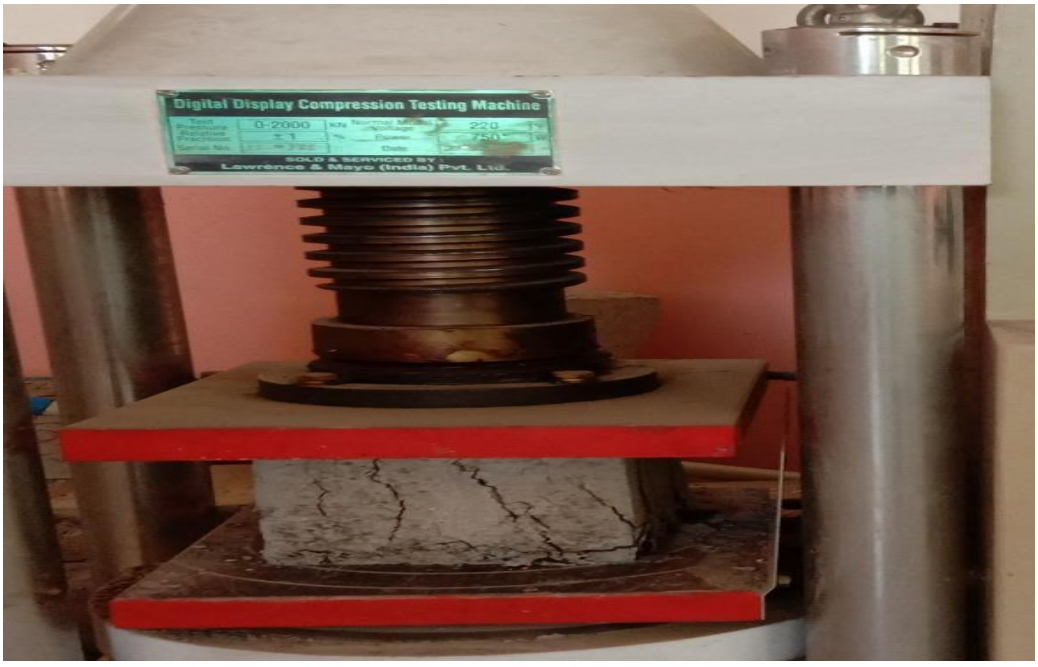

Figure1:

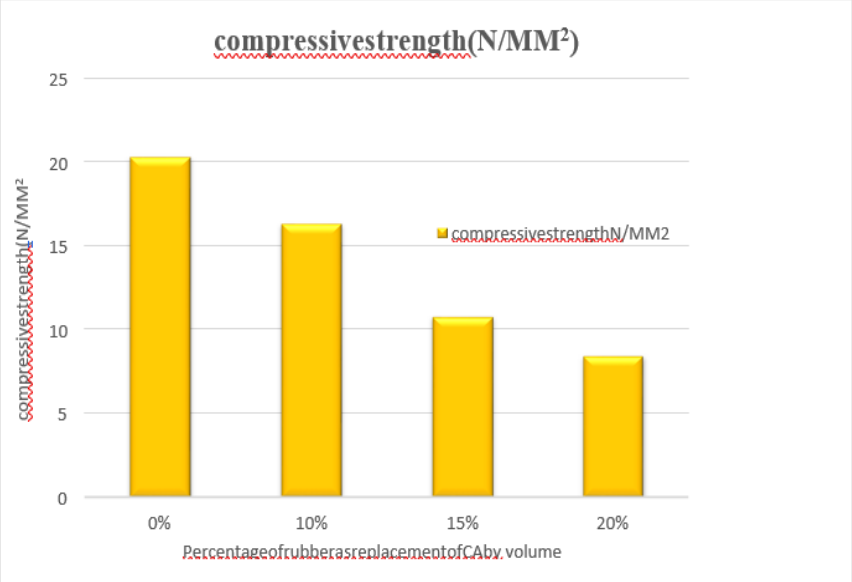

Figure2:Testresultsofcubesafter7 Daysofcuring

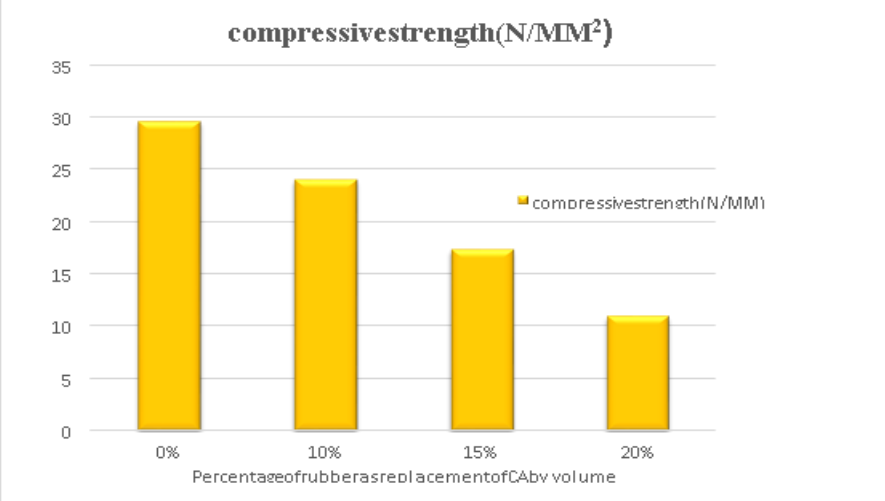

Figure3:

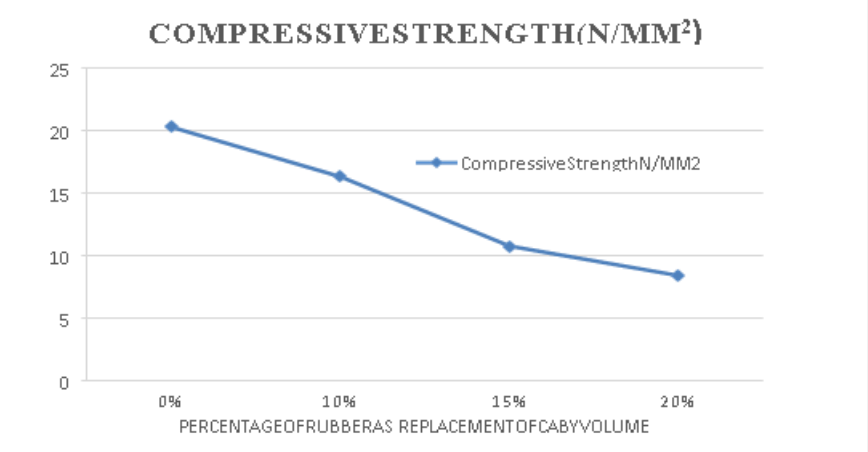

Figure4:GraphShowing ResultsofDifferentPositionofCrumbRubberincubesAfter7 daysofcuring

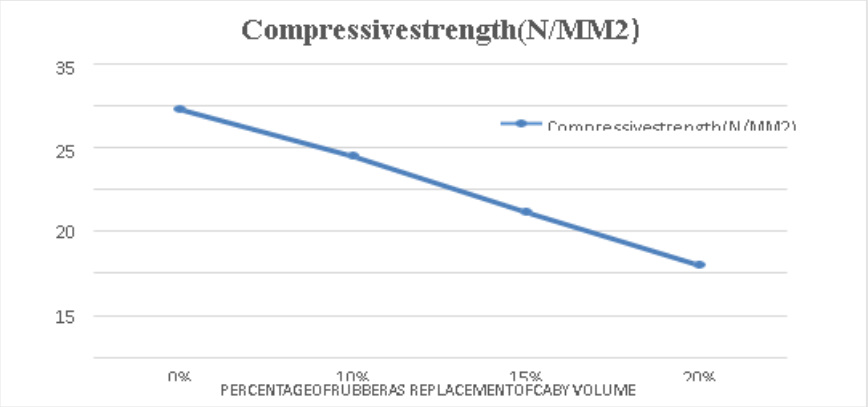

Figure5:

IV. CONCLUSION

- OptimumresultsareobtainedforcompressivestrengthwithrubberatRandomPosition.
- The main objective of this review article was a literature overview of fresh and hardenedproperties of self-compacting concrete with partially replaced natural coarse aggregatewithrecycledaggregatematerial.From this, itcan beconcluded:
- The use of crumb rubber in concrete mix is very much beneficial to environmentalconcernandtosolvetheproblemrelatedtodisposalofwastetirerubberthroughouttheworld.
- Waste tire rubber can be used as a replacement aggregate material in self-compactingconcrete.
- Safedisposalofwastetire,preventingitfromcausingpollutionanddiseases.
- Self-weight of concrete is reduced with the addition of tire particle, so it can be used aslightweightconcrete. Cost effectivesolution
- Further investigation is necessary to improve the hardened properties of rubber filledconcrete, to gain the loss strength due to the use of waste tire crumb rubber at highercontent inconcrete mix.

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Paving the Way for Sustainable Infrastructure: Plastic Coated Aggregates in Bituminous Mixes for Flexible Pavements

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ABSTRACT

The use of Plastics in day to the life occur serious environment pollution such as soil pollution, water pollution, and air pollution. The plastic is as non-decaying waste material and result in pollution. To avoid such harmful environmental issues its need to make proper management regarding recycling and reuse of plastic. The present work covers Utilization of plastic coated aggregate in bituminous mix for flexible pavement. In this study to find out mechanical properties on aggregate and Marshall Stability Test for mix design of flexible pavement for 0%, 5% and 7% plastic coated aggregate. It helps increases road performance and also finds a way for safe disposal of plastic wastes in order to counter environmental pollution as well.

Keywords: Plastic Coated Aggregate (PCA), Marshall Stability Test

I. INTRODUCTION

India, as a rapidly developing country, is facing a significant challenge in managing the increasing amount and diversity of waste generated. Much of the waste produced today, including plastics, persists in the environment for hundreds, if not thousands, of years, contributing to pollution. Recycling plastics and incorporating them into construction materials offer a valuable opportunity to address the issue of plastic waste disposal.

In the construction industry, recycling plastics for use in concrete is emerging as a particularly promising application. Research into innovative uses of waste materials is ongoing worldwide, focusing on finding solutions that are both environmentally friendly and economically viable. Many highway agencies, private organizations, and individuals are conducting studies and research projects to assess the feasibility, environmental impact, and performance of incorporating waste plastics into highway construction.

These efforts aim to align the societal need for safe and cost-effective waste disposal with the requirements of the highway industry for environmentally friendly construction materials. Plastic possesses several properties that make it suitable for enhancing bituminous concrete mixes used in pavement construction, including durability, corrosion resistance, cost-effectiveness, and potential noise pollution reduction.

By leveraging these properties, integrating recycled plastics into pavement construction can lead to longer-lasting, more economical, and environmentally sustainable road infrastructure.

II. METHODOLOGY

To find out properties of plastic coated aggregate following are the implementation would be taken.

- To comparative study the various engineering properties of plastic coated aggregate and normal aggregate.
- To find out Optimum Bitumen Content using Marshal Mix design procedure.
- To discuss the test result and find out conclusions.

Materials Used:

- Aggregate: 20mm, 10mm,
- Bitumen: A35 grade bitumen
- Waste Plastic: Waste plastic in the shredded form, stone dust and cement as filler.

Understand the scientific terms and jargon related to your research work.

III.RESULTS AND DISCUSSION

A. Test on Aggregate

The Physical properties of the aggregates were tested in laboratory. To check the aggregate with plastic coat and without plastic coat from the test result we found that the selected aggregate is within the specified range for hot asphalt mix design.

TABLE I PHYSICAL PROPERTIES OF AGGREGATES CONVENTIONAL (0% PLASTIC) AND PLASTIC COATED AGGREGATE (PCA)

Description of tests	Percentage of Plastic used			Specifications IRC:111-2009
	0%	5% (PCA)	7% (PCA)	
Aggregate Crushing strength	15.86%	13.9%	11.4%	Max 30 %
Impact value	14.33%	13.9%	11.6%	Max 24%
Specific gravity	2.78	2.73	2.75	2.5-3.0
Los Angeles Abrasion value	18.82%	14.8%	11.2%	Max 30%
Flakiness Index value	9.2%	13.8%	12.6%	Max 35 %
Elongation index value	11.5%	11%	11.2%	Max 35 %
Water absorption value	0.99%	0.67%	0.34%	Max 2%

B. Marshall Mix Design

The main object of Marshall Mix Design is to make durable and economic mix with proper gradation of aggregate and adequate proportion of bitumen so as to fulfill the desired properties of the mix bituminous concrete. In this method, the resistance to plastic deformation of a compacted cylindrical specimen of bituminous mixture is measured when the specimen is loaded diametrically at a deformation rate 53 of 50 mm per minute. There are two major features of the Marshall method of mix design.

- Density-voids analysis
- Stability-flow tests.

The Marshall stability of the mix is defined as the maximum load carried by the specimen at a standard test temperature of 60°C. The flow value is the deformation that the test specimen undergoes during loading up to

the maximum load. Flow is measured in 0.25 mm units. In this test, an attempt is made to obtain optimum binder content for the type of aggregate mix used and the expected traffic intensity.

Marshall Stability is related to the resistance of bituminous materials to distortion, displacement, rutting and shearing stresses. The stability is derived mainly from internal friction and cohesion. Cohesion is the binding force of binder material while internal friction is the interlocking and frictional resistance of aggregates. As bituminous pavement is subjected to severe traffic loads from time to time, it is necessary to adopt bituminous material with good stability and flow.

In this study found following test result.

TABLE III MARSHALL TEST RESULTS

Sr No	% Bitumen by Weight of Total Aggregate Mix	Theoretical specific gravity (G mm)	Bulk specific gravity (G mb) g/cm³	% of Air voids (Vv)	% of voids filled with bitumen Air voids (VFB)	Marshall Stability Value (Kg)	Flow value (mm)
1	0	2.60	2.39	8.07	56.09	1688	4.52
2	5	2.52	2.36	6.34	74.36	1724	4.10
3	7	2.51	2.34	6.77	75.18	1738	3.30

From the test carried on normal and coated aggregate it was observed that the maximum value of Marshall Stability was observed at plastic coated aggregate content of 7%. It is shown that plastic coated aggregate give better result than convention aggregate. It reduces environmental impact. Also give solution on disposal problem of plastic

IV. CONCLUSION

The utilization of plastic coated aggregates in the construction of flexible pavement is the give solution to disposal of plastic. From the performance of test on aggregates coated with different amount of percentage of plastic, the following conclusions are drawn:

- Coating aggregates with waste plastic reduces moisture absorption, as evidenced by lower impact values and aggregates crushing values compared to conventional aggregates without plastic.
- There is a slight decrease in specific gravity values with increasing plastic content in the aggregates
- Comparison of Marshall Stability values between conventional mixes and those containing plastic-coated aggregates revealed improved performance with 7% replacement of conventional aggregates with plastic-coated ones.
- The test results suggest that incorporating waste plastic into aggregates enhances their performance, indicating a promising solution for both waste disposal and pavement construction

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Design of Traffic Control System

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ABSTRACT

Traffic control has been a serious issue since humancivilization. The modern world demands mobility. Cars representthe main method of mobility, but today's congested highways andcity streets don'tmove fast, and sometimes theydon'tmove atall. India has 70% mobility on the road mode; hence themajor problems created in large cities are traffic congestion andwastage of valuable time in developed countries. For this need tosolve the major problem of traffic, to achieve the strategic goal ofreducing the congestion and improving the safety of the roadusers.The main aim is to design the best traffic system that will beflexible and adaptive. Intelligent traffic systems (ITS), sometimescalled intelligent transportation systems, apply communicationsandinformationtechnologytoprovidesolutionstothiscongestionas wellas othertraffic control issues.Theintelligenttransportsystem (ITS)takesthefirst step towards meeting this challenge by providing effective,reliable, meaningful knowledge to motorists in time throughsignals. Problems like high traffic congestion, low transportationefficiency, low safety,and endangered environment can be solvedthroughinnovativeandsophisticatedwaysofhandling thelatesttechniques.Inthispaper,variousfactorsare requiredtoreducethe traffic problem at KatrajChowk, Pune for efficient vehicle movement andimplemented for reducing the traffic problem from the datacollected through traffic surveys at these points &Design ofsignals foronejunctionis carriedout.

Keywords: Intelligenttransportsystem,trafficsignaldesign,trafficcongestion.

I. INTRODUCTION

A. Transportation Engineering

In the society of today, the road network is of great importance. As cities grow, so does the need for transportation, and this puts increased pressure on the infrastructure. Thus, it is of great importance to have a reliable and redundant infrastructure for traffic to make sure that it works even in bad conditions. Several different hazards may have an impact on the road infrastructure, such as natural catastrophes, accidents, or the failure of parts of the road network. Since the different infrastructure systems get more and more intertwined in the society of today and society becomes more vulnerable to catastrophes, these hazards might have effects on other infrastructure systems as well. Thus, more researchers are starting to look at the risk of possible cascaded consequences in interconnected networks. Transport planning has been historically concerned with travel behaviour and the transportation system in some nominallytypical' conditions under which the networks were designed for certain demand and certain capacity. In the past, insufficient consideration has been given to

the robustness and associated reliability of road networks. It is only during the last decade that considerable research interest has started to emerge for this important aspect of the transportation system.

B. traffic Signals

Traffic Signals are one of the more familiar types of intersection control. Using either a fixed or adaptive schedule, traffic signals allow certain parts of the intersection to move while forcing other parts to wait, delivering instructions to drivers through a set of colorful lights (generally, of the standard red-yellow (amber)-green format). Some purposes of traffic signals are to improve overall safety, decrease average travel time through an intersection, and equalize the quality of services for all or most traffic streams. Traffic signals provide orderly movement of intersection trafficcan be flexible for changes in traffic flow and can assign priority treatment to certain movements or vehicles, such as emergency services. However, they may increase delay during the off-peak period and increase the probability of certain accidents, such as rear-end collisions. Additionally, when improperly configured, driver irritation can become an issue.

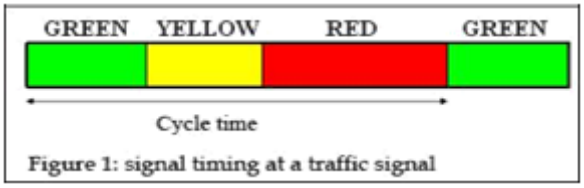

Figure 1: signal timing at a traffic signal

Figure1:Trafficsignal

C. Intelligent Transportation System

Intelligent Transportation Systems (ITS) is the application of computer, electronics, and communication technologies and management strategies in an integrated manner to provide traveller information to increasethe safety and efficiency of the surface transportation systems. These systems involve vehicles, drivers, passengers, road operators, and managers all interacting with each other and the environment, and linking with the complexinfrastructure systems to improve the safety and capacity of road systems.

D. Objectives

The Followings are the objectives of the present paper:

- To design traffic signals of Intersection at KatrajChowk, Pune for efficient vehicle movement.

II. METHODOLOGY

A. Design Step For Traffic Signal At Location

Normal flow,Y1 = q1 / s1 and Y2 = q2 / s2

Optimum signal cycle time, Co = (1.5L + 5) / (1-Y) Co = the optimal delay cycle length

L = total lost time in sec.

L = 2n

n = number of phase R = all red time.
Y = Y1+Y2
Applying green time= G1=(Y1/Y) X (Co-L) G2=(Y1/Y) X (Co-L)

B. Methods Of Designing Intersections

F.V.Webster's method: In the 1950's Webster conducted a series of experiments on pre-timed isolated intersection operation (1) Two traffic signal timing strategies came from his study One is signal phase splits. Webster demonstrated, both theoretically and experimentally, that pre-timed signals should have their critical phases timed for an equal degree of saturation for a given cycle length equation in developing the equation for the optimal minimum delay cycle length, it was assumed that the effective green time of the phases was in the ratio of their respective y values.

Co = [(1.5L + 5)/(1-Y)

Where Co = The optimal minimum delay cycle Length
L= Total lost time within the cycle sec Y= the sum of critical phase flow ratio
The above two strategies are very useful for traffic design and planning when the two rules are applied together one can practically minimize the resulting delay at an isolated pre-timed signalized intersection.

C. Design Of Intersection Of Traffic Signal

The design hour traffic volumes in PCU/hr collected can be tabulatedas per the roadway width time taken forthe pedestrian to cross the street is calculated. If there is a large width of streets it is desirable to have a central pedestrian refuge of at least 1m width. The Time that will be needed by pedestrian to reach the pedestrians refuge from the curb will then be:

Time = Distance/velocity= X seconds

This will be the pedestrian clearance interval during which no signal is displayed to the pedestrian and those who have just left the curb or the central refuge before the termination of the pedestrian green signal can reach safely the central refuge of the curb as the case may be. The pedestrian clearance interval is followed by amber of the next vehicular phase and by the red signal in the pedestrian phase.

For the "average" and level sites with the parking prohibited, no corrections are needed for the Saturation flow obtained from the below formula.

S = 525W

Where,

W= width of approach road in Meters

We have to consider straight moving vehicles for that purpose following corrections are applied to the left and right-turning vehicles. The effect of left- turning traffic will be accounted for it constitutes more than 10% of the traffic by counting each left- turner as equivalent to 1.25 straight-ahead vehicles. Since no exclusive right-turning lanes are provided, the effect of right-turning traffic will be accounted for by counting each right turner as equivalent to 1.75 straight-ahead vehicles

Maximum Y (Y max) for two different phases is calculated by the following formula:

Y= (q/s)

Where,

q = flow in arm after applying corrections s = saturation flow

Calculate Intergreen time as follows:

Intergreen period= Amber period (a) + All red period Calculate lost time as follows:

Lost time (L) = Lost time per vehicular phase x Number of phases.

Calculate optimum cycle time:

Optimum cycle time, C0 =[(1.5L+5)÷(1-y)]

Apportioned Green time for each phase by using the following formula

GNS phase = For N-S

GEW phase =For E-W

III.FIELDSTUDY&DATAANALYSIS

A. Volume count data at katraj Chowk

1) From North:

TABLE I VEHICULARMOVEMENTINVEH/HR

From	To	Two Wheeler	Auto Rikshaw	Bus	Truck	Car	Cycle	Pedestrian	Total
North	Straight (S)	1294	127	105	105	164	5	43	1766
	Right(W)	668	41	25	25	375	13	125	1278
	Total	1962	168	130	130	539	18	168	3044

TABLE III VEHICULAR MOVEMENTIN PCU/HR

From	To	Two Wheeler	Auto Rikshaw	Bus	Truck	Car	Cycle	Total
East	Straight(S)	1175	350	570	195	395	5	2690
	Right(W)	668	92	135	216	802	13	1926
	Pucfactor	0.5	1	3	3	1	0.5	
	Total	1843	442	705	411	1197	18	4616

2) Fromwest:

TABLE IIIII VEHICULARWISETURNINGMOVEMENTIN VEH/HR

From	To	Two Wheeler	Auto Rikshaw	Bus	Truck	Car	Cycle	Pedestrian	Total
West	Straight(E)	1532	71	39	142	415	13	72	2284
	Right(S)	235	42	19	14	71	19	64	464
	Total	1767	113	58	156	488	32	136	2748

TABLE IVV VEHICULARMOVEMENTINPCU/HR

From	To	Two	Auto	Bus	Truck	Car	Cycle	Total

		Wheeler	Rikshaw					
West	Straight(E)	766	71	117	426	415	6.5	1801.5
	Right(S)	117.5	42	57	42	71	9.5	339
	Puc Factor	0.5	1	3	3	1	0.5	
	Total	8835	113	174	468	486	16	21405

3) From south

TABLE V VEHICULAR WISEMOVEMENTINVEH/HR

From	To	Two Wheeler	Auto Rikshaw	Bus	Truck	Car	Cycle	Pedestrian	Total
South	Straight(N)	2498	400	118	102	516	16	100	3750
	Left(W)	1357	135	57	135	325	12	124	2145
	Right(E)	177	27	4	29	45	5	40	327
	Total	4032	562	179	266	886	33	264	6222

TABLE VI VEHICULAR MOVEMENTIN PCU/HR

From	To	Two Wheelr	Auto Rikshaw	Bus	Truck	Car	Cycle	Total
South	Straight(N)	1249	400	354	306	516	8	2833
	Left	678.5	84	171	405	325	6	16695
	Right(E)	885	27	12	87	45	2.5	262
	Pucfactor	0.5	1	3	3	1	05	
	Total	2016	511	537	798	886	16.5	47645

B. Design of intersection Of Trafic signal At katrajchowk(Pune)

TABLE VII THEDESIGNHOURVOLUMESIN PCU/HRCOLLECTEDAREASFOLLOWS

From	N			S			W		
To	W(L)	E(S)	S(R)	S(L)	W(S)	N(R)	N(L)	E(S)	S(R)
Pcu/hr	-	1339.5	924.5	1669.5	2833	262	1801.5	339	611.5

IV. SOLUTION

The roadway width being 40 m the time taken for the pedestriantocross the street is 33 sec witha sped of walk 1.2 m/sec Because of the large width of the street it is desirable to have a central pedestrianrefugeofleast3.7mwidthtimethatwillneededbypedestriantoreachthepedestrianrefugefromthecurb will then be

Time=Distance/Velocity

Distance (width of road)=(40-7.4)/2=16.3mTime= distance / velocity=16.3/1.20=14sec.pedestriangreen time=14sec

Pedestrianclearanceinterval=5sec

Thewidth oftheapproach roadfrom each directionis16.3m

Sincethesiteis'average'andislevelwiththeparkingprohibited, no correctionsareneededforthe saturation flowobtained from theaboveformula.

S=525W

=525X 16.3 =525 x16.3=8558

TABLE VIII FOLLOWINGTABULATION INDICATES THESEQUENCE OF CALCULATION

From	N			S			W		
To	E (L)	S(S)	W(R)	W(L)	N(S)	E(R)	E(S)	S(R)	N(L)
PCU/hr	-	1339.5	924.5	1669.5	2833	262	1801.5	339	-
CorrectionnfromLeftTurn+25%				417.37					-
CorrectionnfromRightTurn+75%			693.5			196.5		254.75	-
Total		1339.5	161787	2086.8	2833	458.5	1801.5	593.75	-
Q	2957.37			5378.3			2394.75		
S=525W	8558			8558			8558		
Y=(q/s)	0.35			0.63			0.28		

Provide amber time= 5 sec.

All red periods after each vehicular phase=5 sec

Calculation of Intergreen period, Amber time = 10

All red period = 5sec.

Total= 15sec

Pedestrian phase = 14 sec

Amber following phase= 5sec.

Starting delay per vehicular phase= 10 sec.

Lost time = (Pedestrian phase + Amber following phase) + (Intergreen period – Amber time)+ delay per vehicular phase

L = (14 + 5) + (15-5) + (15-5) + (15-5) + 10+10

L= 60 sec.

Optimum cycle time= Co= (1.5L+ 5)/(1-Y)

= (1.5X60 + 5)/1-(0.3+0.28)

= 256 say 250 sec.

Effective green time per cycle available to the vehicular phase= Co-L= 250-60 = 190sec. This will be apportioned between N-S and E-W phase as follows-

Gn-s = Yns / Y X (Co – L)

=(0.35 X 190) / (0.35+0.63)

= 68 sec.

Ge-w = Ye-w / Y X (Co – L)

=(0.28 X 190) / (0.35+0.28)

= 78 sec.

V. CONCLUSION

In this paper following parameters of the traffic control system are studied

- Traffic signal
- Intelligent traffic system and also decide location at the point such as KatrajChowk- Pune, for that I am going to study the traffic congestion in Pune city making a smart city
- We have planned for the efficient flow of traffic and making a smart city.

TABLE IX

Location	Phases	Currentgreentime	Newgreentime
KatrajChowk - Pune	Phase1	90 Seconds	68Seconds
	Phase2	90 Seconds	68Seconds
	Phase3	90 Seconds	78Seconds

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SMART IV Infusion Dosing System

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ABSTRACT

With intravenous (IV) mixture treatment, the patient's vein can be utilized to regulate the implantation liquid. It is utilized for blood transfusions or to regulate drugs straightforwardly into the circulatory system. A hospitalized understanding has a 60–80% chance of getting intravenously managed mixture treatment. The portrays a keen IV implantation measurement framework for farther fluid in an IV bottle discovery, signalling, and observing. It comprises of three layers: detecting and computation (an IV liquid level discovery and signalling framework, and a framework for controlling and ceasing mixture stream); communication (a remote data exchange between the equipment component of the framework and the client); and client (observing and visualization of IV treatment). real-time gathering at a removed put. Since each layer is secluded, the whole framework can be updated. The proposed framework informs therapeutic staff when IV bottles require to be ceaselessly and expeditiously changed, which can make strides the victory of IV treatment, especially in oncology patients. For the cytostatic to work as expecting, the IV chemotherapy trickle time ought to be entirely followed to.

Keywords: Web of Things (IoT), remote intravenous framework, shrewdly IV implantation measurement framework, IV treatment, IV bottle, IV chemotherapy, nurture reaction time, and inaccessible mixture observing system.

I. INTRODUCTION

A needle or cannula is utilized to infuse liquid specifically into a patient's vein amid intravenous implantation treatment, a common therapeutic hone utilized in all ranges of medication. Especially amid surgical and postsurgical operations, IV implantation patient's circulatory system and to transfuse blood or a few of its constituent parts. Moreover, it is connected to patients who have stomach related framework issues, those who are got dried out, those who require to rectify electrolyte awkward nature, those who are cancer patients, and, more and more habitually these days, those who have coronavirus illness 2019 (COVID-19). In this manner,

there is a 60–80% chance that a hospitalized quiet may experience intravenous implantation treatment of a few kinds.

Although IV implantations are generally uneventful, they can every so often be excruciatingly agonizing, particularly for oncology patients getting cytostatic. Indeed, whereas not all cytostatic are as extreme, a few months of intravenous cytostatic treatment causes genuine, irreversible harm to the veins. These veins "pull back" and are thus challenging to find amid the taking after treatment session since they essentially lessen their tone in expansion to changing color and darkening. A bad dream and critical mental issue for nearly all cancer patients, there in the long run comes a minute where there are no longer any veins on the patient's hands that can persevere daily cytostatic treatment after numerous cycles of IV chemotherapy. For occasion, the cisplatin/etoposide/bleomycin (PEB) and cisplatin/etoposide/ifosfamide (PEI) conventions are utilized in the treatment of patients with testicular cancer of the seminoma- and non-seminoma-type, respectively. In arrange to grant IV chemotherapy, IV bottles must be changed persistently and instantly, requiring steady staff perception and provoke activity. The participation of a nurture for each quiet, in any case, gets to be for all intents and purposes unreasonable when there are a few patients accepting different IV bottles of diverse shapes of chemotherapy per day.

II. LITERATURE SURVEY

Intravenous (IV) treatment plays a pivotal part in advanced healthcare, conveying liquids, medicines, and blood items straightforwardly into patients' veins. To upgrade understanding security and move forward clinical results, there has been continuous investigate and improvement in mixture checking frameworks and procedures. This writing overview points to give an outline of later headways in IV treatment and implantation checking technologies.

Historically, IV treatment has been overseen physically, posturing challenges such as the chance of human mistake, complications like disease and liquid over burden, and the require for consistent checking (Hindley, 2004; Millam, 1988).[2] The advancement of electronically controlled implantation sets has risen as a promising arrangement to address the confinements of conventional IV treatment (Fraunhofer-Gesellschaft, 2020).[1]Ajibola et al. (2018) proposed an computerized intravenous blood implantation observing framework utilizing stack cell sensors, guaranteeing exact liquid delivery.[4]Various frameworks have been outlined to anticipate complications like blood backflow amid IV mixtures (Shelishiyah et al., 2015; Moorthy et al., 2020).[5] significance of clinician engagement and preparing (Makobore et al., 2019a; Mulerwa et al., 2019).[13]

Early achievability ponders have appeared promising comes about in terms of understanding security and liquid conveyance precision (Makobore et al., 2019b).[13]Effective communication among healthcare suppliers and patients is vital for guaranteeing opportune intercessions and lessening unfavorable occasions (Unluturk et al., 2015; Chapman, 2009).[31]

III.BLOCK DIAGRAM

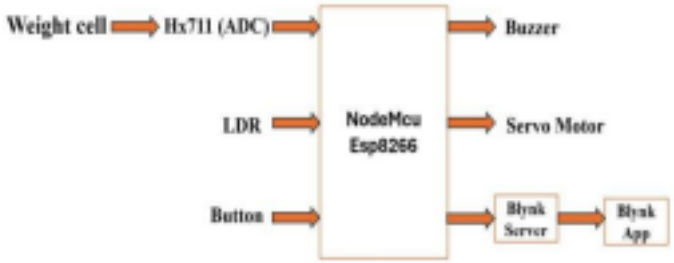

Figure 1. Block Diagram of iv infusion Dosing system

IV.LIMITATIONS AND EXISTING WORK

The integration of Web of Things (IoT) innovation has revolutionized implantation checking, empowering real time following and farther observing of IV liquid levels (Raghavendra & Evangili, 2020).[20],Smart trickle mixture observing frameworks prepared with remote communication capabilities have been created for moment alarms and consistent information transmission (Ramisha et al., 2017; Joseph et al., 2019).[7]Capacitance-type liquid level sensors (Cohen & Rose, 1992), stack cell sensors (Ajibola et al., 2018), and remote adaptable capacitive sensors (Wei et al., 2011) have been utilized for exact IV liquid level detection. Optical and non-invasive sensor frameworks have too been investigated for real-time checking of IV liquid levels (Tseng et al., 2019; Pratim & Thapa, 2019).[10] Clinical ponders have illustrated the possibility and viability of electronically controlled gravity nourish mixture sets in grown-up patients, highlighting the Taken a toll: SIIDS improvement and execution can be expensive. It can be very costly to purchase and work smart infusion pumps, coordinated them into current clinic frameworks, and give the fundamental preparing to restorative professionals.

Existing Investigate: To lower the in general fetched of SIIDS, analysts are looking at cost-effective strategies counting open-source computer program and secluded hardware.

Issues with interoperability: It can be troublesome to make beyond any doubt that SIIDS can synchronize with numerous healing center data frameworks, electronic wellbeing records, and other devices.

Existing Work: To improve interoperability, measures like HL7 and IHE are utilized. Rules and conventions are being created by analysts and organizations for made strides information exchange.

Data Security and Protection: Given that SIIDS is network-connected, information security and understanding security are best needs. Adjusting implantation parameters or picking up unauthorized get to to quiet information might have desperate repercussions.

Existing Inquire about: To secure information transmission and get to, analysts are making encryption and confirmation methods. The recognition of information security laws is too a priority.

Accuracy of Calculations: Dosing calculations must be precise. Off base information passage or calculations may result in over- or underdosing, which may be destructive to patients.

Existing Work: Progressing alterations to dosing calculations that take into account patient-specific factors are being made. Exactness is being expanded with the help of counterfeit insights and machine learning.

Human Components: It is fundamental to comprehend how healthcare experts utilize SIIDS and to construct frameworks that fit their workflow. Ease of use issues can be caused by ineffectively planned interfacing or troublesome procedures.

Existing Work: To upgrade client involvement, reorganize workflows, and lower the plausibility of blunders, human components designing, and convenience thinks about are being carried out.

V. RESULT AND DESCRIPTION

IV Flow Monitoring: The LDR sensor module and laser module effectively monitor the IV flow. When the IV flow stops for more than 5 seconds, the system activates a buzzer for 10 seconds, alerting healthcare providers of a potential issue with the infusion.

Sline Weight Measurement: The weight cell accurately measures the weight of the saline solution in the IV bag. Notifications are triggered when the weight reaches specific thresholds - 50%, 30%, and 10%. These notifications serve as timely reminders for nurses to attend to the IV bag, ensuring that patients receive the necessary fluids without interruption.

Blynk App Integration: The integration with the Blynk app enhances the system's usability and accessibility. Nurses receive notifications directly on their smartphones, enabling quick response times and efficient management of patient care.

Firebase Database: Utilizing Firebase for data storage ensures reliable data management and accessibility. The system securely stores information regarding IV flow status, saline solution weight, and notification triggers, enabling healthcare providers to review historical data for analysis and quality improvement purposes.

Enhanced Patient Safety: By continuously monitoring IV flow and saline solution weight, the system significantly reduces the risk of medication errors, fluid overload, or under-infusion, ultimately enhancing patient safety and care quality.

Efficient Workflow: The real-time notifications and remote monitoring capabilities provided by the Blynk app streamline healthcare workflows. Nurses can promptly address any issues with IV flow or saline solution levels, minimizing downtime and optimizing resource utilization.

Adaptability and Scalability: The modular design of the system allows for easy integration of additional sensors or features, making it adaptable to various healthcare settings and patient needs. Furthermore, the use of Firebase database enables seamless scalability to accommodate larger datasets and future expansions.

Cost-Effectiveness: Despite the advanced functionality, the Smart Intravenous Infusion Dosing System remains cost-effective compared to traditional infusion monitoring systems. The use of off-the-shelf components and open-source platforms contributes to lower implementation and maintenance costs, making it accessible to a broader range of healthcare facilities.

User Feedback and Improvement: Continuous feedback from healthcare providers and patients will be crucial for further refinement and improvement of the system. User experience surveys, usability testing, and clinical trials can provide valuable insights for optimizing the system's performance, usability, and overall effectiveness.

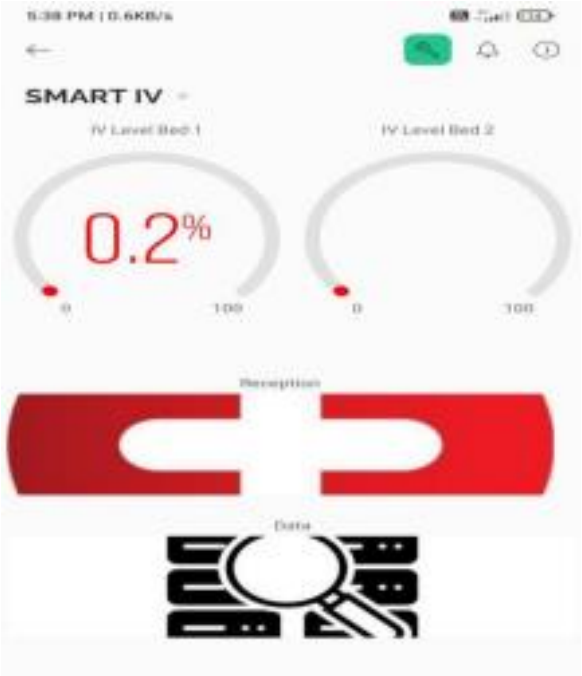

Figure 5.1. The above image describes the Home Page of Blynk App

Figure.5.3. The above image describes the information submit details

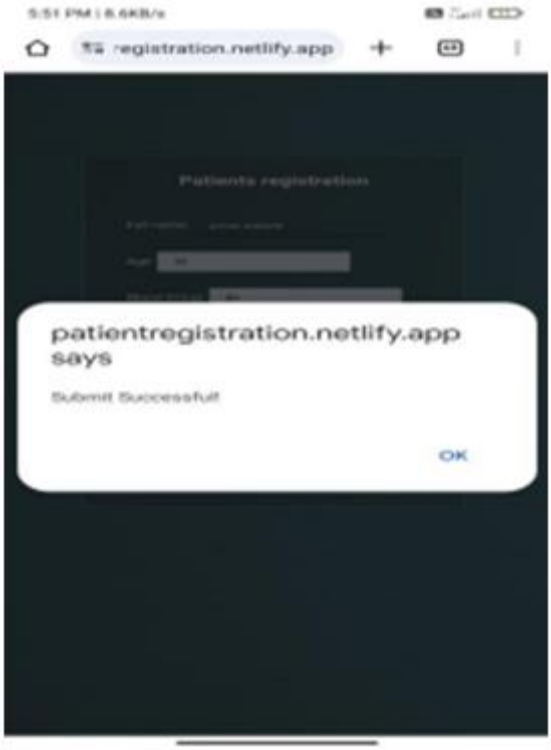

Figure.5.4. The above image describes the database of patient's

Figure 5.2. The above image describes the patient's registration form

Figure 5.5 The fig shows actual setup of project

Figure 5.6. The fig shows actual setup of project

VI. CONCLUSION

The innovative IV implantation dosing system described offers a clever solution for monitoring fluid levels in IV containers remotely. By leveraging advanced technology, such as real-time data transmission and remote monitoring, the system aims to streamline IV treatment administration, minimizing the need for manual checks and reducing the risk of errors.

Key features include seamless integration with cloud servers, enabling healthcare providers to access vital information from various devices, such as smartphones and tablets, regardless of their location. This ensures that healthcare professionals can stay informed about infusion progress and respond promptly to any alerts indicating the need for IV bottle replacement.

While the current global situation may postpone clinical testing of the system, plans for future testing are in place to ensure compliance with regulatory standards. Ultimately, the system holds promise for enhancing the efficiency of IV treatment administration and improving patient care.

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Covid-19 Data Visualization Using Data Science

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ABSTRACT

The COVID-19 pandemic has necessitated rapid and widespread vaccination efforts globally to mitigate the spread of the virus and its associated impacts. In this study, we analyze COVID-19 vaccination data to gain insights into the distribution and administration of vaccines at the state level in India. Utilizing a comprehensive dataset sourced from official repositories, we conduct exploratory data analysis (EDA) to uncover trends, patterns, and disparities in vaccination coverage across different demographic groups and geographic regions.

Our analysis reveals several key findings. Firstly, we identify the top states based on total vaccine doses administered, providing valuable insights into regional vaccination progress. Furthermore, we analyze vaccination rates over time, highlighting fluctuations and trends in the pace of vaccination campaigns. Additionally, we examine demographic factors such as gender and age group distributions among vaccinated individuals, shedding light on equity and accessibility issues in vaccine distribution.

Through our study, we contribute to the understanding of COVID-19 vaccination efforts in India, providing crucial insights for policymakers, public health officials, and researchers. Our findings underscore the importance of data-driven decision-making and targeted interventions to ensure equitable vaccine distribution and maximize population immunity against COVID-19.

Keywords: Covid-19, Machine Learning, big data, Data science, visualization, WHA region, Python.

I. INTRODUCTION

The emergence of the COVID-19 pandemic has posed unprecedented challenges to global public health, economies, and societies worldwide. Since the identification of the novel coronavirus, SARS-CoV-2, efforts to contain the spread of the virus and mitigate its impact have been multifaceted. Among these efforts, the development and deployment of effective vaccines have emerged as pivotal strategies in controlling the pandemic and restoring societal normalcy.

Vaccination against COVID-19 represents a crucial tool in achieving herd immunity, Thereby reducing transmission rates and preventing severe illness,

Hospitalizations, and fatalities. In response to the urgent need for vaccines, countries around the world have embarked on ambitious vaccination campaigns aimed at immunizing their populations against the virus. In India, one of the most populous countries globally, the vaccination drive has been a cornerstone of the nation's pandemic response strategy.

In this context, our study focuses on analyzing COVID-19 vaccination data at the state level in India. By leveraging a comprehensive dataset sourced from official repositories, we aim to provide insights into the distribution, administration, and coverage of COVID-19 vaccines across different regions and demographic groups. Through exploratory data analysis (EDA) techniques, we seek to uncover trends, patterns, and disparities in vaccine uptake, with the overarching goal of informing public health policies, interventions, and decision-making processes.

The importance of understanding the dynamics of COVID-19 vaccination in India cannot be overstated. As the country grapples with the challenges of balancing vaccine supply, demand, and distribution logistics, evidence-based insights derived from data analysis are invaluable for optimizing vaccination strategies, prioritizing high-risk populations, and ensuring equitable access to vaccines. Furthermore, insights gleaned from our study can aid in identifying areas for improvement, addressing bottlenecks in vaccine delivery, and enhancing the effectiveness of vaccination campaigns nationwide.

In this paper, we present our analysis of COVID-19 vaccination data in India, encompassing key findings, trends, and implications for public health policy and practice. By shedding light on the progress and challenges of the vaccination drive, our study contributes to the ongoing discourse on pandemic response strategies and underscores the importance of data-driven decision-making in combating COVID-19.

II. LITERATURE REVIEW

The COVID-19 pandemic has spurred a flurry of research and scholarly inquiry across various disciplines, with a significant focus on understanding the dynamics of vaccination campaigns and their implications for public health outcomes. In this section, we review existing literature pertinent to COVID-19 vaccination efforts, with a specific emphasis on studies related to vaccine distribution, coverage, equity, and efficacy.

“Big Data Visualization and Visual Analytics of COVID-19 Data”, in this paper, we present a data visualization and analysing COVID-19 pandemic

Data. The tool benefits consumers to get a well sympathetic of information about the established cases of COVID-19. While this tool is planned for conception and visual analytics of pandemic data, it is applicable to visualization and visual analytics of data from many other actual applications and facilities.[1].

“Data Analytics with a Smart Standalone Mobile Application”, A separate mobile application has been manufactured from mark to visualize and analyse Covid-19 data composed from web servers in actual phase. All the visualizations and outcomes of the analytics may be suddenly shared with new consumers nonstop from the application itself. The application can so take data analytics connected to Covid-19 right into the indicators of the usual consumer [2].

A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus (2019-nCoV) infected pneumonia (standard version)”,In December 2019, a fresh kind virus-related pneumonia cases surveyed in Wuhan, Hubei Province; and then named "2019 novel coronavirus

(2019-nCoV)" by the World Healthiness Association (WHA) on 12 January 2020.For it is a not ever remained knowledgeable respiratory virus before and with impurity capability generally and speedily, it involved the world's kindness but without management and control physical. This rapid guidance instruction is appropriate for the first front doctors and nurses, managers of hospitals and healthcare sections, public citizens, public health persons, applicable researchers, and all person who are interested in the 2019-nCoV [3].

"COVID-19 Pandemic Data Visualization with Moment about Midpoint: Exploratory", To visualize COVID-19 data using Tentative Data Analysis (TDA) to express the COVID-19 tier expository. Consumptions TDA method to visualize the COVID-19 data. Data composed from World Health Association (WHA) in a section form and divider the world using WHA areas. Instant about a centre and TDA are equally used to analyse the data [4].
"Prediction and Spread Visualization of Covid-19 Pandemic using Machine Learning", we suggest a preservative regression model with explicable limitations that can be obviously stable by professionals with area sensitivity about the time sequence. The main advantages of this work exclude exact analysis of country-wise as well as area/state-wise definite cases, worse cases, deaths, guess of pandemic viral attack and how future it is increasing worldwide [5].

III. ARCHITECTURE

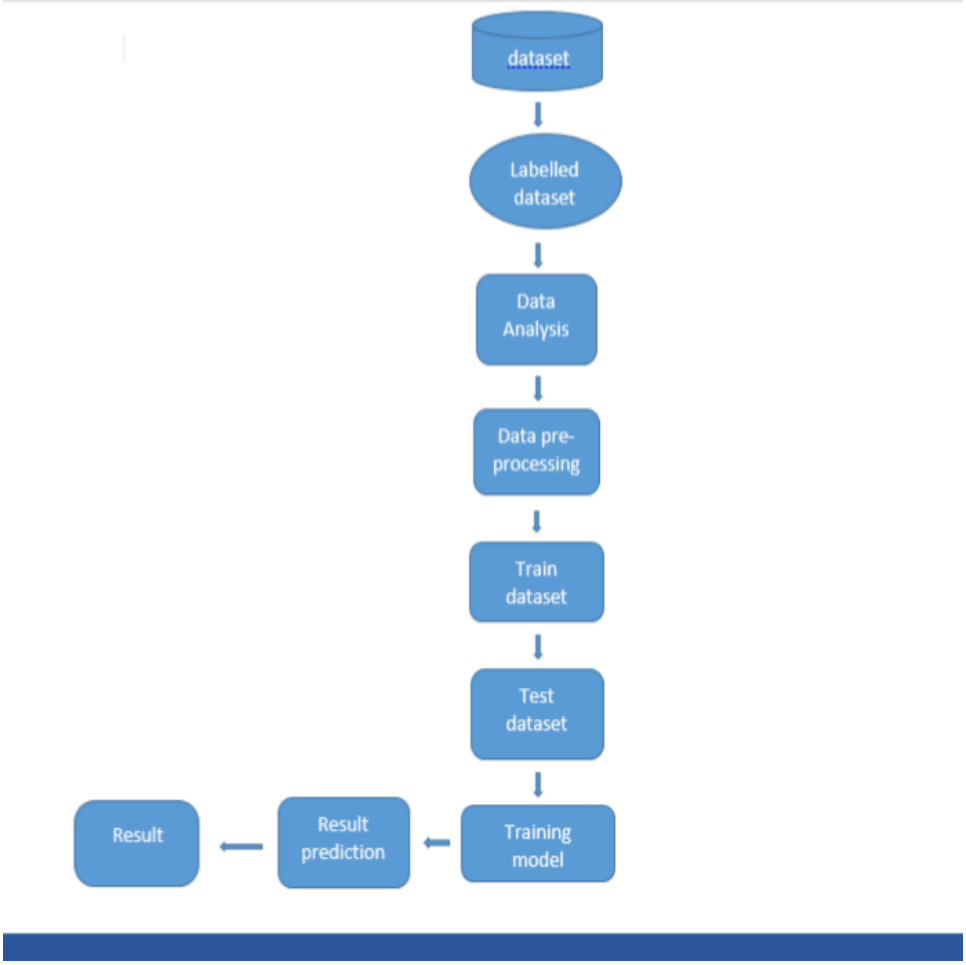

Figure 1: Data visualization

In this architecture, data has been taken from various sources like Government organization, research Institutes, which is in raw form. these data is labelled using different machine learning algorithms, Data processing is done .the trained dataset is used to train the model. While testing model the predicted result and actual result is compared to check accuracy of the system.

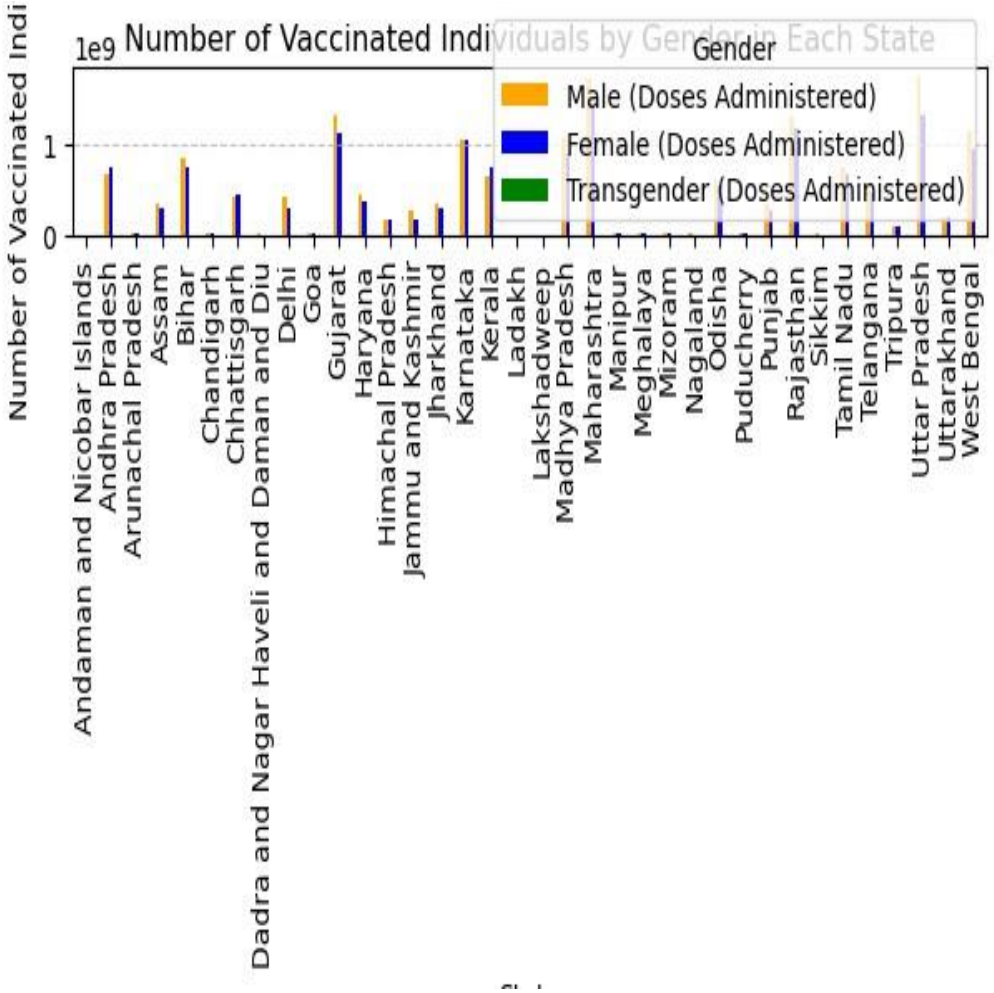

Figure 2: Bar Plot (Gender Comparison)

IV. CHALLENGES

- Data Excellence and Accessibility: Confirming the excellence and consistency of the data is fundamental. Data may be changeable, imperfect, or focus to reporting preferences, mainly when composed from multiple causes. Also, data
- Accessibility can disagree between areas and countries making it challenging to create inclusive visualizations.
- Difficulty of Analysis: COVID-19 data is multidimensional and includes many metrics such as cases, deaths, testing rates, vaccination rates, demographics, and physical factors. Analysing and visualizing this difficult data needs stylish statistical and machine learning techniques.
- Dynamic Environment of the Virus: The COVID-19 pandemic is frequently changing, with new cases, alternatives, and public health interventions going on quickly. Keeping visualizations up-to-date and applicable in real-time presents a challenge, specifically when predicting upcoming trends.
- Resource Limitation: : Developing and keep up data visualization tools and display place needs important properties, including capable personnel, computational structure, and access to dependable data sources. Limited properties may limit the scope and effectiveness of data visualization struggles.

V. CONCLUSION

In conclusion, the complete analysis of COVID-19 vaccination data presented in this project highlights the importance of leveraging data-focused visions to inform public health interventions and vaccination policies. Through static and interactive visualizations, we have gained valuable visions into the distribution, reporting, and demographic designs of vaccination efforts across different states in India. The fixed visualizations providing a picture of vaccination attention, highlighting variations among states and demographic collections. These insights revealed differences in vaccine approval, highlighting the need for directed interferences to address local and demographic-specific challenges. Additionally, the time series design explained historical trends in vaccination charges, contribution valuable situation for understanding the progress of vaccination efforts over time. The collaborative visualizations further enriched our understanding by allowing for self-motivated survey of the data. Users could relate with the visualizations to zoom in on exact time periods, states, gender categories, and age groups, facilitating a deeper analysis of vaccination designs and differences. These interactive tools invest participants to identify areas for improvement and modify interferences to meet the developing needs of different populations.

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EV Stations Management System Using AI Chatbot Support

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ABSTRACT

Automotive manufacturers like TATA have launched new electric automobiles on the market along with the construction of charging stations. However, the current charging duration varies from 15 to 30 minutes, which might cause delays when the stations are completely utilized. Our idea entails linking every electric car charging station into a single network to overcome these problems. Users can quickly find and choose their chosen station, which is especially useful for long-distance driving in electric cars and ultimately saves time. When slots are available, the system allows users to reserve them; otherwise, it prompts them to choose a new time. Online booking confirmation requires a portion of the cost. Our technology also shows the quickest path to the chosen station and gives charging stations a management interface to control open and reserved slots. Our Android-based solution makes use of time-slot allocation strategies and the Google Maps API to sense direction. Through our chatbot system, provides users with personalized assistance, answers to the queries and real time guidance to the users and an online payment gateway speeds up transactions. By utilizing our technology, consumers can find and reserve suitable charging stations quickly and with a significant time savings. Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology. [16]

Keywords: Smart management, charging slot, EV Cars, Map, Chatbot.

I. INTRODUCTION

The use of fossil fuels and global warming have both increased recently. global warming and the twin, serious challenges of fossil resource depletion caused by careless energy consumption. Fossil-fuel-free renewable energy systems must be installed in order to address these problems. The government's Feed-in Tariffs (Fit) program has accelerated Japan's adoption of solar power. The increased output from these systems has, however, had a negative effect on the voltage distribution and system frequency. As a result, the Fit system is currently being reviewed by the Japanese government. Additionally, photovoltaic installation costs are falling yearly, portending much cheaper PV electricity costs in the future. In this study, it is suggested that EV charging stations be used as energy aggregators, primarily for the purpose of transmitting power from PV systems in smart homes to EVs and smart homes. These charging stations need fixed batteries to exchange electricity.

In this project, we want to provide clients with a platform where they may schedule charging sessions at open charging stations in accordance with their needs. A few of the features the system offers include an AI Chatbot, mapping capabilities for direction sensing, digital payment options, as well as notifications alerts for each activity. Electric vehicles can be recharged using a variety of charging infrastructure types, each tailored to specific locations and requirements. This chapter underlines the need of taking local design and implementation for EV charging networks into consideration by highlighting technical specifics and EV charger standards.

II. LITERATURE SURVEY

"Random Forest Algorithm (RFA) is applied for finding stations that are near the vehicle location; Linear Search Algorithm (LSA) for filtering stations that satisfy the user requirements."
"A novel approach based on the dynamic forecast of charging demand has been developed to address the problem of planning EV charging stations."
"Use the enhanced Cuckoo search algorithm to optimize the deployment strategy for wireless charger nodes. The accuracy and effectiveness of the algorithm, together with the proposed model, are validated in this study."
"The optimal planning of a charging station based on discrete distribution of the demand for charging."
"The modelled charging demand of the charging station was made more realistic by taking into account EV charging behaviour, charger configurations, and charging assignment models."
"According to our study, a simulation model was proposed to forecast EV charging demand based on a number of key parameters."
"A prediction model for the demand for charging power for electric vehicles was developed by taking into account the behaviour of buses, taxis, and private vehicles."

III.PROPOSED SYSTEM

A. Problem Statement

To design and develop a web-based application to book the charging slot to the electric vehicle.

B. Block Diagram

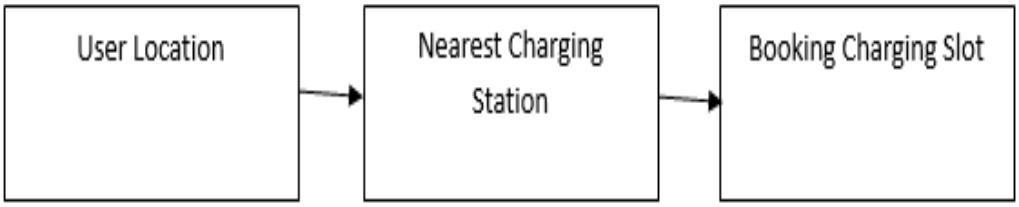

Figure 1: Proposed system

The EV charging stations management system utilizing AI chatbot support aims to streamline and enhance the user experience for electric vehicle (EV) owners. The system integrates AI technology to provide users with efficient and user-friendly support through a chatbot interface.

The EV charging stations management system leveraging AI chatbot support aims to enhance the accessibility, efficiency, and reliability of EV charging infrastructure while providing users with a seamless and intuitive experience.

C. Mathematical Model

I/P →Processing → O/P

Nearest Charging Station

Input: Finding Nearest Charging Station.

Processing: According To user Location the GMAPS shows the nearest EV stations registered by Owner.

Output: User successfully find a nearest charging station.

Slot Booking

Input: Slot Booking For Charging EV.

Processing: User required contact information, EV details (model, number), time & date.

Output: User successfully booked a slot for charging.

D. Hardware and Software Requirements

Hardware: Standard computer with having windows 8 or above.

Software: Java environment, required Apache Tomcat Server 9, HTML, CSS, JSP, Bootstrap and having Eclipse.

E. Algorithm for System

The proposed system presents a process of finding the nearest EV charging station and booking a slot. It begins with the user inputting their location, followed by a search for nearby charging stations. The available stations are then displayed to the user, who selects their preferred option. The system checks the selected station's availability, and if a slot is available, the booking is made and confirmed.

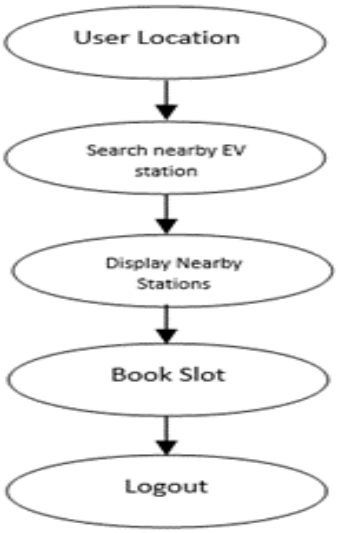

Figure 2: Workflow

IV. RESULT DISCUSSION

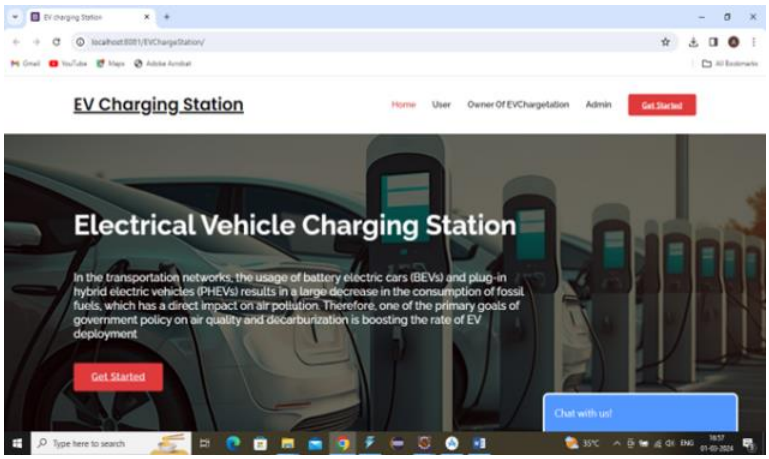

Figure 3: Home Page

Home page of EV Stations Management System platform with navigation bar which provides different options like User, Owner section, admin section with a dropdown menu with chatbot support.

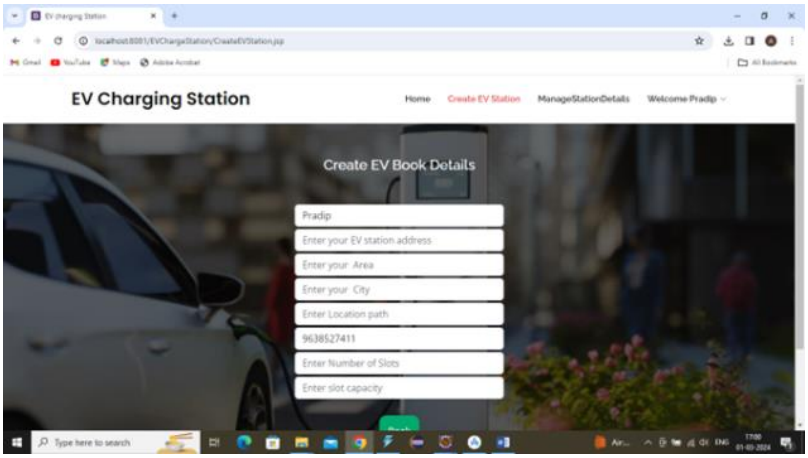

Figure 4: Create EV Sation

In this page the owner of EV charge station can create its own charging station by providing details like name, address, area, city, path, etc. so the user can easily find nearest charging station.

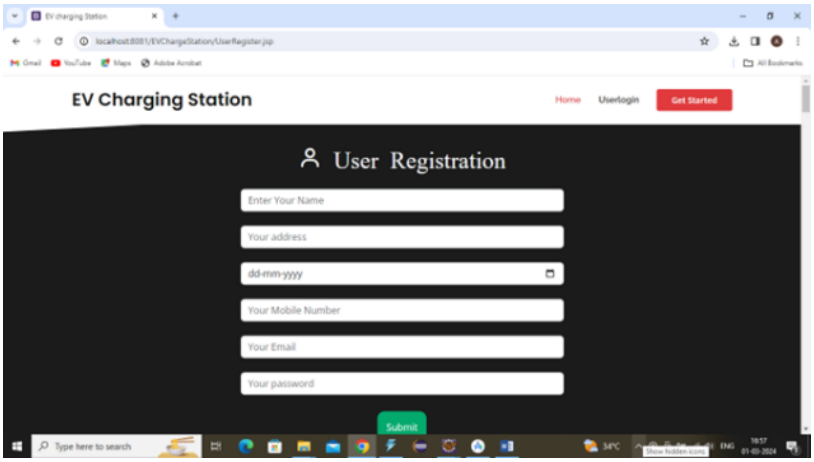

Figure 5: User Registration

In user registration a new user can register in the website by providing details like name, address, mobile number, email and password.

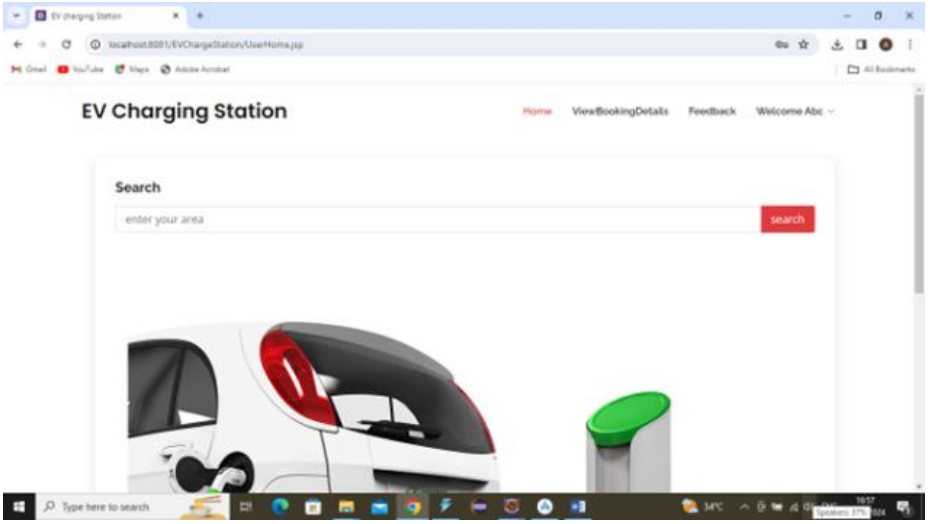

Figure 6: Nearest EV Station

In this page the user can find the nearest EV station by entering the area or the city.

V. CONCLUSION

In conclusion, the system for "Smart Management of EV Charging Stations" uses a web application methodology. It provides charging slot reservation based on charging socket types, an AI chatbot for real time question answering, and effective direction detection through the Google Maps. This complete solution makes the management of EV charging stations and enhance the user experience in general., designed to be user-friendly.

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Result Paper on IoT Based Wireless Electric Vehicle Charging System

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ABSTRACT
Road safety and maintenance are critical concerns for transportation infrastructure. Potholes and humps on roads pose significant risks to drivers, passengers, and vehicles. Traditional methods of detecting road anomalies rely heavily on manual inspection, which is time-consuming, costly, and often inefficient. In response, this paper proposes an Automatic Humps and Pothole Detection System (AHPDS) utilizing Internet of Things (IoT) technology. Automatic Humps and Pothole Detection System represents a significant advancement in road safety and maintenance practices. By leveraging IoT technology and data analytics, the system offers a scalable and efficient solution to address the challenges associated with road anomalies, ultimately contributing to safer and more sustainable transportation networks.
Keywords: Road Safety, Smart City, Pothole detection, Humps detection, Obstacle Detection.

I. INTRODUCTION

The quality of road infrastructure is a fundamental aspect of modern transportation systems, influencing safety, efficiency, and overall user experience. However, road networks are subject to wear and tear, leading to the formation of potholes and humps that pose hazards to drivers, pedestrians, and vehicles. Traditional methods of monitoring road conditions rely heavily on manual inspection, which is labor-intensive, time-consuming, and often reactive rather than proactive.

Using Ultrasonic sensor system detects the Obstacle which are present in front of vehicle. Using IR sensor system detects the Potholes before reaching the actual pothole it detects it and stops the vehicle and also it will start the buzzer so that Driver will get alert.

And after that Using IR sensor drowsiness is also detected. As soon as driver closes its eyes for some while then vehicle will automatically be stopped and buzzer start ringing so that driver will get alert and it will increase the safety of driver.

Chargeable batteries are used to charge the battery. Battery is of 12 volts.

II. LITERATURE SURVEY

Asperpaper[1]"Automatic Detection of Potholes and Humps on Roads " Prof. Chandrakant Bhange, Sneh Kurhade, Laukik Arewer, Ashish Kumar presents a detection and notification of Humps and Pothols on roads to aid drivers.

As per paper [2] "Automatic Detection and Notification of Potholes and Humps on Roads using IoT" authored by Swetha, Punithgowda, Lalithesh, Deepak Sharan, Shivuprasad captures the geographical coordinates of the potholes and humps using a GPS receiver and sends the data to maintenance authorities for analysis and action.

In paper [3], "detection pothole and humps on the road and information sharing" by Prof. Lavanya, Vijayalakshmi, Manu, Kushbu, Varsha examines the detection of potholes on roads. This system, that we call the Pothole Detection System, uses Accelerometer Sensor of Android smartphone for detection of potholes and GPS for plotting the location of potholes on Google Maps.

In paper [4]," Development of an Effective Road Surface Monitoring System for Automated Pothole Detection" The problem solved in this paper is the development of an effective road surface monitoring system for automated pothole detection. This system aims to provide real-time information to drivers about potholes on the road, helping them avoid accidents and enabling authorities to take preventive actions.

As per paper [5], "A CostEffective Solution for Pothole and Hump Detection on Roads in India" by Lokesh S and SrinivasG The paper aims to propose a cost effective solution for the automatic detection of potholes and humps on roads and collecting data to fix the problem.

According to paper [6], "Automatic Detection of Potholes and Humps on Road." authored by ParagKadale, Shivam Barde, AnandPawa, the project focuses on potholes on roads and the development of a system to provide timely action to avoid accidents or vehicle damages. Ultrasonic sensors are used to identify the potholes, and the depth of the pothole is displayed on an LCD screen.

As per paper [7], "Automatic Detection of Potholes and Humps on Roads to Driver Using PIR Sensor." Authors Mr.S. Rajadurai, Mr.P. Thiyagarajan, Ms.R. Sandhiya presents thetopicThe problem addressed in this paper is the high number of road accidents and casualties in India, caused by factors such as bad roads, careless user behaviour, and poor enforcement of traffic rules. The paper proposes a solution that involves using sensors in vehicles to detect road anomalies like potholes, and transmitting this data to a central system for analysis

According to paper [8], "Automatic humps and pothole detection on road" authored by Mahesh Jala, Ajay Chauhan, Prof. Varun Mishra, The problem solved in this paper is the detection of potholes on roads and the development of a system to provide timely action to avoid accidents or vehicle damages. Ultrasonic sensors are used to identify the potholes, and the depth of the pothole is displayed on an LCD screen.

In paper [9], "Automatic Detection and Notification of pothole and Humps on Roads Using IOT," authors Kunal D. Patil, Shardul R. Patil, Vipul V. Kale, and Shubham S. Thorat explore The problem statement of the paper is to address the issues of potholes and humps on roads in India, which contribute to traffic congestion, accidents, and loss of human lives.

III.PROPOSED SYSTEM

Here in this section, we will cover points regarding our proposed system. Our proposed system is explained here with problem statement, Block diagram, Software and Hardware requirements.

A. Problem Statement

To design and develop such System which detects the Humps and pothole before reaching to that particular hump or pothole so that it will increase road safety with the help of IoT. To design a system which also detects the drowsiness of the driver so that it will avoid the accidents on the road by start ringing the buzzer when driver sleeps

B. Block Diagram:

The block diagram includes a 12-volt battery regulated by an IC 7805, powering an Arduino microcontroller managing system functions and interacting with aIR sensor for high-voltage control. Ultrasonic sensor uses the 5v supply and detects the Obstacles. And IR sensors to detects the Pothole and Drowsiness. LD293D driver to control the Motors or we can say controls the vehicles wheel.

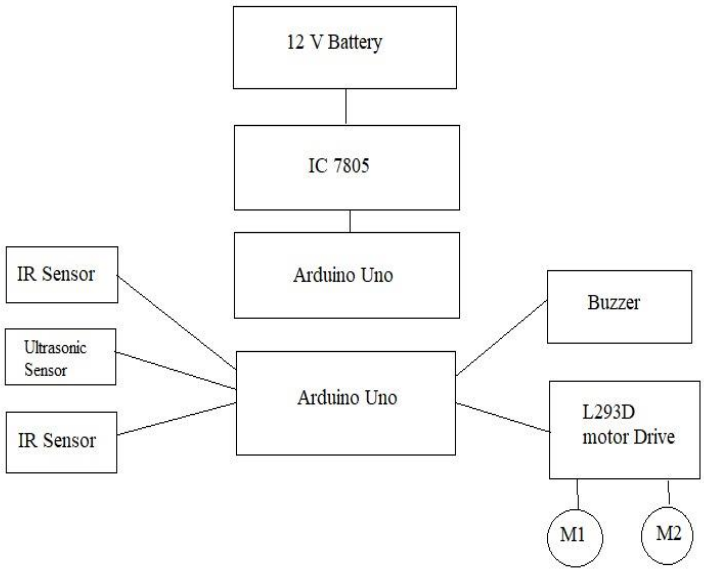

Figure 1: Proposed Architecture

C. Software Requirement

- Operating System -Windows11
- Programming Language-C
- IDE–Arduino

D. Hardware Requirement

- Battery 12Volt
- IR Sensor
- Integrated Circuit 7805
- Ultrasonic Sencer
- Arduino
- LD293D driver
- DC motors

IV. RESULT DISCUSSION

Here this section covers the result of implemented project.

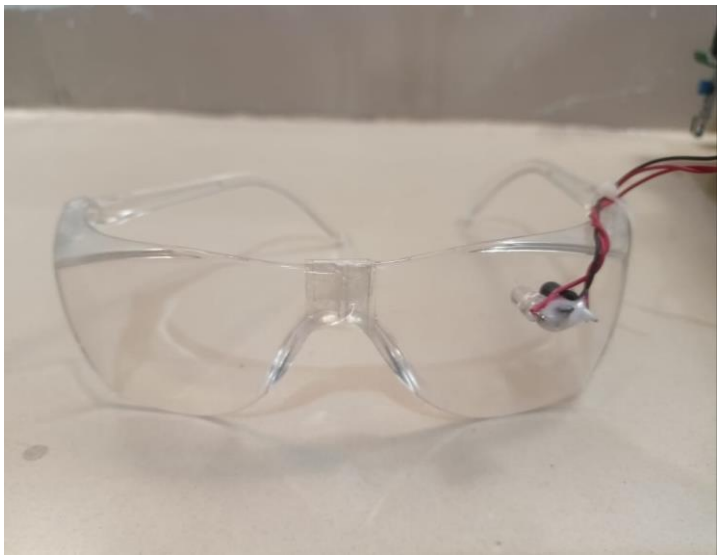

Figure 2: Drowsiness Detection

The Drowsiness of Driver is detected using IR sensor. IR sensor is connected to the Goggle. It is mandatory to wear the goggle when driver drives. When drivers close its eyes for some while then vehicle will automatically be stopped and Buzzer starts ringing.

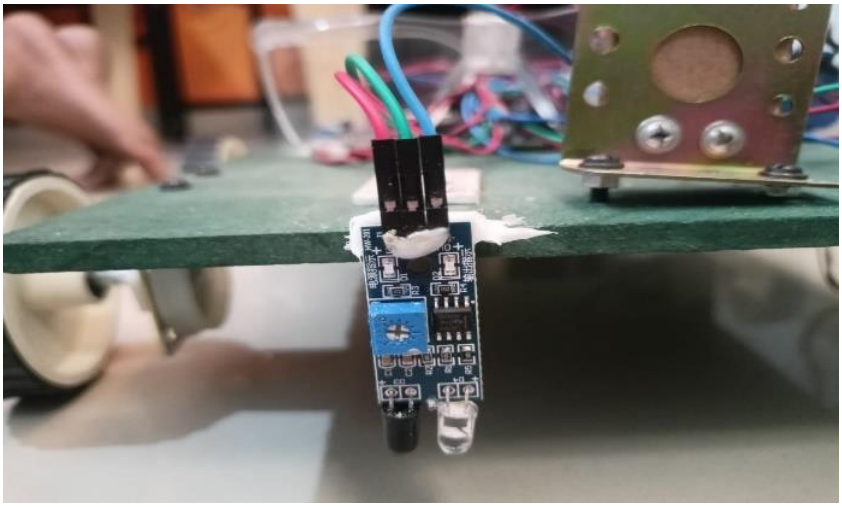

Figure 3: Drowsiness Detection

When any pothole occurs in front of vehicle then vehicle will automatically stopped. Using IR sensor the pothole will be detected.

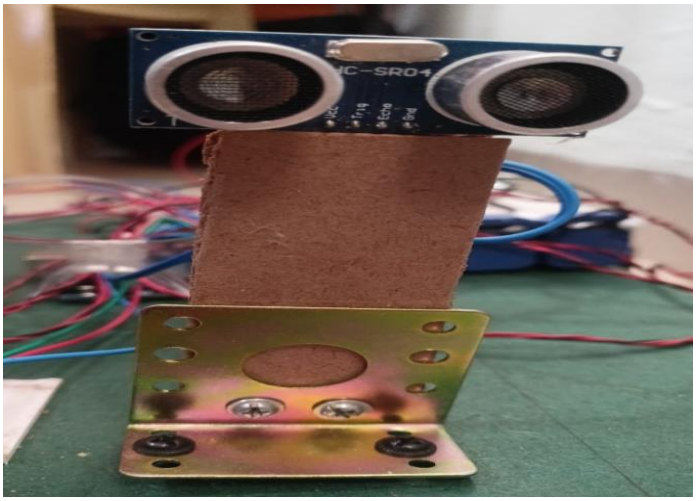

Figure 4: Humps or Obstacle detection

Using Ultrasonic sensor Humps and Obstacles in front of vehicle will be Detected.

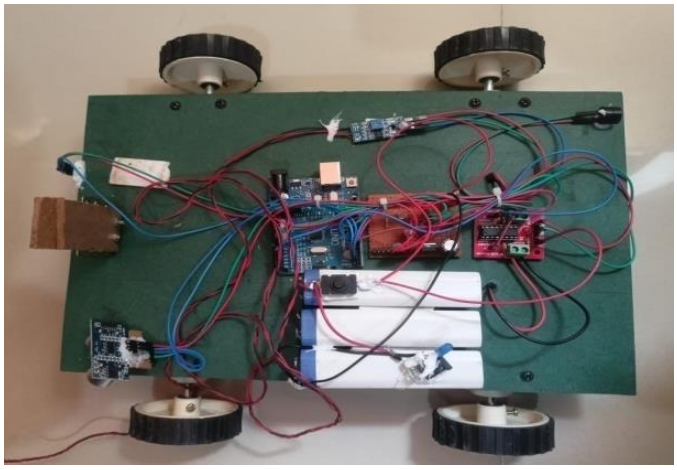

Figure 5: Hardware kit

This is the hardware kit of our Automatic Humps and Pothole Detection system comprises essential components such as Arduino, Altrasonic Sensor, IR sensor, IC7805, LD293D driver, 12V Battery, DC Motors, etc.

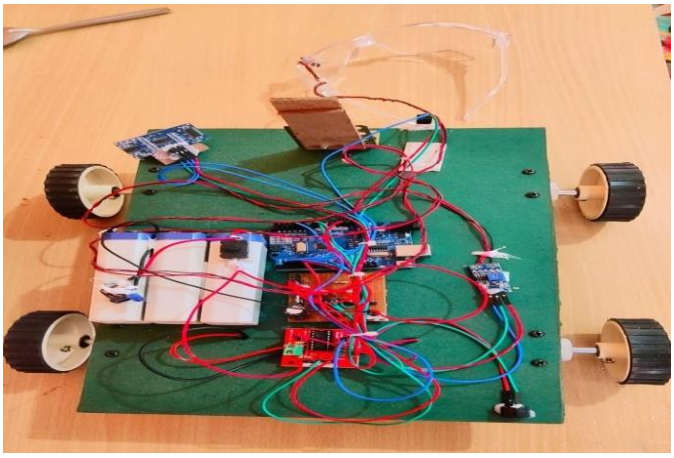

Figure 6: Automatic Humps and Pothole Detection System

This System will increase the road safety and provide security while driving. Also, it is usefull application for smart city.

V. CONCLUSION

In conclusion, the development and implementation of automatic humps and pothole detection systems represent a significant stride towards safer and more efficient road transportation. These systems leverage advanced technologies, including IoT, computer vision, and machine learning, to address critical road infrastructure challenges. An automatic humps and pothole detection system can significantly enhance road safety and infrastructure maintenance. By utilizing advanced sensors and technology, it enables real-time identification of road irregularities, allowing for timely repairs and improved driving conditions. Implementation of such systems can contribute to smoother traffic flow and reduce accidents, ultimately enhancing the overall efficiency of road networks.

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Sentiment Analysis of Dysthymia Form of Depression Using Multimodal Approach

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ABSTRACT
To investigate the correlation between linguistic traits and dysthymia symptoms, researchers have compiled a comprehensive set of speech features, drawing on previous research findings. These features encompass various aspects of speech, including prosody, pitch, intonation, speech rate, and pauses, among others. Analysing these linguistic cues can provide valuable insights into an individual's emotional state and mental well-being. One commonly used technique for assessing the severity of depression is the Beck Depression Inventory (BDI). This approach involves individuals answering specific questions that help gauge their level of depression. By incorporating such self-report measures into the analysis of linguistic traits, a more holistic assessment of dysthymia can be obtained. The combination of objective linguistic analysis and subjective self-assessment measures can enhance the accuracy and reliability of dysthymia detection. We have one solution to solve this issue in terms of machine learning.

Keywords: Machine Learning, Video Processing, Facial Expressions, Sentiment Analysis, fusion Algorithm, KNN, Depression Detection, Bag-of-Words.

I. INTRODUCTION

Every Human being in day to day life is being diagnosed with depression due to affection of different parameters. It disturbed mental state of the human being, So as consider to technology we have one solution to solve this issue in terms of machine learning. Machine learning is a process which leams from past experience and provide the best result when the same issue or event occurs in the future.[2] It considers different parameters like user emotions. Depression is a leading cause of mental ill health. It is a major cause of suicidal ideation and leads to significant impairment in daily life. Machine Learning can help detection and can generate possible solutions to tackle depression. Suicide is one of the most serious social health issues that exists in today's culture. Suicidal ideation, also known as suicidal thoughts, refers to people's plans to commit suicide. Our motivation is to find out a speech feature set to detect, evaluate and even predict Dysthymia. For examining the correlation between Dysthymia and speech, we extract features as many as possible according to previous research to create a large voice feature set. It can be used as a suicide risk measure. India Depression is a mental illness that is not taken seriously in some countries that can cause us depression.[1] among the top countries among in the world to have annual suicide rate. Depression is a psychiatric disorder that needs to be

addressed with medication. According to Our World in Data Website, Depressive disorders occur with varying severity. The WHO'S International Classification of Diseases defines this set of disorders ranging from mild to moderate to severe. The Institute of Health Metrics and Evaluation adopt such definitions by disaggregating to mild, persistent depression (dysthymia) and major depressive order (severe). Though this project can use varieties of techniques such as facial expression detection, social media feeds. Question naire, etc. to target and identify users depression levels. We limit the scope of this project by using only facial expression detection[10] and questionnaire based solution to tackle depression.

II. LITERATURE SURVEY

"A Survey of Multimodal Sentiment Analysis"- Mohammad Soleymani, David Garcia, Brendan Jou, Bjorn Schuller, Shih-Fu Chang, Maja Pantic* In this paper, it represent an overview of concept and the goal of multimodal sentiment analysis and discussed about the challenges and perspectives related to above field. Sentiment analysis is a promising approach to complementary channels of information for sentiment analysis such as recognition and subjective analysis.

"Hierarchical Attention Network for Document Classification"- Yang, Z., Yang, D., Dyer, C., He, X., Smola, A., & Hovy, E* In this paper, it represents Hierarchical Attention Network (HAN) for classify documents. For better visualization use highly informative components of a documents. kind of pagination anywhere in the paper. Donot number text heads-the template will do that for you. Picking out important sentences and words from the documents.

"Multimodal Sentiment Analysis Based on Deep Learning"-J. Bian, L. Rajamanickam, Z. Nopiah*. In this paper, it shows on the basis of characteristics of deep learning algorithm. There are various fusion methods that implements sentiment analysis. The CNN model is used which is pre-trained on large scale image data set and then send to train model to train the text emotions classification model. Result is obtained by decision fusion.

"Multimodal Sentiment System and Method Based on CRNN-SVM"- Y. Zhao, M. Mamat, A. Aysa, K. Ubul*. This paper proposed as an AI deep learning method that is used in sentiment analysis for multimodal approach. It is improving recognition rate and analysis accuracy of sentiments. In this paper system performance optimization method is tested, and remarkable result achieved.

"Multimodal Emotion Recognition Model Based on a Deep Neural Network with Multi-objective Optimization"- M. Li, X. Qiu, S. Peng, L. Tang, W. Yang, y. Ma* This paper represents a multimodal emotion recognition model based on multimodal objective algorithm. It will gives accuracy and result at a same time. It is best improvement for emotion recognition model.

"Understanding and measuring psychological stress using social media"- Guntuku, S.C., Buffone, A., Jaidka, K., & Eichstaedt, J.C* In this paper, as a sample take an Social media account like twitter or instagram, check the stress individually. The result show in LIWC. The result also shows that psychological survey data by deep understanding the environment.

"A Survey on Multimodal Sentiment Analysis"- S.J. Fulse* In this paper it is show that the sentiment analysis multi-modal problem is a problem occurs in machine learning. There are many difficulties to sentiment analysis as Cultural influence, linguistic variation and it is difficult to derive sentiment.

"Multimodal sentiment analysis: Addressing key issues and setting up the baselines."- Poria, S., Cambria, E., & Bajpai, R.* This paper shows useful baseline for the multimodal sentiment analysis for emotion detection. It having different aspects as multimodal sentiment analysis problem like cross-dataset, unknown speaker etc.

"An MLP-based Model for Multimodal Sentiment Analysis and Depression Estimation"- Hao Sun, Hongyi Wang, Jiaqing Liu, Yen-Wei Chen, Lanfen Lin *. In this paper, treat multimodal fusion as feature mixing and propose the MLP-based Cube MLP for unified multimodal feature processing. In Cube MLP, we perform the mix-up at all axis of multimodal features. Cube MLP can reach the state-of-the-art performance for sentiment analysis and depression detection while keeping the computational burden low. We analysed Cube MLP's components and compared it to other techniques.

"Detecting depression of microblog users via text analysis"- Sihua Lyu, Xiaopeng Ren, Yihua Du and Nan Zhao*. This study found that depression could be detected solely through word frequency features by machine learning methods. This model could have potential value in the screening for depression and be able to generalized across platforms. Furthermore, our study demonstrated that in addition to LIWC, which was commonly used in previous studies, lexicons related to cultural psychology and suicide risk.

III.PROPOSED SYSTEM

A. Problem Statement

To develop a user centric application program which addresses growing problem of depression in teenagers. Basically, to design and develop an application which can be helpful to the normal user where machine learning is playing a big role to calculate the depression level of the user according to the user input or face expression detection (parameters like face edges and audio).

B. Block Diagram

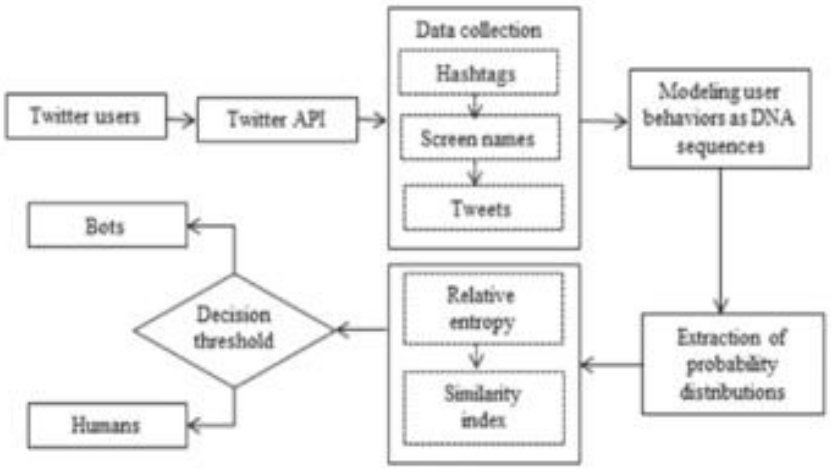

Figure 1: Block Diagram

C. Software Requirement

- Operating System – Windows
- Application Server - Apache Tomcat
- Back End – Python
- Database - My SQL
- IDE – VS Code

D. Hardware Requirement

- Processor - Intel i3/i5/i7
- Speed - 3.1 GHz
- RAM - 4 GB(min)
- Hard Disk - 30 GB

E. Algorithm for System

Sentiment analysis for the detection of dysthymia, a form of depression, using a multimodal approach involves analysing various types of data, such as text, audio, and possibly visual information. Here are the algorithmic steps along with descriptions for a multimodal approach to dysthymia detection:

1) Input Data Collection: Gather multimodal data from individuals, including textual data (e.g., social media posts, messages), audio recordings (speech patterns, intonations), and potentially visual data (facial expressions, body language).
2) Preprocessing: Clean and preprocess each modality of data. This includes text cleaning (removing stop words, stemming), audio preprocessing (feature extraction, normalization), and visual data preprocessing (if applicable).
3) Textual Analysis: Utilize natural language processing (NLP) techniques to extract features from textual data. This may involve sentiment analysis, emotion detection, and other relevant NLP tasks.
4) Audio Analysis: Extract features from the audio data using signal processing techniques. Focus on aspects such as pitch, tone, speech rate, and other acoustic features indicative of emotional states.
5) Multimodal Integration: Combine the features extracted from different modalities into a unified representation. Techniques such as feature concatenation, fusion, or attention mechanisms can be employed for effective integration.
6) Model Training: Train a machine learning or deep learning model using the preprocessed and integrated multimodal data. Consider using algorithms capable of handling multimodal inputs, such as multimodal neural networks or ensemble models.
7) Cross-Validation: Validate the model's performance using cross-validation techniques to ensure robustness and prevent overfitting.
8) Output: Deploy the trained model for real-world applications, ensuring that it integrates seamlessly with the target environment, whether it be a mental health app, social media monitoring system, or other platforms.

IV. RESULT

A. Input Location

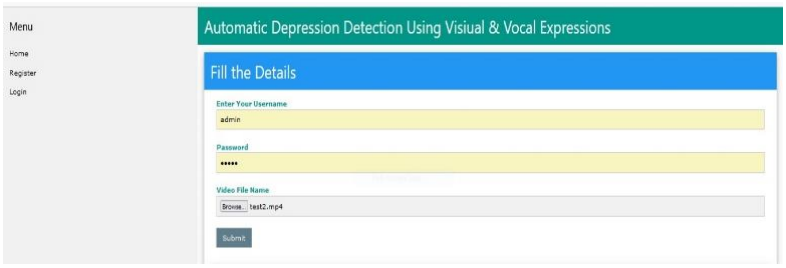

Figure 2: Input Page

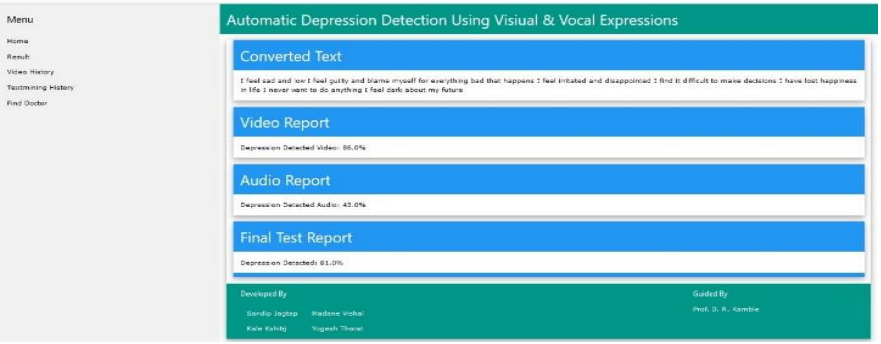

Figure 2: Output Page

V. RESULT DISCUSSION

Pre-Processing the Emotion Recognition Challenge dataset is impacted by anomalous circumstances including light fluctuation, facial occlusion, and more. Pre-processing is in our architecture. Our first step is to align, normalise, and resize the to 224x224 px, the face. Next, we select frames from video every 2sec interval to use as inputs for the facial image model. Similar to this, after employing 98 facial landmarks initially, we entered 3 frames into the facial landmarks model. For training, we utilize Cloud Speech-to-Text API to convert the audio into text format to extract features from the audio model.

B. Conclusion and Discussion We use several neural networks to extract complementing features for the Multimodal based emotion identification challenge in order to get better performance. We have primarily used two types of fusion approaches for our research: fusion by segments and fusion by video. Additionally, and include a variety of fusion techniques, such as voting on the highest value and the score produced by each model. Experiments reveal that the latter has superior accuracy. The outcomes of the various networks that we presented are shown the Facial Landmarks Model achieved an accuracy of 70.00%. while the Facial Expression Model was 70.71 percent accurate, that of the Audio Model is 49.29%, It's vital to note that although while the audio fusion model performs less accurately than other networks, it still has a significant impact because of the complementing data it provides. Finally, the top fusion framework scored 76.43% on the database of validation. In the past, accuracy was determined using segment-based data. As a result, we suggest a novel approach to determining accuracy rate: computation by video unit. Each video's five clips are counted, and the forecast with the greatest number of occurrences is chosen as the final outcome.

VI. CONCLUSION

Finally, we conclude that Sentiment Analysis Of Dysthymia Form Of Depression Using Multimodal Approach in the field of The questionnaire covers various aspects of mental health, including symptoms, duration, and impact on daily functioning. By systematically assessing these factors, we can gauge the severity of depression and tailor interventions accordingly. Additionally, our system incorporates advanced facial expression recognition technology. By utilizing artificial intelligence algorithms, we can accurately detect and analyse facial expressions associated with different emotional states.

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Text to Face Generation Using Deep Learning

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ABSTRACT

The realm of deep learning has made significant strides in generating realistic and high-quality human faces. This abstract provides an overview of the methodologies employed in face generation using deep learning models, primarily focusing on Generative Adversarial Networks (GANs) and variational autoencoders (VAEs). These models have demonstrated the capability to synthesize lifelike faces, with applications spanning across computer vision, entertainment, and beyond.

Keywords: Deep learning frameworks (e.g., Tensor Flow, PI Torch), Image-to-image translation, Image synthesis, Unsupervised learning.

I. INTRODUCTION

Is an exciting and rapidly advancing field within artificial intelligence (AI) and computer vision. It revolves around the creation of realistic and high-quality images. The deep learning has emerged as a pivotal technology in the creation of realistic human faces, crucial for applications in entertainment, virtual reality, and facial recognition. Generative Adversarial Networks (GANs) and variational autoencoders (VAEs) have been instrumental in this domain, learning complex patterns from vast datasets to produce diverse and high-quality facial images. This paper explores the advancements in image-to-image translation, particularly in face generation using deep learning techniques.

Several studies have contributed to the understanding and development of face generation using deep learning. Hermosilla et al. [1] explored thermal face generation using StyleGAN, demonstrating its effectiveness in generating thermal images. Muneer et al. [2] focused on facial age recognition using deep learning approaches, achieving high accuracy rates. Other studies, such as ZHANG et al. [3] and Wang et al. [4], delved into realistic face image generation and text-to-face generation, respectively, showcasing the versatility of deep learning in generating facial images. Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[14] Automated system detects person using three-phase methodology.[13]

II. LITERATURE SURVEY

Several studies have contributed to the understanding and development of face generation using deep learning. Hermosilla et al. [1] explored thermal face generation using StyleGAN, demonstrating its effectiveness in generating thermal images. Muneer et al. [2] focused on facial age recognition using deep learning approaches, achieving high accuracy rates. Other studies, such as ZHANG et al. [3] and Wang et al. [4], delved into realistic face image generation and text-to-face generation, respectively, showcasing the versatility of deep learning in generating facial images.Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[14] Automated system detects person using three-phase methodology.[13]

A. Proposed system

The proposed system aims to create a robust artificial intelligence system capable of generating realistic and diverse human facial images from textual descriptions. Overcoming challenges such as mode collapse and blurry outputs is essential for creating a convincing face generation model suitable for various applications. The system architecture involves phases such as research, data collection, model selection, software development, and deployment.

B. Block Diagram

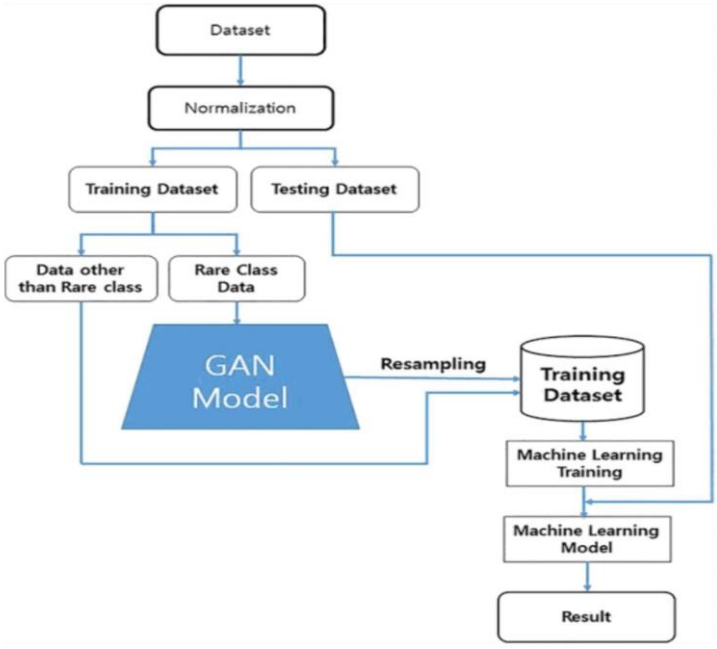

Figure 1: Block Diagram

C. Algorithm/Workflow of system

The proposed system utilizes Generative Adversarial Networks (GANs) for face generation from textual descriptions. The algorithm involves initializing networks, generating fake images, training the discriminator and generator iteratively, and fine-tuning the model based on performance evaluation. In this system of text

through face generation the algorithm used is GAN. Step-by-step execution outlines the basic process of training a GAN for face generation.

Step 1. Initialize Networks

Step 2. Generate Fake Images

Step 3. Sample Real Images

Step 4. Train Discriminator

Step 5. Generate New Fake Images

Step 6. Train Generator

Step 7. Repeat

Step 8. Evaluate

Step 9. Fine-Tuning

Step 10. Save Model

Additionally, monitoring the training process closely and tuning the model based on performance evaluation are essential for successful GAN training.

III.RESULTS & DISCUSSION

Our experiments revealed that the generated faces exhibited a wide range of facial attributes, including gender, age, ethnicity, and facial expressions. Moreover, the model demonstrated the ability to generate novel faces not present in the training data, indicating its capacity to generalize and produce diverse outputs.

Due to the creation of image by a machine learning program it takes some time.

Just like a human being the machine also create an image pixel by pixel so it is bit time consuming process as we observe while output generation. Overall, the entire process of generating output is unstoppable and carefully generated by machine.

Mentioning details from the human face is most important factor of output generation process. Due to the accuracy of facial features in the human face the more accurate face generation is possible.

Input to the program is always given in the format of text. Hence due to this program is text to face generation.

- Input1: A baby with red T-shirt pink lips blue eyes brown hair

Expected output: The output that is expected is a baby face with pair of blue eyes and a red shirt at minimum

Figure 2: output 1

- Input 2: A woman with blue eyes broad smile bright tone and straight hair

Expected output: The minimum expected out is a female face with pair of blue eyes and smile.

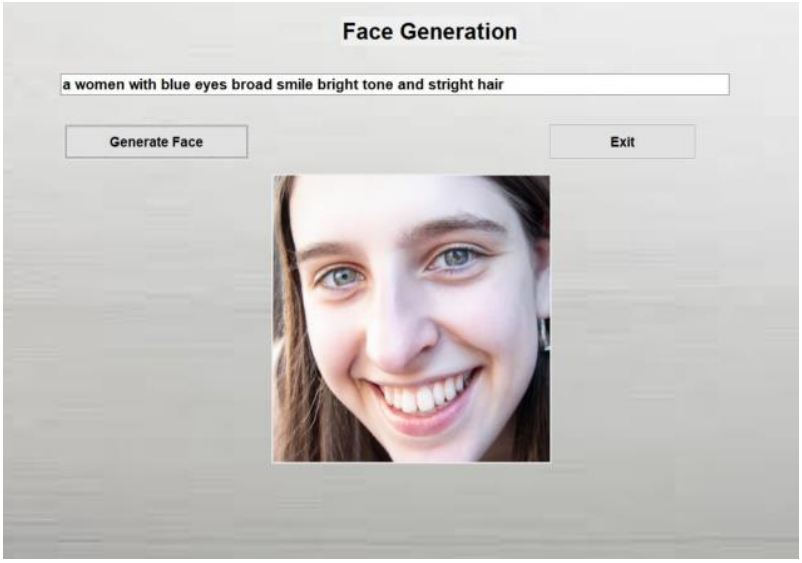

Figure 3: output 2

- Input 3: A man with red shirt fair skin normal smile brown eyes curly hair

Expected output: The minimum expected output will be a male face with red shirt and curly hair.

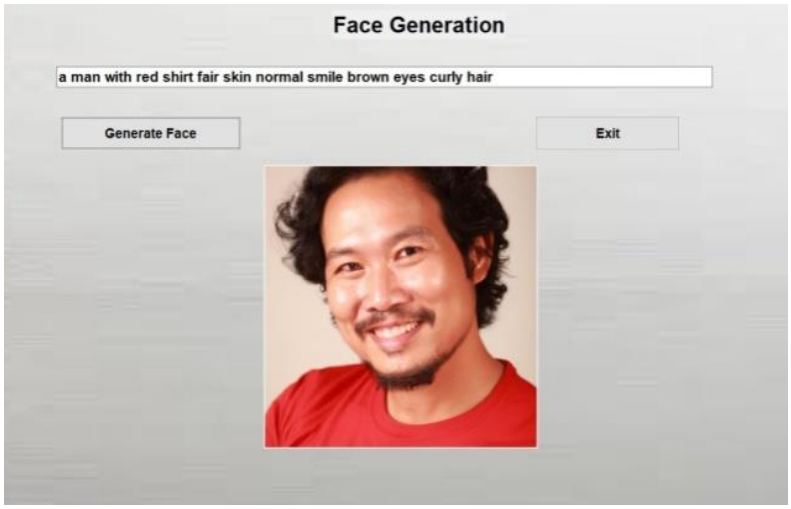

Figure 4: output 3

A. Comparison

In comparison to existing systems, our proposed text-to-face generation system offers several advancements and improvements, particularly in terms of speed and accuracy.

B. Speed

Existing systems often suffer from computational inefficiencies, resulting in slow image generation processes. Our system incorporates optimized algorithms and efficient model architectures, enabling faster generation of facial images from textual descriptions. By leveraging parallel processing techniques and optimized network structures, our system significantly reduces the time required for image synthesis.

C. Accuracy

While existing systems may produce realistic facial images, they often struggle with generating diverse and nuanced facial attributes. Our system utilizes advanced attention mechanisms and multimodal similarity models to capture fine-grained details and nuances in facial features. Through extensive experimentation and optimization, our system achieves higher levels of accuracy in reproducing desired facial attributes, such as gender, age, ethnicity, and expressions.

D. Robustness

Existing systems may be prone to mode collapse or generating blurry and unrealistic images under certain conditions. Our system implements robust training strategies, including adversarial training and regularization techniques, to mitigate issues like mode collapse and ensure stable training. By enhancing the robustness of the training process, our system produces more reliable and consistent results across different textual inputs and datasets.

E. Scalability

Some existing systems may lack scalability, limiting their applicability to large-scale datasets or real-time applications. Our system is designed with scalability in mind, capable of handling large volumes of textual descriptions and scaling seamlessly to accommodate diverse datasets and application scenarios. Through efficient resource utilization and distributed computing strategies, our system can scale horizontally to meet growing demands for text-to-face generation tasks.

F. User Experience

Existing systems may have complex user interfaces or require extensive configuration and parameter tuning. Our system prioritizes user experience by offering intuitive interfaces and streamlined workflows, making it accessible to users with varying levels of expertise. By automating tedious tasks and providing real-time feedback during the image generation process, our system enhances user satisfaction and productivity.

Overall, our proposed text-to-face generation system represents a significant advancement over existing systems, offering superior speed, accuracy, robustness, scalability, and user experience. Through innovative techniques and optimizations, our system sets a new benchmark for generating high-quality facial images from textual descriptions in a fast and efficient manner.

IV. CONCLUSION

In this paper, we introduced a novel application of Generative Adversarial Networks (GANs) for fine-grained text-to-image synthesis, focusing specifically on face image generation. Our GAN architecture incorporates an attention mechanism inspired by the AttnGAN framework to enhance the quality and realism of the generated images. Through a multi-stage process facilitated by the attentional generative network, our model effectively captures fine-grained details and features from textual descriptions to produce high-quality face images.

Additionally, we proposed a deep attentional multimodal similarity model to improve the training process of the generator within the GAN framework. By leveraging both textual descriptions and visual features, our model learns to generate face images that closely match the provided descriptions.

Our experimental results demonstrate the effectiveness of our GAN model in generating diverse and realistic face images. We achieved significant improvements over previous state-of-the-art methods on benchmark datasets such as CelebA and LFW, highlighting the robustness and scalability of our approach. These findings underscore the potential of GANs in text-to-image synthesis tasks, offering promising avenues for applications in computer vision and image generation.

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Development of an E-Commerce Sales Chatbot

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ABSTRACT
This paper presents the development of an e-commerce sales chatbot designed to enhance customer support and boost sales. Leveraging machine learning for natural language understanding, the system employs a modular chatbot framework featuring a web-based training platform for natural language, a micro service for text classification and entity extraction, and a responsive framework for routing user requests to specialized controllers. The innovative approach aims to seamlessly integrate e-commerce and AI, striving to create a chatbot with human-like sales capabilities by comprehending context and intent. This entails a focus on effective text classification and entity extraction, enabling the chatbot to generate contextually relevant responses. Overall, the system represents a significant stride in the fusion of e-commerce and AI, offering an advanced chatbot experience for users that goes beyond conventional customer support to drive sales through nuanced understanding and responsiveness.

Keywords: E-commerce, natural language processing, neural network, challenges, customers, Chabot, support, face-to-face contact.

I. INTRODUCTION

The rise of e-commerce has transformed global business, offering consumers the convenience of 24/7 shopping from anywhere, particularly benefiting those in rural areas. Project E-commerce emphasizes the expanded product variety accessible through online retailers unrestricted by physical space. Globalization further catalyzed business evolution, enabling companies to serve customers worldwide, leading to the emergence of global e-commerce platforms and subscription services.

In the proposed system's implementation phase, a chatbot utilizing AIML for natural language processing will facilitate customer interactions. The chatbot, post-deployment, will analyze customer queries, identify intent, and respond in a natural and informative manner. The survey highlights the potential of Deep Neural Networks (DNNs) in enhancing chatbot performance within the customer service industry, offering benefits like improved natural language understanding, personalized responses, and adaptive learning capabilities.

The design principles for an effective chatbot include the ability to understand and respond to natural language, ensuring clear, concise, and easily comprehensible responses. Additionally, the chatbot should prioritize being helpful, informative, engaging, and friendly, creating a user experience that simulates interaction with a real person.

II. RELATED WORK

The Role of Customer-Centric E-Commerce Implementing Artificial Intelligence for Better Sales and Service Authers Salu George Thandekettu, M.Kalairasi Statement to provide potential of implementing artificial intelligence (AI) in customer-centric e-commerce to enhance sales and service, addressing challenges in AI systems' understanding of customer needs.[1]

Authers Chaiara Valentine misischina Flora – plazain paper [2] Chatbots in customer service: Their relevance and impact on service qualitymentioned that Chatbots' significance in customer service lies in their capacity for instant, automated support through AI and natural language processing, enhancing service quality by delivering quick, consistent, and accurate information.

The implementation of Chatbot in online Commerce, and Open Innovation Authers Maria D. Illescas Manzano, Noe Vicente Lopez Nuno Afonso Gonzalez, Carmen Cristofol Rodriguez statement to improve customer acceptance, addressing concerns and offering a seamless experience is crucial, with a promising future as chatbots advance in intelligence, potentially integrating with voice assistants and augmented reality for enhanced interactions.[3]

In accordance with Authers Bilal Jafery in paper suggested that connecting meaningfully in the new reality mentioned that Chatbots, powered by AI and open innovation, streamline customer interactions, offering personalized information and tailored solutions to foster meaningful connections.[4]

The development of an e-commerce Sales Chatbot Authers Mohammad Monirujjaman Khan, Shahnoor Chowdhury Eshan Statement The e-commerce sales chatbot focuses on enhancing customer support and boosting sales through a modular framework and machine learning for natural language understanding. [5]

The Sambot – Intelligent conversational Bot for Interactive Marketing with Consumer-centric ApproachAuthers Aditya Pradana, Goh Ong Sing, and Yogan Jaya Kumarthe development of SamBot, a conversational bot integrated into the Samsung IoT Showcase website, utilizes Artificial Intelligence and deep learning to enhance interactivity and information provision. [6]

According to Thomas NT Amrita Vishwa, an E-business Chatbot using AIML and LSAThe implemented solution involves AIML-defined templates for greeting and general queries, incorporating both pattern-based AIML and semantic-based Latent Semantic Analysis (LSA) for more diverse and effective customer interactions. [7]

III. PROPOSED SYSTEM

The challenge at hand involves creating a sophisticated e-commerce sales chatbot with capabilities to comprehend and categorize customer queries adeptly. This advanced chatbot aims to provide personalized product recommendations and real-time discounts, emulating human-like interactions. Its primary objectives are to enhance customer support, alleviate concerns arising from the absence of live sales representatives, and ultimately drive higher sales. The solution must strike a balance by remaining cost-effective and scalable to accommodate 24/7 customer support demands within the dynamic e-commerce sector.

A. Block Diagram

The block diagram is a visual representation of a system, emphasizing overall structure and functions. It features three main components User Interface, Web Server, Chatbot core chatbot core with specific operations.

For instance, Intent reorganization, database, and response generation. The components extract data from loaded sub-databases through a repository, containing updated cloud service with the help of recommendation engine, adaptive price engine. A main gateway facilitates storing integrated schema data in a highly structured database, showcasing relationships between components in a hierarchical manner.

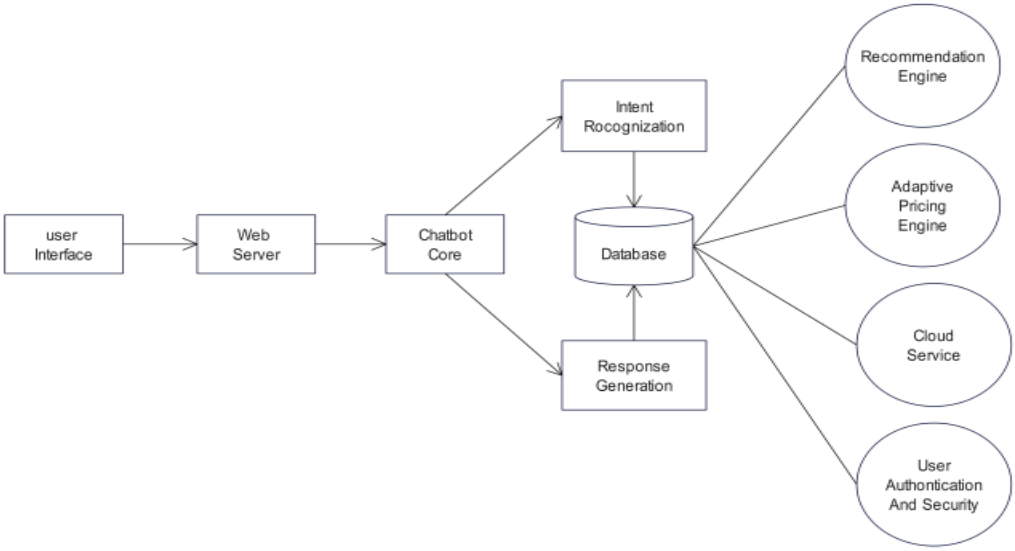

Figure 1: Block Diagram

IV. RESULTS AND DISCUSSION

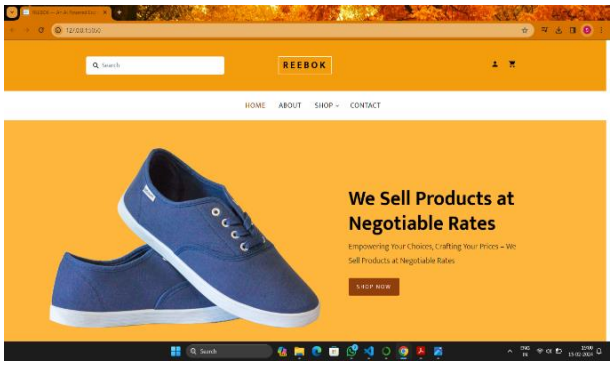

Figure 2: Home Page

Home page of E-commerce platform with navigation bar which provides different options like home button, about section, shop section with a dropdown menu with a list and contact section.

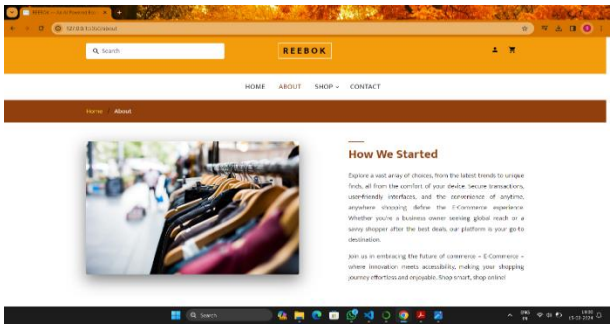

Figure 3: About Page

In the About section, there is information related to our proposed system and also elaborate on how to use it to perform the bargaining with online products with the help of E-commerce chatbot.

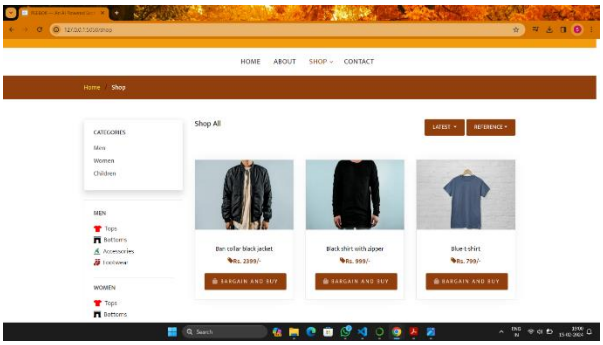

Figure 4: Shop Page

Here is about the shop section in that there are different lists to shop the products for Men, Women, and children to buy the product.

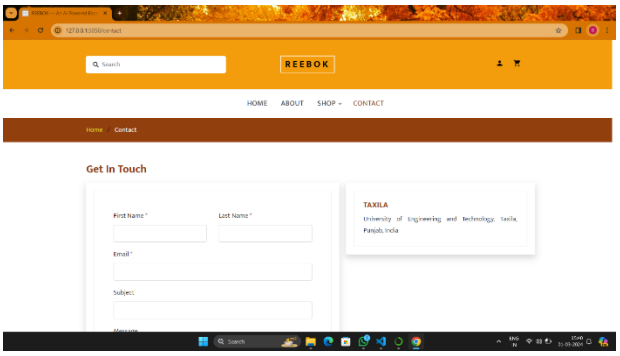

Figure 5: Contact Page

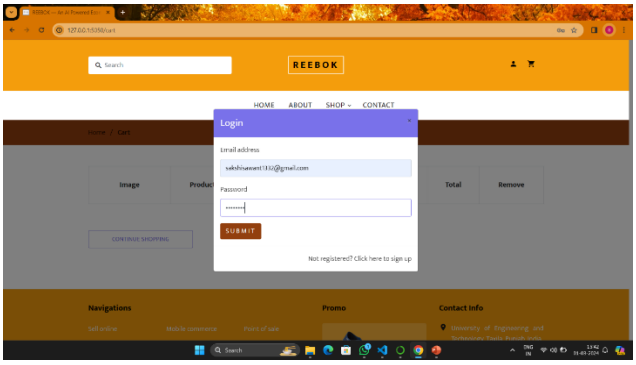

Figure 6: Login Page

This is the login form to login into the system if user does not have an account there is an option to create an account also and then login into the system.

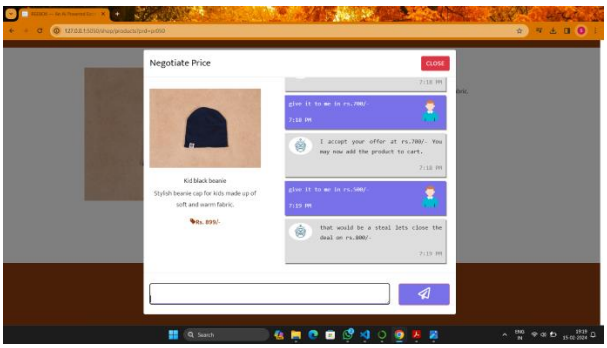

Figure 7: E-commerce Chatbot

Here is the product bargaining section to chat with the E-Commerce chatbot with the user with the help of AI and buy the product.

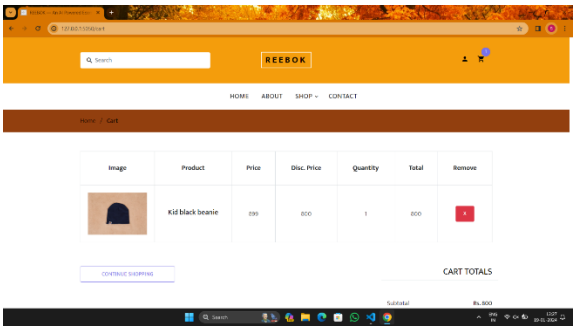

Figure 8: Cart Page

Here is the cart section in the user can save the products that he can buy after some time in that it will show the all information about that product.

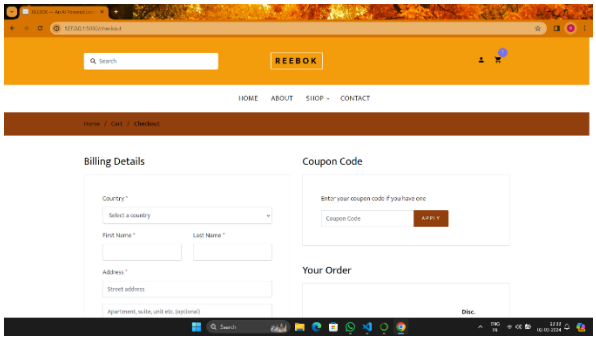

Figure 9: User Ordered Page

Here is the final billing section which helps also get the discount coupon also show the list of ordered product.

V. CONCLUSION

We designed and implemented the e-commerce chatbot system which provides an automatic response to the incoming customer-to-seller question. An E-Commerce Website intelligence is one of the most important factors for improving customer satisfaction in the era of intelligence. Through collected customer information automatically by intelligence technology, a website can better feel customer feelings and better understand

customer needs, then can provide one-to-one service for customers, realization customization service, thus can provide optimum services exceeding customer expectations.

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E-Pass for Bus

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ABSTRACT

To overcome the issues that people face nowadays, the E-pass system is generated as a web application. Each time people travel by buses suffer from a lot of hectic rules and regulations to generate pass physically. The E pass system is the web application system that is going to be developed to generate E passes digitally by adding necessary information and documents to generate passes. The main feature of this work is to make the application user-friendly to make their lifestyle easier. By adding all the necessary information regarding the pass, the pass is easily generated. The Bus Pass Generator Application is a user-friendly and efficient mobile application designed to simplify and streamline the process of acquiring and managing bus passes for public transportation systems. This innovative application leverages modern technology to enhance the convenience and accessibility of public transportation for both commuters and transit authorities.

Keywords: E-Pass, Digital Pass, Access Control, Identity Verification, Contactless Pass, Authorization System, Pass Validation, Reporting and Analytics.

I. INTRODUCTION

The E-Pass Generator Project is a digital solution designed to streamline and modernize the process of issuing and managing passes or permits for various purposes. This system leverages technology to provide efficient and secure access control, whether it's for events, transportation, healthcare, or any other scenario where controlled access is essential. The E-Pass system for buses can streamline ticketing and improve passenger convenience. E-passes are electronic tickets that passengers can purchase and store on their smartphones or smart cards. They offer benefits such as contactless payments, reduced paper waste, and the ability to track usage and plan routes more efficiently. This innovation can enhance the overall bus travel experience for passengers and make public transportation more accessible and sustainable. The E-Pass system for buses represents a significant leap forwarding modernizing and optimizing public transportation. E-passes, or electronic passes, offer passengers a convenient and efficient way to access and pay for bus services. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[17]

II. LITERATURE SURVEY

Online Bus Pass System created in 2022 is mainly helpful for the student who are facing problem with the current manual work of bus pass registration and generate as well as getting bus pass online and renew online without any irritating process. The proposed system is will work in all the configurations. So, Online buss pass system is use to generate online buss pass and give the Digital bus pass at home.

In 2022, The Software powered by PHP assures clear and systematic services to the company. This easy to operate system helps to access and change user. The process of getting bus Pass Apply through Online, view bus information and Cost details for given source. The process of getting bus Pass Apply through Online, view bus information and Cost details for given source and destination, Add New bus details and Ticket amount details by admin and all Customer details and Bus pass details and Renewal Details, Payment Details are maintained more simple and easy.

Digital Bus Pass Generation System 2021 technique is used to solve the problem is by providing QR codes to generate pass easily but system is will work in all the configurations. So, Online buss pass system is use to generate online buss pass and give the Digital buss pass at home.

The technique used to solve the problem by providing user friendly applicaion to generate pass with low cost (2019) scope for future development, as the users requirement is always going to be changed which is including tracking the location of the bus. It is helpful for the user to find the current location of the bus and it is providing the feature that is online booking of ticket and seat.

'Survey on Online Bus Pass System' in 2019 This online bus pass system application will help candidates to save their time and renewal bus pass without standing in a line for hours near counters, is developed using Active Server Page.

Online Bus Pass System is mainly helpful for the student who are facing problem with the current manual work of bus pass created in 2019. The proposed system is will work in all the configurations. So, Online buss pass system is use to generate online buss pass and give the Digital buss pass at home. It will verify by Aadhaar card and User-id.

The technique is used to reduce work of customers to get pass who travelled by buses (2019). Online based app for applying and renewals of bus pass in government bus.

Study of an Effective Online Bus Pass Generation and Renewal System(2018). Study of an Effective Online Bus Pass Generation and Renewal System.

In 2015, Online bus pass Generation system is a web application for people to get Bus passes through online. This system was intended to develop an application to perform functionalities.

Online Bus Pass (2015) this project is created to safe, reliable and time saving service for people. To provide an effective solution for marinating bus pass.

Lots of IOT based technologies are used for advancement of safe, secure and smart travelling [11].

More Security can be provided with the help of Watermarking scheme[13]

III.PROPOSED SYSTEM

A. Problem Statement

The current state of public transportation lacks an efficient, user-friendly, and technologically advanced fare collection system for bus services. Traditional paper tickets and cash payments are cumbersome for passengers

and transit authorities, leading to issues like long queues, inefficient fare collection, and limited data analysis capabilities. Traditional ticketing systems, reliant on paper tickets and cash payments, are time-consuming and result in long queues, especially during peak hours. Paper tickets are susceptible to counterfeiting and fraud, leading to potential revenue losses for transit authorities.

B. Architecture Diagram

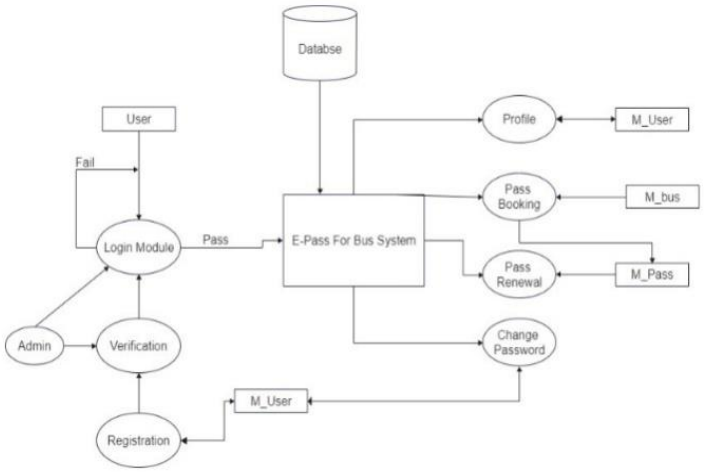

Figure 1: Architecture Diagram

C. Requirements

A. Hardware Requirements:

- Processor - Intel i5/i7
- Speed - 3.1 GHz
- RAM - 4 GB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA Document Scanner/Camera

B. Software Requirements:

- Operating System – Windows
- Front End - ReactJS, Bootstrap, CSS
- Language – Java
- IDE - Eclipse IDE J2EE, Visual Studio Code

D. Requirements

A use case diagram can show the different types of users of a system and the various ways in which they interact with the system. Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements [13]. The detailed survey given in [14].

IV. RESULT AND DISCUSSION

The result of implementing an e-pass for buses using Java full-stack development would be highly beneficial for people, offering convenience and efficiency regardless of their location. Users would be able to easily book and manage their bus passes online, reducing the need for physical queues and paperwork. Additionally, features such as real-time tracking and updates could enhance the overall travel experience, making it more accessible and user-friendly for passengers. Overall, the e-pass system would streamline the process of bus travel, providing a valuable service to people everywhere. Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEG Vigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[16]

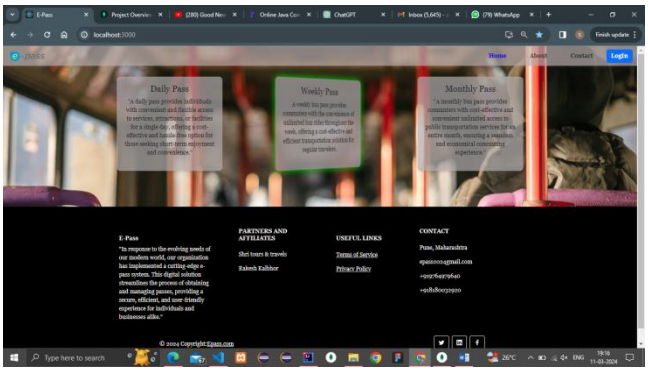

Figure 2: Home Page

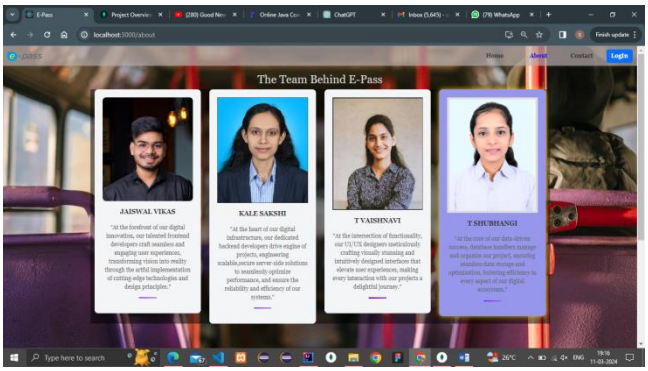

Figure 3: About Us

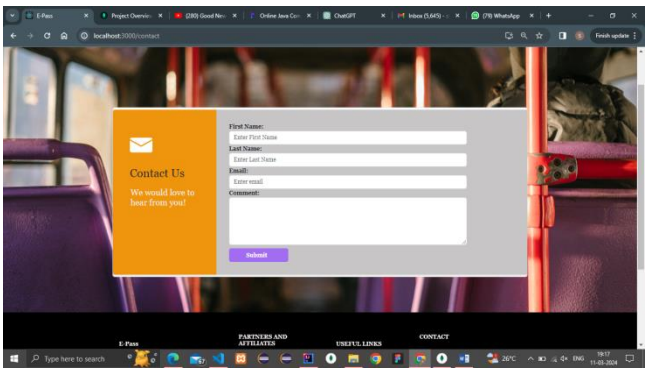

Figure 2: Contact Us

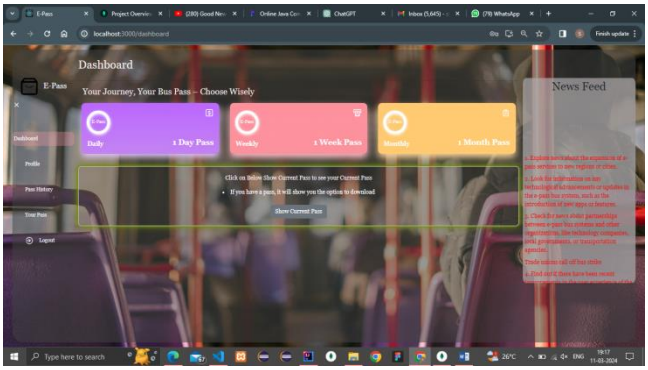

Figure 3: Dashboard

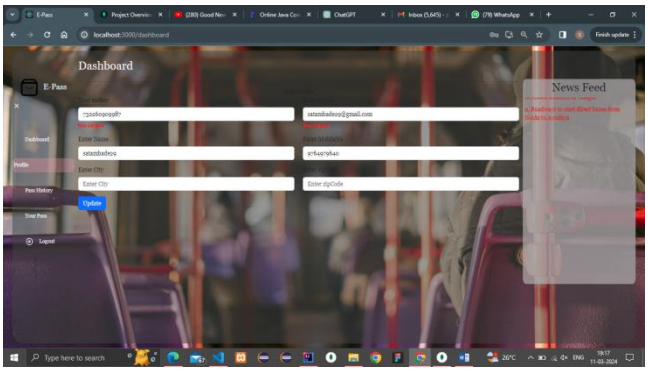

Figure 4: Pass History

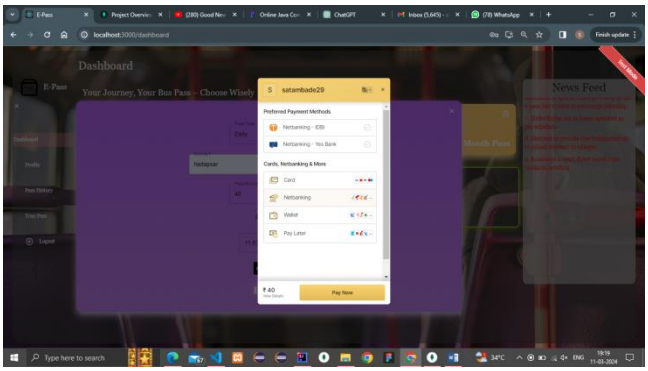

Figure 5: Payment

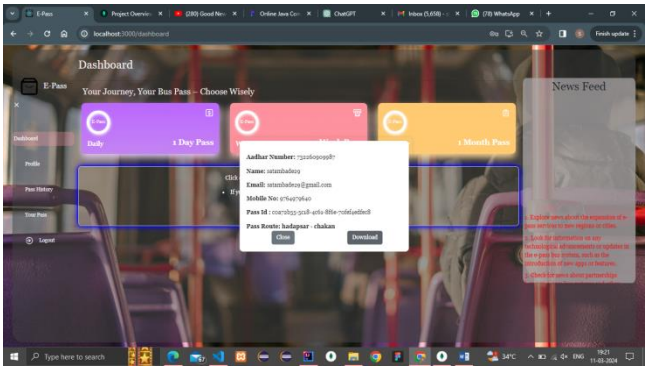

Figure 6: Pass Download

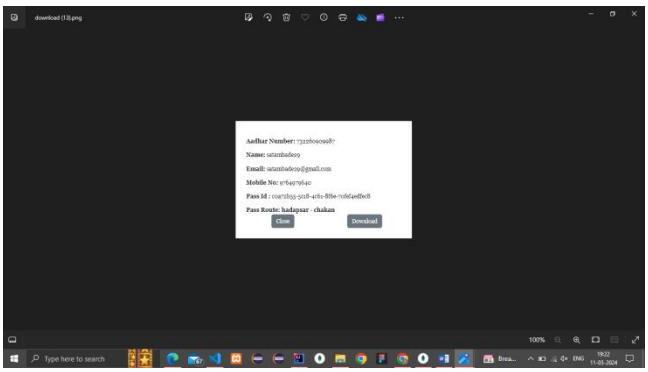

Figure 7: Pass Downloaded

V. CONCLUSION

The E-Pass Generator Project represents a significant advancement in access control and pass issuance through digital means. This project harnesses technology to provide efficient, secure, and convenient solutions for various industries and scenarios. However, it is important to be aware of the project's limitations and challenges, such as issues related to security, privacy, and accessibility.

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Result Paper On Image or Video Metadata Using AI and Image Processing

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ABSTRACT

In the context of e-learning standards, algorithms capable of processing semi-structured documents in plain text are commonly used for automatic metadata extraction and generation. Given that much of the information available on the web today is unstructured and often in the form of multimedia files, there is a need for more generalized approaches. Our proposed automatic metadata generation procedure aims to label specific unstructured data (such as video lectures) with metadata that aligns with the SCORM reference model. After pre-processing, we evaluate three different summarization algorithms to create synthetic descriptions of video content, covering both the Description and Title aspects. Notably, the Description field of videos demonstrates good agreement with the true lesson abstracts authored by human experts.

Keywords: Artificial Intelligence, Image Processing, Video Analysis, Feature and data Extraction, Metadata Object Detection.

I. INTRODUCTION

The 'Image and Video Metadata' project aims to create a user-friendly software tool for efficiently extracting and analysing metadata from image and video files. The key objective is to provide an intuitive interface that allows users to select media files and obtain detailed information about their content. The project involves extracting metadata from various media formats, including common image types like JPEG and PNG, as well as popular video formats such as MP4 and AVI. Additionally, the project covers interpreting this metadata, including attributes like image resolution, format, creation date, camera settings, and geolocation data for images. For videos, it includes details such as frame dimensions, upload date, view count, comment count, and other relevant information for YouTube videos."

"The Image and Video Metadata project serves as a versatile software solution, enabling users to extract, analyze, and visualize metadata from image and video files. By leveraging Python libraries such as Pillow (for images) and OpenCV (for videos), this project empowers users with valuable insights from their media assets. The user-friendly graphical interface allows users to select an image or video file, after which the program deciphers and organizes the embedded metadata. For images, this includes attributes like resolution, format, creation date, camera model, and GPS data (if available). Video metadata encompasses details such as frame dimensions,

upload date, view count, like count, and comments for YouTube videos. Overall, this project provides a convenient way to explore the hidden information within media files, benefiting photography enthusiasts, content creators, and various other applications.

II. LITERATURE SURVEY

In their 2023 paper titled 'High Performance Artificial Intelligence Recommendation of Quality Research Papers Using an Effective Collaborative Approach,' Vinoth Kumar Venkatesan, Mahesh Thyluru Ramakrishna, Anato-liyBatyuk, And-rii Barna, and Bohdana Havrysh address the problem of recommending relevant, high-quality research papers to researchers based on paper-citation relationships. They propose the RPRSCA technique, which leverages latent linkages between a research paper, its references, and citations from uncertain systems. Future work in this area could focus on improving the methodology, particularly the metrics used for information retrieval systems, such as accuracy, recall, and F1 measurement."[1].

"In their 2021 paper titled 'Video Processing Using Deep Learning Techniques: A Systematic Literature Review,' Vijeta Sharma, Ma-njiri Gupta, Ajai Kumar, and Deepti Mishra address the application of deep learning techniques to video processing. Their methodology focuses on video classification, analysis, and recognition. These techniques enhance various aspects of video understanding, including video classification, analysis, action recognition, and pose recognition. Looking ahead, the authors suggest future research directions related to specific data challenges, such as threat identification, multi-person identification, multi-object tracking, and scene labeling."[2].

"In their 2021 paper titled 'Automated Metadata Annotation: What Is Not Possible with Machine Learning,' Hans Brandhorst, Joseph Busch, Dr. Joaquim More Lopez, Marjorie Hlava, Dr. Mariacristina, and Dr. Mingfang Wu address the challenge of automated metadata annotation. They emphasize that the effectiveness of such annotation heavily relies on the quality of the training dataset and the domain-specific rules available. Understanding the data content that a pre-trained machine learning algorithm has been exposed to is crucial for recognizing its limitations and potential biases. Notably, various software and technology companies offer AI solutions, but each has distinct strengths and weaknesses in the technical aspects they address." [3].

"In their 2021 paper titled 'Artificial Intelligence in Information Systems Research: A Systematic Literature Review and Research Agenda,' Christopher Collins, Denis Dennehy, Kieran Conboy, and Patrick Mikalef explore the multifaceted role of AI. They highlight that AI is applied to various domains, including perceiving, reasoning, learning, interacting with the environment, problem-solving, decision-making, and even demonstrating creativity. Looking ahead, the authors emphasize the need for identifying the current reported business value and contributions of AI, as well as investigating practical implications for its use." [4].

"In their 2020 case study titled 'Integrating Artificial Intelligence Metadata within Paramount's Digital Asset Management System,' Dony West, Caitlin Denny, and Rebe-cca Ruud explore the integration of AI-based metadata tools. The problem addressed is the enhancement of archivist workflows using AI techniques such as face detection, object detection, and text detection. These tools assist archivists in locating relevant content within the digital asset management system. For instance, AI can identify images of specific sets, search for objects based on user requests, or even suggest suitable artwork for home decor. However, it's important to note that these AI tools are not entirely accurate and should complement, rather than replace, human interaction. The study emphasizes the need for AI service providers and software companies to actively seek user feedback to improve their glossaries and datasets.[5]. The detailed survey given in paper [9]

III. PROPOSED SYSTEM

A. Problem Statement

In today's digital age, the vast amount of image and video content being created and shared online has made it increasingly challenging to manage and organize this media effectively. Traditional methods of manually tagging and categorizing images and videos are time consuming and error-prone, leading to inefficient data management and retrieval. This project aims to address this problem by leveraging the power of artificial intelligence (AI) to automatically extract and analyse metadata from images and videos.

B. Software Requirement

- Operating System – Windows
- Front End - HTML, CSS
- Language – Python
- Database-MySQL
- IDE –Spyder, jupyter

C. Hardware Requirement

- Processor - Intel i5/i7
- Speed - 3.1 GHz
- RAM - 4 GB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mous
- Monitor – SVGA

IV. ALGORITHM/WORKFLOW OF SYSTEM

Using EXIF data we can extract the metadata from images and videos. Exif metadata, commonly generated by cameras and other capture devices, contains technical details related to an image's capture process. This information encompasses exposure settings, capture timestamp, GPS coordinates, and camera model."
organizing and managing digital assets. Metadata is descriptive information that provides context about the content of an image or video. It can include information such as the date and time the image was captured, the location, camera settings, and other details.

- Metadata schema.
- Metadata management software.
- Metadata storage.
- Metadata extraction.
- Metadata validation
- Metadata displayed

Step-by-step execution
Step 1. Start Register then login

Step 2. Load an image or video file
Step 3. Read the image or video file using Open CV Library
Step 4. then extract the properties of image or video
Step 5. Displaying the extracted metadata Of selected video or image file.

V. RESULTS

A. Registration Process

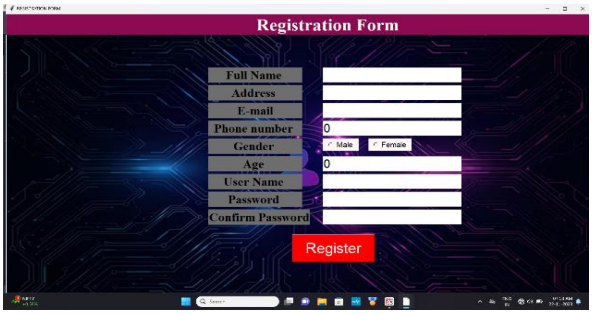

Figure 1: Registration Process

It collects user information, including Full Name, Address, Username, Email, Phone Number, Gender, Age, Password, and Confirm Password.

B. Login Process

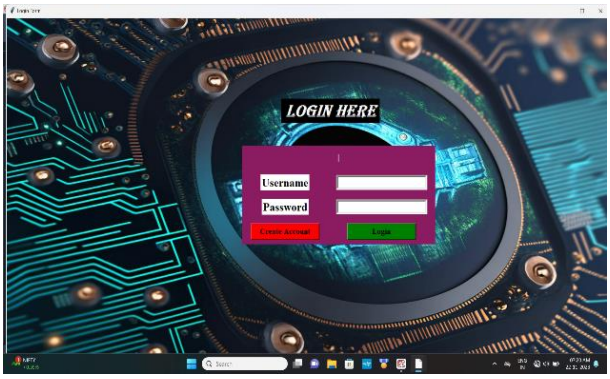

Figure 2: Login Process

It checks the entered credentials against the data stored in the evaluation.db database.

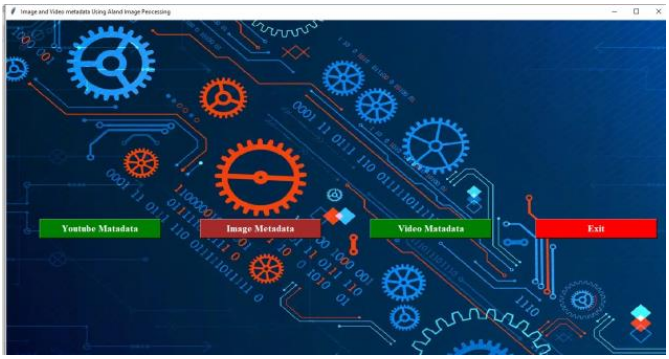

Figure 3:

Figure 4:

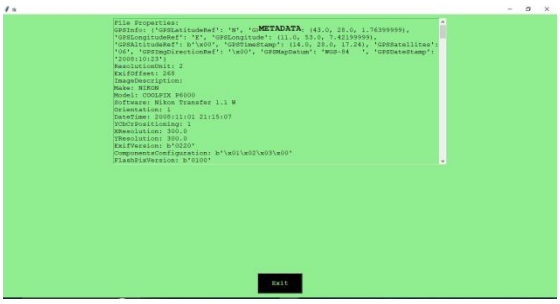

Figure 5:

Metadata includes general file properties, EXIF data, and additional image-related information.
It displays the extracted metadata in a Tkinter window with a scrollable text widget.

C. Video Metadata Extraction

Figure 6:

Figure 7:

It displays the extracted metadata in a Tkinter window with a scrollable text widget.

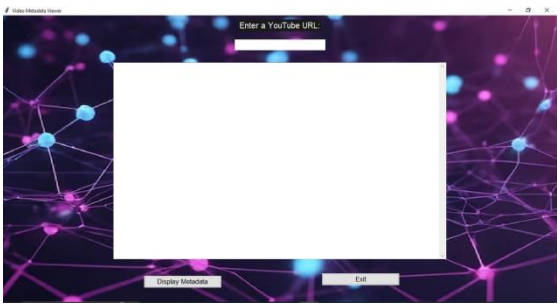

Figure 8:

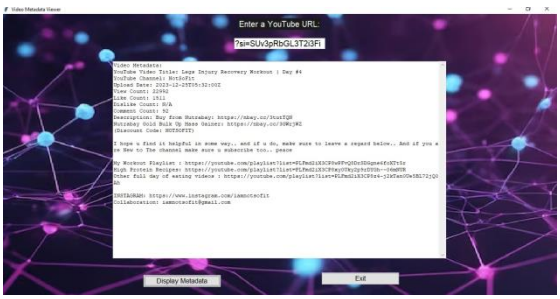

Figure 9:

The user inputs a YouTube URL, and the script fetches information similar to the final.py script.

VI. CONCLUSION

The Image and Video Metadata project has effectively delivered a user-friendly solution for extracting metadata from image and video files. Its advantages include an intuitive interface, support for batch processing, customization options, secure data handling, and compatibility across different environments. Users can efficiently organize and analyse their media files, benefiting content creators, geotagging enthusiasts, developers, and educational users. However, it's important to note that the project has limitations related to online video retrieval, file format sensitivity, and performance with large datasets.

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Development of an Automated Crop Disease Detection System

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ABSTRACT

Crop diseases pose significant threats to agricultural productivity and food security worldwide. Early detection and management of these diseases are crucial for minimizing yield losses and ensuring food sustainability. In this paper, we present the development of an automated crop disease detection system using machine learning techniques and image processing algorithms. The proposed system aims to accurately identify various types of diseases affecting different crops based on images of their leaves or affected parts. We conducted extensive experiments using a diverse dataset comprising images of healthy and diseased crops, collected from different regions and under various environmental conditions. Our results demonstrate the effectiveness of the developed system in accurately detecting and classifying crop diseases with high precision and recall rates. The proposed system holds great potential for assisting farmers and agricultural experts in early disease diagnosis, timely intervention, and effective disease management strategies, thereby contributing to improved crop yield and sustainable agriculture practices. Keywords: Crop disease detection, Automated system, Machine learning, Image processing, Agricultural productivity, Early detection, Disease management, Sustainable agriculture, Crop yield.

Keywords: Machine learning, Deep learning, Convolutional neural networks (CNNs)

I. INTRODUCTION

Crop diseases have long been recognized as a significant threat to agricultural productivity and global food security. According to the Food and Agriculture Organization (FAO), plant diseases are responsible for substantial yield losses, estimated at 20- 40 percent annually, affecting crops such as wheat, rice, maize, and potatoes. Timely and accurate detection of these diseases is crucial for implementing effective disease management strategies, minimizing yield losses, and ensuring sustainable agricultural practices. Traditional methods of disease detection primarily rely on visual inspection by farmers or agricultural experts, which can be time-consuming, labor-intensive, and prone to subjective interpretations. We leverage a combination of machine learning algorithms, including convolutional neural networks (CNNs), and image processing techniques to analyse large-scale datasets of crop images. Our system aims to provide farmers and agricultural stakeholders with timely information on disease outbreaks, enabling proactive disease management strategies and enhancing agricultural productivity

II. LITERATURE SURVEY

Demystifying Issues, Challenges and Solutions for Multilingual Software Development Developing a software project using multiple languages together has been a dominant practice for years. Yet it remains unclear what issues developers encounter during the development, which challenges cause the issues, and what solutions developers receive. In this paper, we aim to answer these questions via a study on developer discussions on Stack Overflow. By manually analyzing 586 highly relevant posts spanning 14 years, we observed a large variety (11 categories) of issues, dominated by those with interfacing and data handling among different languages. [1]

AI-based Desktop Voice Assistant All actions performed by the system will be based on the voice of the user. The system helps the user based on voice notes, i.e., the system works on commands given by the user. A voice assistant utilizes cloud computing to integrate AI and communicate with users in natural language. Programs based on desktop voice assistants recognize and respond to human voices via an integrated voice system. [2]

Crop Disease Detection and Classification using Transfer Learning and Hyperparameter-sized Convolutional Neural Network Automatic detection of plant diseases is an essential research topic as it may prove beneficial to monitoring large fields of crops, and thus automatically detect the symptoms of diseases as soon as they appear on plant leaves. To identify plant disease at an early stage, image processing techniques are used in the detection and classification of plant diseases. CNN with transfer learning and optimized CNN are proposed for detection and classification of crop diseases. There are an increasing number of imaging and non-invasive sensors available that can support diagnosis and plant detection. The progress in sensor and information technologies together with the expansion of geographic information systems opens new opportunities for precision agriculture and plant phenotyping. [3]

Voice Assistant System All actions performed by the system will be based on the voice of the user. The system works on commands given by the user. A voice assistant utilizes cloud computing to integrate AI and communicate with users in natural language. Programs based upon desktop voice assistants recognize and respond to human voices via an integrated voice system. Technological advances are making voice assistants more capable, particularly in AI, natural language processing (NLP), and machine learning. To build a robust speech recognition experience, the artificial intelligence behind it must become better at handling challenges such as accents and background noise. Future research could focus on further improving the robustness and adaptability of voice assistants in diverse environments. [4]

Design and Development of UI/UX on Company Profile Web with Design Thinking Method Currently, the human need for documents in this modern world is increasing, which was originally in the form of paper now turned into a digital file. Business people think this is an opportunity because there are so many people who need to create or understand documents but can't do it all, be it due to limited time or lack of knowledge. One solution to overcome some of these problems is to create a system, one of which is a website. A website is a collection of pages that can be accessed via the internet. With the website, users can access information. The design of this website is made using the Design Thinking method, which is a problem-solving method that focuses on the user. Design Thinking Method Growth and Opportunities. With the expanding market and the increasing demand for products and services, experienced and talented UI/UX designers are in high demand. [5]

Crop Diseases Detection using Deep Learning In recent times, drastic climate changes and lack of immunity in crops have caused a substantial increase in the growth of crop diseases. This causes large-scale demolition of crops, decreases cultivation, and eventually leads to financial loss for farmers. Computer vision employed with

deep learning provides a way to solve this problem. This paper proposes a deep learning-based model trained using a public dataset containing images of healthy and diseased crop leaves. The Technique Used to Solve the Problem is Deep Learning. The model serves its objective by classifying images of leaves into the diseased category based on the pattern of defect. Factors influencing the use of deep learning for plant disease recognition are discussed. Deep learning is quickly becoming one of the most important tools for image classification, and this technology is now beginning to be applied to the tasks of plant disease classification and recognition. [6]

Plant Diseases Detection and Classification by Deep Learning Automatic detection of plant diseases is an essential research topic as it may provide benefits in monitoring large fields of crops, and thus automatically detect the symptoms of diseases as soon as they appear on plant leaves. The application of deep learning in plant disease recognition can avoid the disadvantages caused by artificial selection of disease spot features, make plant disease feature extraction more objective, and improve research efficiency and technology transformation speed. The Technique Used to Solve the Problem is Deep Learning. Deep learning is a branch of artificial intelligence. In recent years, with the advantages of automatic learning and feature extraction, it has been widely concerned by academic and industrial circles. It has been widely used in image and video processing, voice processing, and natural language processing. [7]

Plant Diseases Detection using Machine Learning Crop diseases are a noteworthy risk to sustenance security; however, their quick identification remains troublesome in numerous parts of the world due to the non-attendance of the necessary infrastructure. The emergence of accurate techniques in the field of leaf-based image classification has shown impressive results. The Technique Used to Solve the Problem is Random Forest.This paper makes use of Random Forest in identifying between healthy and diseased leaves from the datasets created. The proposed paper 3 includes various phases of implementation, namely dataset creation, feature extraction, training the classifier, and classification. There are an increasing number of imaging and non-invasive sensors available that can support diagnosis and plant disease detection. The progress in sensor and information technologies together with the expansion of geographic information systems opens new opportunities for precision agriculture and plant phenotyping. [8]

Plant Diseases Detection using Image Processing Agriculture has become far more than simply a method to feed ever-growing populations. It's important wherever additional than 70% of the population of an Asian country depends on agriculture. Detecting diseases is key to preventing agricultural losses. The steps like loading an image, pre-processing, segmentation, extraction, and classification involve disease detection. Therefore, the use of image processing techniques to find and classify diseases in agricultural applications is useful. Machine learning approaches such as SVM, K-NN, and CNN are used to distinguish diseased or non-diseased leaves. T The Technique Used to Solve the Problem is using Image Processing, Machine Learning (SVM, K-NN, CNN). [9]

Language Identification on Indian Multilingual Document Using Profile Feature. To reach a larger cross-section of people, it is necessary that a document should be composed of text contents in different languages. But on the other hand, this causes practical difficulty in OCRing such a document because the language type of the text should be predetermined before employing a particular OCR. [10]

III.PROPOSED SYSTEM

The proposed automated crop disease detection system integrates cutting-edge machine learning techniques and image processing algorithms to accurately identify and classify diseases affecting various crops. The system

consists of several key components, including data acquisition, preprocessing, feature extraction, disease classification, and user interface modules.

A. Data Acquisition

The first step in the system involves collecting digital images of crop leaves or affected parts using high-resolution imaging devices such as smartphones, drones, or digital cameras. These images serve as input data for the subsequent processing stages.

B. Preprocessing

The acquired images undergo preprocessing to enhance their quality and remove any noise or artifacts that may interfere with the disease detection process.

C. Feature Extraction

Next, feature extraction techniques are applied to the pre-processed images to capture relevant information that discriminates between healthy and diseased crops. Features 4 may include texture, color, shape, and structural characteristics of the crop lesions.

D. Disease Classification

The extracted features are then fed into a machine learning model, such as a convolutional neural network (CNN) or a support vector machine (SVM), for disease classification. The model is trained on a labelled dataset containing images of healthy and diseased crops to learn the patterns associated with different diseases.

E. Block Diagram

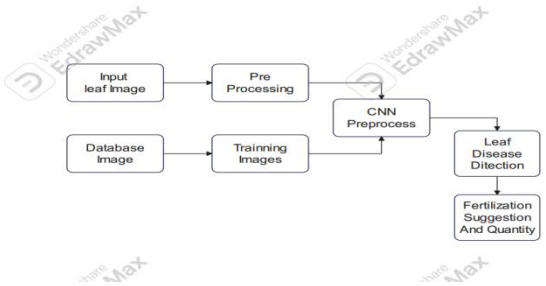

Figure 1: Block Diagram

F. Hardware Requirements

Intel Core, Speed: 2.80 GHz, RAM: 8GB, HardDisk: 500 GB, Key Board: Standard Windows Keyboard

G. Software Requirements

Operating System: Windows 10(64 Bit), IDE: Spyder, Programming Language: python version 3.7,3.8

IV. WORKFLOW OF THE SYSTEM

A. Data Acquisition

Collect digital images of crop leaves or affected parts using high-resolution imaging devices such as smartphones, drones, or digital cameras.

B. Preprocessing

Resize the images to a standardized resolution. Normalize pixel values to ensure consistency across images. Apply noise reduction techniques to remove any artifacts.

C. Feature Extraction

Extract relevant features from the pre-processed images, such as texture, color, shape, and structural characteristics of the crop lesions. Use techniques like histogram equalization, edge detection, and morphological operations to enhance feature extraction.

D. Disease Classification

Train a machine learning model, such as a convolutional neural network (CNN) or a support vector machine (SVM), on a labelled dataset containing images of healthy and diseased crops.

E. User Interface

Develop a user-friendly interface that allows users to upload images, view disease detection results, and access additional information on disease management strategies. Implement interactive features such as zooming, panning, and image comparison to enhance user experience.

V. RESULT DISCUSSION

The results obtained from the evaluation of the automated crop disease detection system demonstrate its effectiveness in accurately identifying and classifying diseases affecting various crops. Through extensive experiments conducted on diverse datasets, we evaluate the performance of the system in terms of accuracy, precision, recall, and F1-score. Overall, the developed system holds great potential for revolutionizing disease management practices in agriculture, enabling farmers to adopt proactive measures for preventing yield losses, minimizing environmental impacts, and ensuring food security.

VI. RESULT SCREENSHOT AND ITS DESCRIPTION

Figure 2: The above image describes the Home Page of the project which includes options for login and registration of the user.

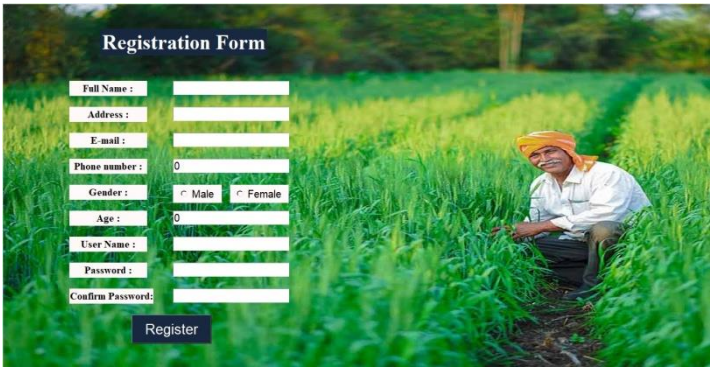

Figure 3: Registration page for new user

Figure 4: Login page for registered user

Figure 5:

VII. COMPARATIVE STUDY

This is the major part of project where we need to follow some steps to know about the disease and its solution step1: upload the image, step2: Apply image processing method, step3: Use CNN algorithm to predict the disease The automated crop disease detection system utilizes Convolutional Neural Network (CNN) algorithms to effectively predict 16 types of diseases by analysing images of crops. By leveraging advanced machine learning techniques, the system accurately identifies and diagnoses crop diseases, enabling prompt intervention and mitigation measures. This innovative approach enhances agricultural productivity and crop yield by facilitating timely responses to disease outbreaks, thereby ensuring the health and sustainability of agricultural ecosystems.

VIII. CONCLUSION

In conclusion, the development of an automated crop disease detection system represents a significant advancement in precision agriculture, offering a powerful tool for early disease detection, timely intervention, and sustainable crop management practices. Through the integration of machine learning techniques, image processing algorithms, and user-friendly interfaces, the proposed system demonstrates its potential to revolutionize disease management strategies and enhance agricultural productivity. By harnessing the power of technology and innovation, we can address the challenges posed by crop diseases and ensure a brighter future for global food security and agricultural prosperity.

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Algorithmic Trading : An Overview

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ABSTRACT
Stock prediction is a popular research topic with experts from various fields such as business, economics, mathematics, and computer science exploring potential solutions to glitches that can affect accuracy. While predicting the stock market remains a challenging task due to its complex and often random nature, millions of investors worldwide engage in this activity daily. Predictive models that leverage supervised machine learning techniques offer considerable value to decision-makers seeking to make informed decisions regarding stock market investments. This paper reviews recent research on supervised machine learning models for stock market forecasting, with a focus on the most commonly used techniques such as support vector machines, artificial neural networks, K-nearest neighbors, naive Bayes, random forest, linear regression, and support vector regression. Promising results have been achieved with these approaches, empowering investors and decision-makers to make effective and informed choices.
Keywords: Supervised Machine Learning, Classification, Regression, Support Vector Machine (SVM), Artificial Neural Network (ANN), Stock Market Prediction

I. INTRODUCTION

Stock prediction is a challenging field that draws researchers from diverse areas like economics, business administration, arithmetic, and computer science. Accurate share price predictions have the potential to generate significant profits, hence, this area has received critical attention for years. However, forecasting the stock market is a difficult task, primarily due to the inherent volatility and random behaviour of equity time series. Financial analysts face many challenges in this arena, including the need to make effective investment decisions while minimizing risks. Recent technological advancements have made the stock market more accessible to investors, leading to the development of various models for market forecasting, including machine learning, data mining, and statistical models. Despite the complexity of financial markets, researchers continue to strive for better understanding and predictability.

II. RELATED WORK

The focus of our work is to conduct a thorough investigation into both fundamental and technical analysis in predicting stock market trends, particularly in relation to market economies and stock prices. Our research centres around the financial market as the pivotal point, drawing on the findings of previous studies

(Nassirtoussi et al. 2014, Gocken et al. 2016). Therefore, gaining a comprehensive understanding of the financial market is crucial and indispensable [1].

The utilization of machine learning techniques for predicting the stock market is gaining popularity worldwide. It has been observed that these techniques are much more efficient and faster compared to traditional prediction methods. Therefore, machine learning is increasingly being applied for stock market prediction due to its superior accuracy and efficiency.[2]

The financial market is characterized by dynamic, sensitive, nonlinear, and chaotic stock market prices. To predict the abrupt stochastic variations of the market, a novel hybrid model has been proposed that combines the strengths of fractional order derivative and deep learning techniques such as long-short term memory (LSTM) networks. The dynamical features of this model make it particularly effective for predicting the unpredictable behaviour of the financial market.[3]

In a financially volatile market such as the stock market, accurate predictions of future trends are crucial. Given the financial crisis and the importance of scoring profits, it is essential to have a reliable forecast of stock values. Advanced machine learning algorithms are required for predicting non-linear signals in the market. Therefore, accurate predictions using such techniques are necessary to ensure the security of financial investments.[4]

This paper reviews various studies on supervised machine learning models used in predicting the stock market. The discussion focuses on how these techniques can enhance the accuracy of stock market predictions. Among the different supervised machine learning methods, Support Vector Machine (SVM) is the most commonly used technique for stock price prediction, mainly due to its superior performance and accuracy in this domain. [5]

Machine learning techniques are being extensively utilized for stock market prediction worldwide. These techniques are demonstrating greater accuracy and speed compared to traditional prediction methods. Therefore, the application of machine learning techniques for stock market prediction is increasingly gaining popularity.[6]

This paper presents the prediction of stock prices for five companies listed on India's National Stock Exchange (NSE) using two models: the Long Short-Term Memory (LSTM) model and the Generative Adversarial Network (GAN) model. The GAN model employs LSTM as the generator and a simple dense neural network as the discriminant. The study focuses on predicting the stock prices of these companies using these models.[7]

III.EXISTING SYSTEM/OPEN ISSUES

The application of data mining techniques has made the use of stock market analysis more prevalent in recent years. While fundamental analysis has been a common approach for stock prediction, research shows that text mining has several associated problems that can impact the effectiveness and efficiency of decision-making. In their work titled "Text Mining-Techniques Applications and Issues," the authors argue that the text mining process faces various challenges that could affect its outcomes. One critical issue is the dependency on multi-lingual text minor changes, which can create problems in analysis.

IV.CONCLUSION

Research indicates that Artificial Neural Network (ANN) and Support Vector Machine (SVM) are the most commonly used machine learning algorithms for stock prediction. However, ongoing research is focusing on improving stock prediction accuracy using hybrid ensemble machine learning methods. Studies suggest that

considering both internal and external factors can lead to more precise and accurate stock prediction. It is noteworthy that the African market has received relatively little attention in terms of stock prediction research, despite the volume of articles on this topic.

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Tool for Identifying and Categorizing the Twitter Bots Using Machine Learning

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ABSTRACT

Developing a Twitter tool to distinguish between useful and harmful bots aims to enhance user safety by categorizing bots and enabling users to utilize beneficial bots while safeguarding against potential privacy threats This paper aims to ensure Twitter bot users' data privacy. There are very few existing systems with very low accuracy. The tool aims to enhance user safety by categorizing Twitter bots into two distinct groups using machine learning: Useful Bots and Harmful Bots. The classification system serves as a safeguard, allowing users to interact with beneficial bots for their purposes while avoiding harm. The paper aims to create a safer and more efficient Twitter experience by allowing users to navigate and interact with bots responsibly.

Keywords: Summarization, Classification, Identification, Machine Learning, analysis, Data Analysis

I. INTRODUCTION

In the vast landscape of social media, Twitter stands as a dynamic platform for global conversations, news publishing, etc. However, some software, commonly known as bots, can interact with systems or users. The nature of these bots, coupled with their potential to influence narratives and manipulate tweets, makes it necessary to develop advanced tools for their identification and categorization. This research introduces a robust machine-learning framework designed to reveal the difficulty of Twitter's bot ecosystem. With a focus on both identification and categorization, our tool provides platform administrators, cybersecurity experts, and researchers with the means to discern between genuine users and automated bots, while also revealing the purposes behind the activities of these bots. This research helps us in the following task:

- Identification: Develop an advanced machine learning model capable of identifying Twitter bots by analysing behavioural patterns, engagement count and other key features.
- Our approach combines machine learning algorithms, natural language processing techniques, and data analytics to sift through the massive volume of Twitter data. Leveraging labelled datasets and a meticulous training regimen, the model endeavours to discern subtle distinctions between human and bot behaviour.

- Extract relevant features from user profiles, tweets and engagement data to improve the accuracy of bot detection. Using machine learning to detect unusual behaviour patterns that are characteristic of bot accounts, such as high-frequency posting or identical content sharing are several existing systems which also help the users to do the same work. However, those systems are unable to generate the desired output. Because those systems had a lack of accuracy.

II. LITERATURE SURVEY

As per the paper[1] author stated that The consideration of images in detecting Twitter bots because images can contain valuable information and analysing them could potentially improve the accuracy of bot detection models.

As per the paper[2] author stated that moving beyond traditional feature-based detection, future systems may focus on analysing the behavioural patterns of accounts to detect bots more effectively. This could include looking at posting frequency, content similarity, and engagement patterns.

As per the paper[3] author stated that we need to develop a few more models and use some other features that help to find the bot in a more précised and accurate way.

As per the paper[4] author stated that Future implementations could provide real-time data, which would allow Twitter to incorporate this function into their app. Additionally, it can be integrated among all other market-available social networking programs. in this paper, the dataset used for detection is provided through us, it is entirely manual. However, in future, I may upgrade the paper so that the model can use the dataset needed for bot detection on its own.

As per the paper[5] author stated that Graph-based bot detection methods demand significantly more computation resources and execution time than feature-based models. Given that the Twitter network is rapidly expanding, we aim to further explore scalable and graph-based bot detection methods.

As per the paper[6] author stated that Retrainable models through real-time processing would be another solution to this issue. Finally, most of the models are confined to Twitter now. Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEGVigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[16] Leveraging the DL solutions to overcome similar issues in other platforms may potentially increase the usability and impact of this research to a great extent.

As per the paper[7] author stated that we will use those features as heuristics of an unsupervised system aimed at ranking Twitter accounts from more human to less human. Paper innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology.[15] This ranked list of accounts will be revised by annotators so that a reliable gold-standard dataset is obtained at the end.

III.PROPOSED SYSTEM

A. Problem Statement

A tool that will identify harmful Twitterbots to ensure the user's privacy

B. Architecture Diagram

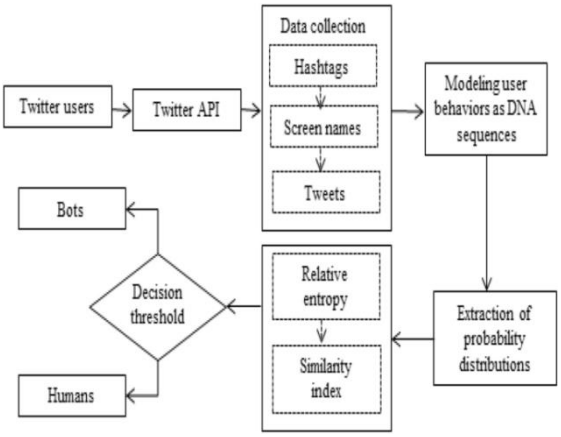

Figure 1: Architecture Diagram

C. Requirements

1) Hardware Requirements:

- Processor - Intel i3/i5/i7
- Speed - 1.1 GHz
- RAM - 4Gb(Min)
- Hard Disk - 256GB
- Keyboar- Standard Keyboard
- Mouse -Two or Three-Button Mouse

2) Software Requirements:

- Operating System- Windows 7/8/10
- Application Server - Apache Tomcat 7
- Front End - HTML, CSS, Bootstrap
- Language -Python
- IDE - Visual Studio Code

IV. RESULT AND DISCUSSION

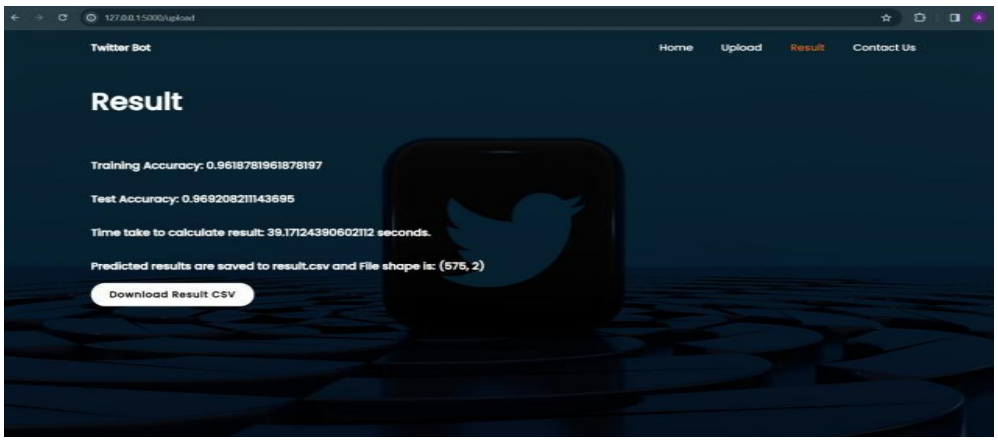

Figure 2:

Our machine-learning model can accurately classify Twitter bots when we test it on a second dataset based on follower counts without the need for manual feature engineering. Screenshots of the classification results, including test accuracy, are available. However, training is currently delayed due to the unavailability of training datasets.

V. CONCLUSION

The development and implementation of bot detection & classification systems represent a significant step forward in the safe use of Twitter, offering promising solutions to address the challenges posed by Twitter bots. Bots adapt, evolve, and find new ways to mimic authentic user behaviour. As we navigate the complexities of identifying and categorizing Twitter bots, we acknowledge the dynamic nature of these digital bots. In conclusion, As we look to the future, the path forward involves not only refining our technological tools but also a collaborative and ethically grounded approach to face the challenges that lie ahead. We're always looking to make it better based on what you and other users tell us. We also take your privacy and security very seriously. You can access our tool on the web, designed to be user-friendly.

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Malware Detection for Web URL's and PE Files Using Machine Learning

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ABSTRACT
Malware such as Viruses, Worms, Trojans, Backdoors are some of the threats to computer system and internet in recent years malware count is increased in millions. In the past few years millions of malwares were found in portable executable files which are downloaded from the internet. As the solution to this, it is highly desirable for users to detect such malware files, so that users can secure the devices as well as highly confidential data. Malware Detection System is an application which will detect the malwares from the portable executable files. The proposed system uses KNN algorithm to predict the malware files and legitimate files. so users can easily differentiate between them and secure their systems. The database will be generated by extracting maximum features of Portable Executable files which improves the accuracy of the model. The system implements pure machine learning algorithms to identify every malware file.
Keywords: Machine Learning, Malware, Portable Executable Files.

I. INTRODUCTION

The main domain for the paper is Machine Learning. Machine Learning is the sub- category of an Artificial Intelligence. AI gives ability to work computer as a human, in this a computer is able to do task which are usually done by human. ML specifically takes data as an input and finds pattern amongst them by using various algorithm. It may include supervised, unsupervised, reinforcement, semi-supervised learning models. The students can make malpractice for choosing answers of questions from assignments or from the online search engines like Google, Chrome, Windows Explore etc. Malware is a recent problem, which affects the data, devices, etc. Prevention of malware attack is important to save highly confidential files and the devices. In this section, let's have a quick look of the existing Malware detection methodologies and related works.

II. LITERATURE SURVEY

For this refer [1] The Online Proctoring Exam System includes as per the term "malicious malware", or malware, is used to refer to computer software that is developed for illegal purposes such as stealing data, corrupting data, damaging computers and computer systems of certain individuals and organizations. As per paper [2] both static malware examination and element malware investigation as indicated by the component of the biologic resistant framework that can shield us from disease by creatures. In this model, the static marks and dynamic marks of malware are separated, and in view of the genuine esteemed vector encoding, the

antigens are produced.[3] Malware is a program or file which harms the computer, network or server intentionally. “Malware Intrusion Detection for System Security” proposed by Mrs. Ashwini Katkar, Ms. Sakshi Shukla and Mr. Danish Shaikh in year 2021. [4]“A Survey and Experimental Evaluation of Practical Attacks on Machine Learning for Windows Malware Detection” proposed by Luca Demetrio, Scott E. Coull, Battista Biggio, Giovanni Lagorio, Alessandro Armando, Fabio Roli in year 2020. [5] This paper provides the functionality of preserving manipulations to the Windows Portable Executable (PE) file format. [6] This paper has the limitations that they didn’t uses Random Forest and Decision tree so the accuracy might vary and also this is powerful in case of Denial-of-Service attacks (DOS) only. [7]“Malware Detection using Honeypot and Malware Prevention” proposed by Dhruvi Vadaviya, Mahesh Panchal, Dr. Abdul Jhummarwala and Dr. M. B. Potdar in year 2019. [8]The main intension of this paper is to elaborate the seriousness of Malware problem and paper the importance of online malware analysis. This paper explains only about the protection regarding the network attacks.[9] Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[15] In this paper authors has used Honeypot system to trace the details about the hacker or the unauthorized user who is accessing the details. Proposed paper only explains about the network safety includes recording and analysis of network activities and captures, and capture, to uncover evidence of the origin of device security attacks. As per paper [10] authors had explained about identification of various harmful URLs through use of Machine Learning techniques. Author presented an algorithm for detecting and preventing Node isolation attack where attacker become the sole MPR of victim and isolated the victim from the rest of the network.[11]

III.PROPOSED SYSTEM

A. Problem Statement

Problem Statement: The problem statement of malware detection using machine learning is to develop effective and efficient techniques that can accurately identify and classify malicious software based on patterns and characteristics in the data. It's essential to keep in mind that malware detection is an ongoing arms race, with attackers constantly evolving their techniques to evade detection. Therefore, a robust and adaptive machine learning approach is crucial for effective malware detection. Additionally, privacy and ethical considerations should be taken into account when collecting and handling malware samples for training purposes.

B. Block Diagram

The block diagram is a visual representation of a system, emphasizing overall structure and functions. It features three main components Data collection Visualization, Preprocessing, Dataset Clean, Learning.

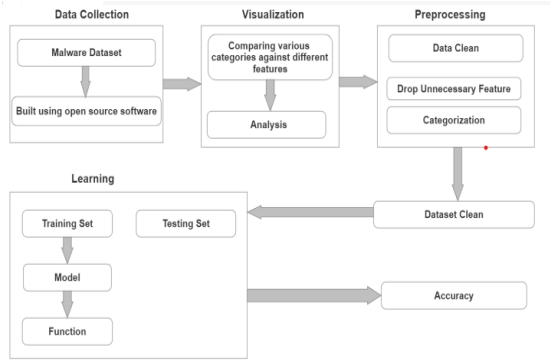

Figure 1: Block Diagram

C. Software Requirement

- Operating System - Windows 11
- Application Server – Django or Flask
- Programming Language - Python
- Front End - HTML, CSS, JavaScript
- IDE - Visual Studio Code
- Database – MySQL

D. Hardware Requirement

- Processor - Intel i5/i7
- Speed - 3.1 GHz
- RAM - 4 GB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor – SVGA

E. Sequence Diagram

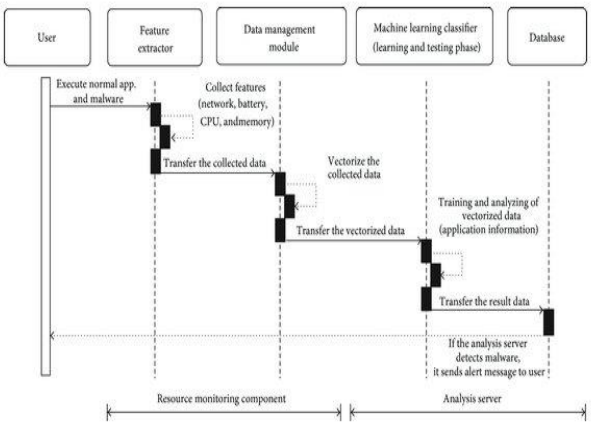

Figure 2: Use Case Diagram

IV. ALGORITHM

KNN Algorithm K-Nearest Neighbor is the simplest Machine Learning algorithms based on Supervised Learning technique. K-NN working is based on the below algorithm: K-NN working can be explained on the basis of the below algorithm:

- Step-1: firstly, Select the value of K that denotes the number of neighbors
- Step-2: Then, Calculate the Euclidean distance of K no. of neighbors
- Step-3: Take the K nearest neighbors based on the calculated Euclidean distance.
- Step-4: Then, Count the number of the points in each category, among these K neighbors.
- Step-5: Assign the new data points to that category to which the number of the neighbor is maximum.
- Step-6: Our model is ready

A. Random Forest Algorithm

Random Forests algorithm learns from a weak model (like DT) to create a. more robust one and to avoid over-adjustment with a minimum cost. The for est is built using bootstrap techniques that is well known. The main idea behind the bootstrapping is to combine learning models by increasing the overall result of classification. To achieve RF, the following steps are performed after a dataset XN of size N is splitted using the bootstrap technique:

- Draw n size random bootstrap sample, where randomly choose n samples from the training set with replacement
- Construct a decision tree from the random bootstrap sample.

At each node:

- Randomly select d features without replacement
- Use the feature to split the node, that provides the best split 3) Repeat the steps 1 to k times. 4) To assign the class label by a majority vote, aggregate the prediction by each tree:
- Select D(xN) = xb along with N samples without replacement.
- Create a bootstrap dataset B in 1, ..., N With the previously assumptions is computed Equation: P rob(K) = N!(K!(N K))(1N)K N1N; 0 k N (13) where P rob(K) is a estimation of probability, N states the number of samples and K is an iteration.

B. Decision Tree

Decision Tree is a supervised classification algorithm that begins by growing with a single-leaf tree i.e. root and through all classes of the training samples assigned to its own sheet with class by a majority voting technique. DT algorithm starts with a one node, which is evaluated by computing possible outcomes. Each outcome inserts the additional nodes, which branch off into other possibilities. The main idea of DT algorithm is to divide the dataset into smaller sets depends on the most descriptive features until is reached the smallest set containing data points that fall under one label. At the end the iterations stops until the zero impurity, this is when entropy (the degree uncertainty) is minimized. The results are demonstrated by identifying which features maximizes the gain of information as depicted in Equation

IG(Dp, xi) = I(Dp) NleftNp I(Dleft) NrightNp I(Dright) where IG(Dp, xi) states the Gini impurity which is a measure to calculate probabilistically different outputs, Dp is the dataset of the parent and child nodes, Np is the total of samples at the parent node, I is the impurity measure, D left and Dright are two child nodes.

V. RESULT DISCUSSION

Our experiments revealed that the:

- The Module is very helpful and productive for learning the detection of malware from the specified features.
- Module has flexible GUI which is understandable to any user.
- The module is divided into four sub modules as upload dataset, show dataset, clean dataset and prediction for test dataset. The visualization of each and every sub modules is clear and easy to understand for any user.
- Each sub module performs its specified functions as upload dataset upload the dataset from system by opening window, show dataset shows the uploaded dataset, clean dataset shows the cleaned dataset and after all the functioning it predicts the result according to the features as it is malware or not.

VI. RESULT

Here in this section we will discuss about the result of our proposed system.
Let us know about the input and output to the proposed system. In this proposed system Malware are present or not in the test file or URL's when we can upload test file or URL's then shows the test file are legitimate or not and URL's are safe or not for the system.

A. Input

Create an account and register with our email id and enter you're password after that open the option test file and upload the file with extension .exe and .dll etc.

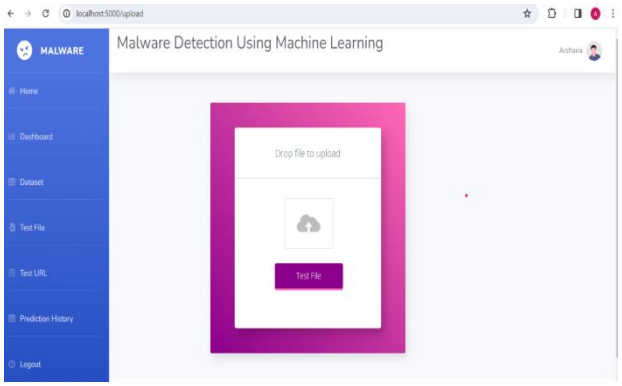

Figure 3: Test file

B. Output

Shows the output malware are present or not after upload the test file.

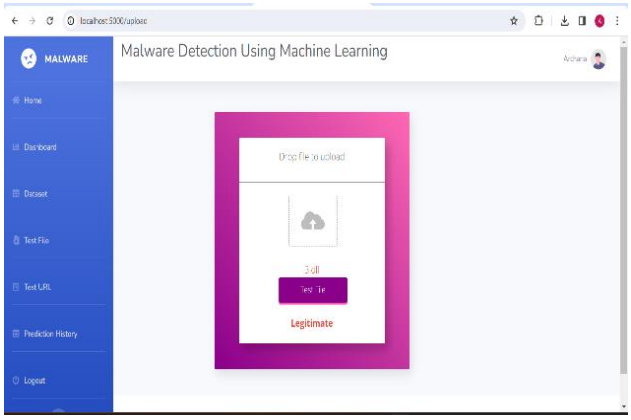

Figure 4: output

C. Input

Upload any type of URL like www.youtube.com,www.indiapost.gov.inetc.

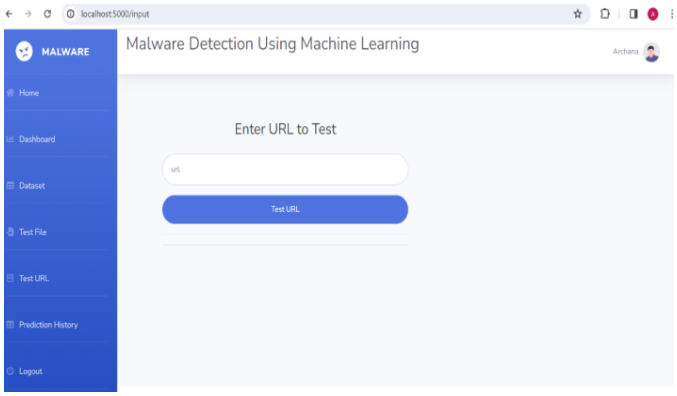

Figure 5: Input

D. Output

Show the website or URL are safe or not for the system.

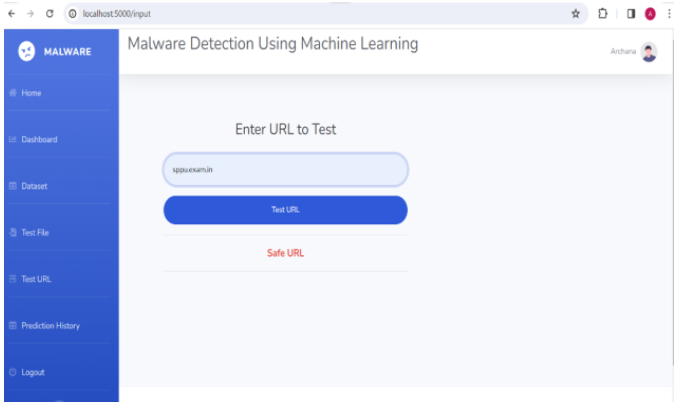

Figure 6: URL's output

VII. CONCLUSION

Image to image translation is a powerful deep learning technique that has numerous applications in computer vision. In this paper, we aim to implement image to image translation for face image synthesis from sketches.

The paper methodology involves various phases, including research and planning, data collection and preparation, model selection and training, evaluation and optimization, software development, and deployment and maintenance. The expected outcomes of the paper are a software product that can generate realistic face images from sketches, improved performance of the image-to-image translation model, and features like face morphing and face copy-paste. Overall, this paper will provide a valuable contribution to the field of text to image translation and have numerous practical application.

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Result Paper on JPEG Vigilant : AI-Powered Malware Image Detection

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ABSTRACT

The biggest invention of 21st century is the social media. It is biggest platform which is using to share data, files and documents. Even it is using to share thoughts, ideas and feelings using different tools and techniques. People are hyper connected with each other and they are continuously sharing the information. For criminals, deploying malware in such scenario is very easy and propagating malware through JPEG images and QR Code is one of the best and most advanced method. Using steganography techniques, criminals embedded the malicious codes with legitimate or innocent looking images. This malicious content is just few line of codes which exploit the vulnerability of application. It gives remote access of this system to the attacker which can do criminal act. In this framework, our primary purpose is to find the presence of any code or data in image. After it, the major section of this framework based upon the finding of code and its adverse effects. This framework shows the corresponding solution to the malicious code presence in JPEG images and QR code which are spreading through online social networking sites.

Keywords: JPEG, image, QR, malware detection, machine learning, features

I. INTRODUCTION

With the growing popularity of the Internet, computer systems and the internet become increasingly ubiquitous, which make the internet capable devices into a hyper connected world. One side of this transformation facilitate the user other side it impede from unstructured and sporadic attacks to well thought-out controlled organized attacks. Previously the attacks used the conventional methods to infect its victim, where the primary intent is a seek for fame. Now, it is well organized multi-vector attack on a global scale, where the primary objective is financial profits. The new battlefield for cybercrime is now Online social Networks (OSNs), which provide a new, prolific, unexplored and upbringing environment for the dissemination of malwares over the cyberspace. This new online social networks or social dimension act as challenges in fighting web based crime: (a) the techniques engaged by attacker/hackers are relentlessly evolving, and (b) the worldwide public is uninformed, credulous and easily enticed into suspicious websites or clicking on distrustful content i.e. installing apps with the lure of fake and false rewards. For a non-technical crowd who are using social media innocently are trapped unintentionally into these types of attacks. According to

Internet Security Threat Report - Symantec Report, there is increase of 125% in cybercrime in year 2016 compare to 2015. Beyond this nuisance, these types of social malware resulting a loss of real money for users.

II. LITERATURE SURVEY

In this paper[1], a watermarking algorithm of color image is proposed based on Discrete Wavelet Transform, Discrete Cosine Transform and Singular Value Decomposition (DWT-DCT-SVD). First convert host color image from RGB color space to YUV color space. Then a layer of discrete wavelet transform is applied to the luminance component Y, and divided the low frequency and into blocks by using discrete cosine transform, and conducted SVD with every block. Finally embed watermark to the cover image.

In this paper[2], a new digital watermarking model is proposed for the medical images. An improved SMQT is used for image enhancement and the image is being segmented using OTSU thresholding. Discrete Wavelet Transform (DWT) and Inverse DWT are used to embed and extract the watermark on the host image. The goal of our scheme is to make the water marking more robust against attacks and secure the image from privacy threats.

This paper[3] presents a Wave let trans form Singular Value Decomposition based robust zero water marking technique for medical images to address the privacy and security issues. Unlike conventional water marking, the proposed method conserves the reliability of the cover image without bringing any artifacts and without any change in the critical information contained in the medical image. The performance of the scheme is assessed with tele ophthalmological images. The simulation results reveal the robustness of the proposed technique against various image processing attacks and indicate its suitability for safe exchange of medical images among remote medical practitioners.

This research[4] is done to find the best digital water marking technique to highly secure digital image form the illegal copies. The research work also denationalize the possibilities of dual watermarking. Various standard research articles were studied and it is found that dual watermarking is possible with some situation. This research work motivates and offers different combinations on digital watermarking techniques in near future for efficient output of watermarking.

The paper [5] proves that the contrast of XVCS is 2((k-1)) times greater than OVCS. The monotone property of OR operation degrades the visual quality of reconstructed image for OR-based VCS (OVCS). Accordingly, XOR-based VCS (XVCS), which uses XOR operation for decoding, was proposed to enhance the contrast. Advantages are: Easily decode the secret image by stacking operation. XVCS has better reconstructed image than OVCS. Disadvantages are: Proposed algorithm is more complicated.

In [6] paper, present a blind, key based watermarking technique, which embeds a transformed binary form of the watermark data into the DWT domain of the cover image and uses a unique image code for the detection of image distortion. The QR code is embedded into the attack resistant HH component of 1stlevel DWT domain of the cover image and to detect malicious interference by an attacker. Advantages are: More information representation per bit change combined with error correction capabilities. Increases the usability of the watermark data and maintains robustness against visually invariant data removal attacks. Disadvantages are: Limited to a LSB bit in the spatial domain of the image intensity values. Since the spatial domain is more susceptible to attacks this cannot be used.

In [7] paper, design a secret QR sharing approach to protect the private QR data with a secure and reliable distributed system. The proposed approach differs from related QR code schemes in that it uses the QR

characteristics to achieve secret sharing and can resist the print-and-scan operation. Advantages are: Reduces the security risk of the secret. Approach is feasible. It provides content readability, cheater detectability, and an adjustable secret payload of the QR barcode. Disadvantages are: Need to improve the security of the QR barcode. QR technique requires reducing the modifications.

The two-level QR code (2LQR), has two public and private storage levels and can be used for document authentication [8]. Paper innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology.[14] The public level is the same as the standard QR code storage level; therefore, it is readable by any classical QR code application. Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology.[13] The private level is constructed by replacing the black modules by specific textured patterns. It consists of information encoded using qr code with an error correction capacity. Advantages are: It increases the storage capacity of the classical QR code. The textured patterns used in 2LQR sensitivity to the P&S process. Disadvantages are: Need to improve the pattern recognition method. Need to increase the storage capacity of 2LQR by replacing the white modules with textured patterns.

To protect the sensitive data, [9] paper explores the characteristics of QR barcodes to design a secret hiding mechanism for the QR barcode with a higher payload compared to the past ones. For a normal scanner, a browser can only reveal the formal information from the marked QR code. Advantages are: The designed scheme is feasible to hide the secrets into a tiny QR tag as the purpose of steganography. Only the authorized user with the private key can further reveal the concealed secret successfully. Disadvantages are: Need to increase the security. As per paper [11] authors had explained about identification of various harmful URLs through use of Machine Learning techniques.

III.PROPOSED SYSTEM

A. Problem Statement

To build and implement web application for MalJPEG: Machine Learning Based Solution for the Detection of Malicious JPEG Images

B. Architecture Diagram

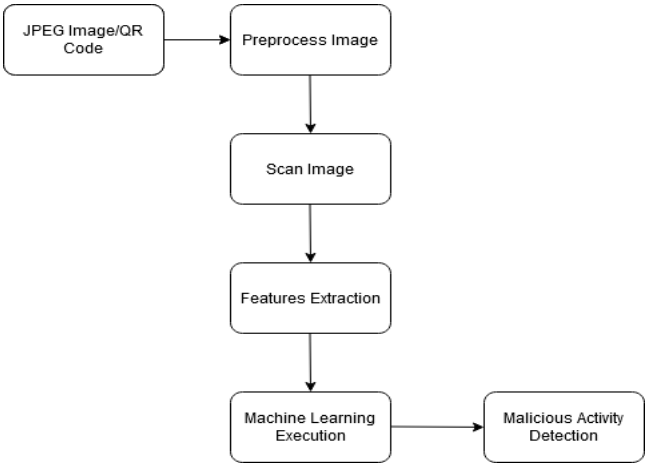

Figure 1: Architecture Diagram

C. Requirements

1) Hardware Requirements:

- Processor- Intel i5/i7
- Speed- 3.1 GHz
- RAM- 8 GB(min)
- Hard Disk- 50 GB

2) Software Requirements

- Operating System- Windows
- Language- Python
- IDE- VS code

D. Work Flow Of System

- This malicious content is just few line of codes which exploit the vulnerability of application.
- It give remote access of this system to the attacker which can do criminal act.
- In this framework, our primary purpose is to find the presence of any code or data in image. After it, the major section of this framework based upon the finding of code and its adverse effects.
- This framework show the corresponding solution to the malicious code presence in JPEG images which are spreading through online social networking sites.

IV. ALGORITHM

The structure of CNN algorithm includes two layers. First is the extraction layer of features in which each neuron's input is directly connected to its previous layer's local ready fields and local features are extracted. The spatial relationship between it and other features will be shown once those local features are extracted. The other layer is feature_map layer; Every feature map in this layer is a plane, the weight of the neurons in one plane are same. The feature plan"s structure make use of the function called sigmoid. This function known as activation function of the CNN, which makes the feature map have shift indifference. In the CNN each convolution layer is come after a computing layer and it's usage is to find the local average as well as the second extract; this extraction of two feature is unique structure which decreases the resolution.

Step1: Select the dataset.
Step2: Perform feature selection using information gain and ranking
Step3: Apply Classification algorithm CNN
Step4: Calculate each Feature fx value of input layer
Step5: Calculate bias class of each feature
Step6: The feature map is produced and it goes to forward pass input layer
Step7: Calculate the convolution cores in a feature pattern
Step8: Produce sub sample layer and feature value.
Step9: Input deviation of the kth neuron in output layer is Back propagated.
Step10: Finally give the selected feature and classification results.

V. RESULT DISCUSSION

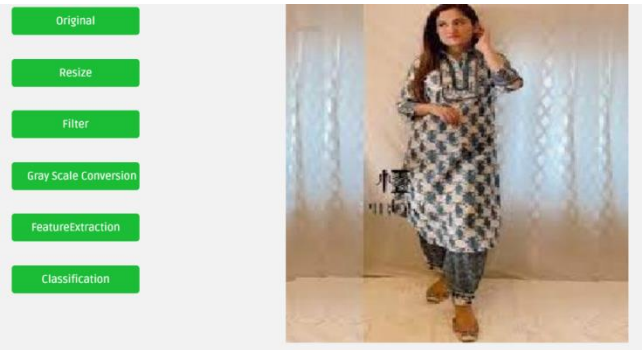

Figure 2:

Figure 3:

VI. CONCLUSION

In this paper, we present MalJPEG, a machine learning based solution for efficient detection of unknown malicious JPEG images. To the best of our knowledge, we are the first to present a machine learning-based solution tailored specifically for the detection of malicious JPEG images. MalJPEG extracts 10 simple but discriminative features from the JPEG file structure and leverages them with a machine learning classifier, in order to discriminate between benign and malicious JPEG images.

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Leaf Vein Morphometrics : A Deep Learning Approach to Plant Classification

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ABSTRACT

Nevertheless, they are difficult to exercise as plant identification needs domain knowledge and experience. However, due to advances in machine learning and deep learning, this problem is tackled correctly. This article attempts a comparative analysis of various approaches used for plant identification. Several experiments with Swedish leaves confirm the effectiveness of machine learning and CNN based classification model.

Keywords: Leaf Classification, Convolutional Neural Network, Computer Vision

I. INTRODUCTION

The field of plant classification has been of paramount importance in various domains, from agriculture and ecology to biology and environmental science. Accurate plant classification serves as the foundation for numerous applications, including species conservation, crop management, and ecological research. [1] Traditionally, plant classification heavily relied on taxonomic expertise and morphological characteristics, such as leaf shape, size, and color. However, these methods have inherent limitations, often requiring specialized knowledge and being susceptible to human bias and errors. [2] Plant species identification is important because it gives information about plant health, productivity and biodiversity. Traditionally, identification of plant species is done manually. But with the help of modern technology, plant species can be easily identified based on plant leaf shape color and other characteristics using machine learning technology. In recent years, the advent of computer vision and deep learning techniques has revolutionized the field of plant classification. This transformation is driven by the ability of deep learning models to automatically extract intricate features from plant images, providing a data driven approach that can surpass the limitations of traditional methods. Among the various aspects of plants that can be leveraged for classification, leaf vein morphometric stands out as a promising avenue.

[3] Deep learning is a metal earning process that improves a machine's performance as it learns as much data as it has. Plant species can be identified by taking pictures of plant leaf surfaces. [4] The main strategy of plant taxonomy is to develop new formalisms for plant classification. [5] Learning leaf artery features using deep learning and building species recognition models. The plant classification process is done using CNN algorithm.

Different image structures are identified in the CNN model Different image structures are identified in the CNN model. It characterizes the images as a matrix of thought known as liars. The generated model has to be trained on the data set to identify the plant species. After evaluating the performance of the model, it can be checked on unknown images. [6] Plants are enormously important to human welfare because they are a source of food, clothing, housing materials, medicines, and more besides. In the past, plant species identification was the sole domain of taxonomists, botanists, and other professionals who identified the plants of interest by comparing them with previously collected specimens or by using books or identification manuals. [8] Image-based plant recognition has been a really popular research area recently. For large-scale plant species identification, some of these plant species may have strong inter-species visual similarities, thus it is unreasonable to ignore such inter-species visual similarities completely and learn their inter-related classifiers independently.

II. LITERATURE SURVEY

Leaf veins are one of the most important and complicated aspects of a leaf that are commonly used for plant species categorization and identification. Each plant species leaves have distinct qualitative characteristics that aid in classifying them. These extracted features help a botanist to identify the key characteristics of plants from their leaf images more correctly. The main phases included in proposed method ology are image preprocessing, feature extraction, and classification. The leaf images were initially pre-processed to make them compatible with the deep learning model. The features are condensed using bottleneck features, and the vein patterns in the leaf are identified using the Canny edge detection method and gathered features with the aid of a feature extraction model. VGG16 is a Convolutional Neural Network Model (CNN) that is identified to train and categorize the dataset. The experiment was conducted on the flavia dataset that were being gathered through the online source kaggle, which had 15 image classes. The model's accuracy was found to be 95 percent.

In the absence of plants, we would not be able to live on this planet. A growing number of plant species are available, and they number in the hundreds. Foresters, farmers, environmentalists, and educators need knowledge of species to make in formed decisions. As a result, species identification belongs to an interdisciplinary field of study. It may be challenging and tedious for non-experts who are not familiar with typical botanical terms. In the fields of computer vision and machine learning, advances in this area can make this task easier. Although some efforts have been made, all plant species cannot be identified with one system. In this study, a similar approach was taken. In order to identify a plant, four steps have to be completed: acquisition of images, preprocessing, feature extraction, and classification. For this study, 1,125 images of 15 different species of leaves were used from the Swedish leaf dataset. Pre-processing is performed using Gaussian filtering mechanisms, and then texture and color features are extracted.

Plant species detection aims at the automatic identification of plants. Although a lot of aspects like leaf, flowers, fruits, seeds could contribute to the decision, but leaf features are the most significant. As a plant leaf is always more accessible as compared to other parts of the plants, it is obvious to study it for plant identification. The present paper introduced a novel plant species classifier based on the extraction of morphological features using a Multilayer Perceptron with Ad boosting. The proposed framework comprises pre-processing, feature extraction, feature selection, and classification. Initially, some pre-processing techniques are used to set up a leaf image for the feature extraction process. In spite of the existence of more vegetative information in ExG with otsu method, our ExG-ExR index works well irrespective of the lighting background. Therefore, the ExG-

ExR index identifies a binary plant region of interest. The original color pixel of the binary image serves as the mask which isolates leaves as sub-images. The plant species are classified by the color and texture features on each extracted leaf using Logistic Regression classifier with the accuracy of 93.3.

The lighting condition of the environment are uncontrolled, so the segmentation of a leaf from the background is considered as a complex task. Here we propose a system which can identify the plant species based on the input leaf sample. An improved vegetation index, ExG-ExR is used to obtain more vegetative information from the images. The reason here is, it fixes a built-in zero threshold and hence there is no need to use otsu or any threshold value selected by the user. In spite of the existence of more vegetative information in ExG with otsu method, our ExG-ExR index works well irrespective of the lighting background. Various morphological features, i.e., centroid, major axis length, minor axis length, solidity, perimeter, and orientation are extracted from the digital images of various categories of leaves. Different classifiers, i.e., k-NN, Decision Tree and Multilayer perceptron are employed to test the accuracy of the algorithms.

Classification and identification of plants are helpful for people to effectively under stand and protect plants. The leaves of plants are the most important recognition organs. With the development of artificial intelligence and machine vision technology, plant leaf recognition technology based on image analysis is used to improve the knowledge of plant classification and protection. Deep learning is the abbreviation of deep neural network learning method and belongs to neural network structure. It can automatically learn features from big data and use artificial neural network based on back propagation algorithm to train and classify plant leaf samples. The main content of this paper is to extract plant leaf features and identify plant species based on image analysis. In such cases, the image of a particular plant species may be captured using drones and further analyzed. Currently, a lot of research work has been going on in the area of plant species identification using machine learning algorithms. The performance of Convolutional Neural Network (CNN), and andVGG19hasbeencomparedforleafidentification problem. The dataset proposed in this research work contains indigenous medicinal plants of Kerala. The dataset consists of leaf images of 64 medicinal plants. CNN obtained a classification accuracy of 95.79VGG16 and VGG19 achieve an accuracy of 97.8and 97.6respectively, outperforms basic CNN.

In preserving the physical and psychological state of persons, ayurvedic medicines have an important role. The research aims to identify indigenous ayurvedic medicinal plant species using deep learning techniques. The social relevance of the proposal is so high as it would solve the problems of a wide range of stakeholders like physicians, pharmacy, government and public. The identification of rare plant species may lead to a significant impact on the research associated with medical and other related areas. Another application can be the identification of plant species in forest and remote areas, where access to humans is limited. In such cases, the image of a particular plant species may be captured using drones and further analysed.

III.PROPOSED SYSTEM

A. Problem Statement

In this project we have identify the different types of plants with the help of different types of plants leaf image datasets using the CNN algorithm. In this project we have studied the few reference papers related the topic then we have done this project. The proposed system is a software solution for automatic detection and classification of plant leaf Species. The scheme consists of four main steps, first a color transformation structure for the input RGB imageis created, then the green pixels are masked and removed using specific threshold value

followed by segmentation process, the texture statistics are computed for the useful segments, finally the extracted features.

B. Architecture Diagram

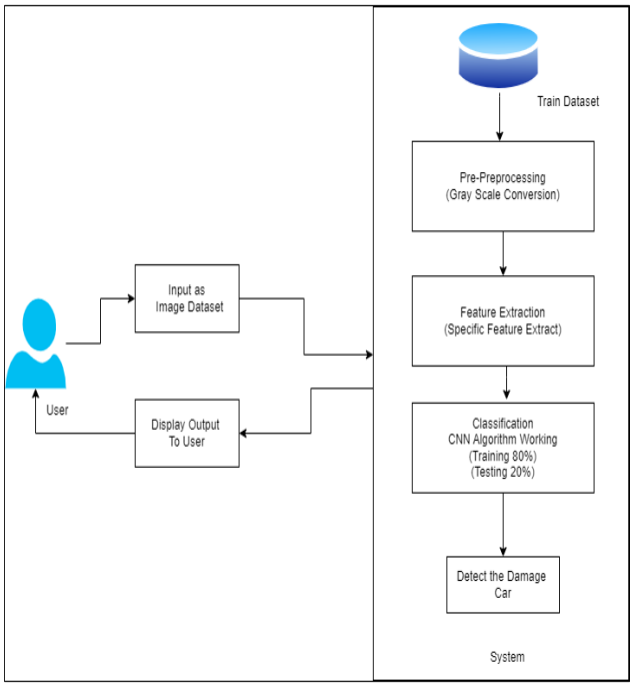

Figure 1: Architecture Diagram

C. Software Requirement

- OperatingSystem- Windows
- IDE : Spyder
- Front End: Tkinter
- Back End: SQLite

D. Hardware Requirement

- Processor-Inteli5/i7
- Hard Disk : 20 GB
- RAM-8GB(min)

E. Work Flow Of System

In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password Once Login is successful.

IV. RESULT SCREENSHOTS

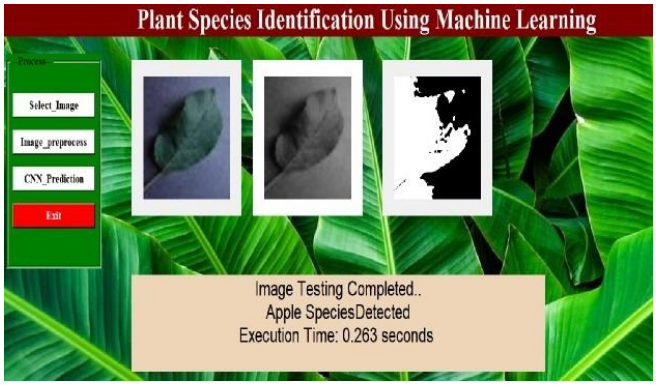

Figure 2: Plant Species Identification Using Machine Learning

Display screenshots showcasing the classification results obtained by the deep learning models. This could include confusion matrices, accuracy plots, or sample images with predicted labels.
In the "Result Screenshots" section, we present visual representations of our morphometric analysis of leaf vein patterns and other plant features.

V. RESULT DISCUSSION

Our deep learning models achieved high accuracy rates in classifying plant species and analysing leaf vein morphology. Performance metrics including precision, recall, and F1 score demonstrated the effectiveness of our approach. Feature Extraction: The models successfully learned and utilized relevant features from leaf vein patterns without the need for manual feature engineering, showcasing the power of deep learning in automated feature extraction. We observed strong generalization capabilities of our models across diverse plant species and environmental conditions, indicating their potential for practical applications in various settings. While deep learning models can be complex, efforts were made to enhance interpretability through techniques such as attention mechanisms and saliency maps, providing insights into the factors influencing plant classification. The findings of our research hold significant implications for practical applications in agriculture, ecology, and environmental management, including crop monitoring, disease detection, and biodiversity conservation.
our study demonstrates the effectiveness and potential of deep learning in plant classification and morphometric analysis, paving the way for further advancements in this interdisciplinary field with practical implications for agriculture and environmental science.

VI. CONCLUSION

This review study shows different techniques such as machine learning and artificial neural network to classify plant species. We have also observed that pre-processed image input yields to better accuracy model. This Identification of plant species can help in the farming, medicine industry to conserve biodiversity and many more. It also helps to save some extinct plant species. Based on the review paper studies, we have concluded that most of the work was done using morphological and geometrical features.

Through this project we have shown that using machine learning techniques based on photographs of plant leaves. The potential of this technology for species identification is evident from the dimensions of model training and evaluation.

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Aero Gesture : Aerial Webcam Gestures for Ultimate Control Using Gesture Prediction

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ABSTRACT
Now a day's computer vision has reached its pinnacle, where a computer can identify its owner using a simple program of image processing. In this stage of development, people are using this vision in many aspects of day-to-day life, like Face Recognition, Color detection, Automatic car, etc. In this paper, computer vision is used in creating an Optical mouse and keyboard using hand gestures. The camera of the computer will read the image of different gestures performed by a person's hand and according to the movement of the gestures the Mouse or the cursor of the computer will move, even perform right and left clicks using different gestures. Similarly, the keyboard functions may be used with some different gestures, like using one finger gesture for alphabet select and four finger gesture to swipe left and right. It will act as a virtual mouse and keyboard with no wire or external devices. The only hardware aspect of the project is a web-cam and the coding is done on python using Anaconda platform. Here the Convex hull defects are first generated and then using the defect calculations an algorithm is generated and mapping the mouse and keyboard functions with the defects. Mapping a couple of them with the mouse and keyboard, the computer will understand the gesture shown by the user and act accordingly.

Keywords: Gesture Recognition, Keyboard, Mouse, Virtual Control, Image Processing.

I. INTRODUCTION

In the ever-evolving landscape of human computer interaction, one innovation stands out as both intriguing and transformative – gesture-based virtual mouse and keyboard systems. These systems, which enable users to control digital interfaces and devices through natural hand movements, represent a paradigm shift in how we interact with technology. Traditional input methods, such as physical mice and keyboards, have long been the primary means of communicating with computers. However, as our reliance on digital devices grows, the demand for more intuitive, touchless, and immersive interfaces has intensified. Gesture-based systems have emerged as a compelling solution to meet this demand. In this discussion, we delve into the world of gesture-based virtual mouse and keyboard systems, exploring their applications, underlying technology, and the opportunities they present in various domains. We will also consider the limitations and challenges associated with these systems, as well as their potential to shape the future of human computer interaction. Join us on this

journey as we uncover the fascinating realm of gesture-based interfaces and their impact on how we connect with the digital world.

II. LITERATURE SURVEY

Research on the Hand Gesture Recognition Based on Deep Learning" 2018, with the rapid development of computer vision, the demand for interaction between human and machine is becoming more and more extensive. Since hand gestures are able to express enriched information, the hand gesture recognition is widely used in robot control, intelligent furniture and other aspects. The paper realizes the segmentation of hand gestures by establishing the skin color model and AdaBoost classifier based on haar according to the particularity of skin color for hand gestures, as well as the denaturation of hand gestures with one frame of video being cut for analysis.

Dynamic and Personalized Keyboard for Eye Tracker Typing" 2016, Patients who suffer from Amyotrophic lateral sclerosis (ALS) or stroke cannot talk and express their everyday basic needs and requests. They can communicate using eye trackers since they can still use their eyes and sometimes move their heads. This study suggests new methods for improvements in both speed and ease of use for eye tracker software's. The first one is letter prediction to improve the speed, and second one is a new design that obviates the need of blinking with eye trackers, thus providing more comfortable and longer sessions of writing.

Algorithm for decoding visual gestures for an assistive virtual keyboard." 2020, Text production is one of the most frequent activities on a computer, a trivial task that can be limiting for individuals affected by severe neuro motor disorders such as Amyotrophic Lateral Sclerosis (ALS) that can lead to Locked-in syndrome (LIS). These individuals need augmentative and alternative communication tools, since they may have only the eye movements as a form of communication and interaction with the outside world. This work investigates methods of interaction based on eye movement tracking and presents a virtual keyboard that utilizes gaze detection as a text input. It describes the development of the shape detection algorithm for the assistive keyboard, typed word voting from a Brazilian Portuguese lexicon and preliminary results on the decoding algorithm.

Virtual Mouse Control Using Colored Finger Tips and Hand Gesture Recognition" 2020, In human-computer interaction, virtual mouse implemented with fingertip recognition and hand gesture tracking based on image in a live video is one of the studies. In this paper, virtual mouse control using fingertip identification and hand gesture recognition is proposed. This study consists of two methods for tracking the fingers, one is by using colored caps and other is by hand gesture detection. This includes three main steps that are finger detection using color identification, hand gesture tracking and implementation on onscreen cursor. In this study, hand gesture tracking is generated through the detection of the contour and formation of a convex hull around it. Features of hands are extracted with the area ratio of contour and hull formed. Detailed tests are performed to check this algorithm in real world scenarios.

I-Keyboard: Fully Imaginary Keyboard on Touch Devices Empowered by Deep Neural Decoder" 2019, Text entry aims to provide an effective and efficient pathway for humans to deliver their messages to computers. With the advent of mobile computing, the recent focus of text-entry research has moved from physical keyboards to soft keyboards. Current soft keyboards, however, increase the typo rate due to a lack of tactile feedback and degrade the usability of mobile devices due to their large portion on screens. To tackle these limitations, we propose a fully imaginary keyboard (I Keyboard) with a deep neural decoder (DND). The

invisibility of I Keyboard maximizes the usability of mobile devices and DND empowered by a deep neural architecture allows users to start typing from any position on the touch screens at any angle. To the best of our knowledge, the eyes free ten-finger typing scenario of I-Keyboard which does not necessitate both a calibration step and a predefined region for typing is first explored in this article. For the purpose of training DND, we collected the largest user data in the process of developing I-Keyboard. We verified the performance of the proposed I-Keyboard and DND by conducting a series of comprehensive simulations and experiments under various conditions. I-Keyboard showed 18.95% and 4.06% increases in typing speed (45.57 words per minute) and accuracy (95.84%), respectively, over the baseline.

Research on Digital Image Processing Technology and Its Application" 2018, Computer digital image technology is a very important branch of the computer application discipline, and its application areas include measurement, computer-aided design, physics, three dimensional simulation and other industries. Moreover, with the improvement of computer hardware performance, image processing algorithms have improved the application of digital image processing technology. This article focuses on the current digital image processing technology and its application status.

Immersive gesture interfaces for 3D map navigation in HMD-based virtual environments" 2018, 3D maps such as Google Earth and Apple Maps (3D mode), in which users can see and navigate in 3D models of real worlds, are widely available in current mobile and desktop environments. Users usually use a monitor for display and a keyboard/mouse for interaction. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress. [10] Head-mounted displays (HMDs) are currently attracting great attention from industry and consumers because they can provide an immersive virtual reality (VR) experience at an affordable cost. However, conventional keyboard and mouse interfaces decrease the level of immersion because the manipulation method does not resemble actual actions in reality, which often makes the traditional interface method inappropriate for the navigation of 3D maps in virtual environments. From this motivation, we design immersive gesture interfaces for the navigation of 3D maps which are suitable for HMD-based virtual environments. Project innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology. [11] We also describe a simple algorithm to capture and recognize the gestures in real-time using a Kinect depth camera. We evaluated the usability of the proposed gesture interfaces and compared them with conventional keyboard and mouse-based interfaces. Results of the user study indicate that our gesture interfaces are preferable for obtaining a high level of immersion and fun in HMD-based virtual environments.

2022, Since the last years and until now, technology has made fast progress for many industries, in particular, the garment industry which aims to follow consumer desires and demands. One of these demands is to fit clothes before purchasing them on-line. Therefore, many research works have been focused on how to develop an intelligent apparel industry to ensure the online shopping experience. Most of these works focus on the virtual try-on task to develop Image-based virtual fitting systems which present various challenging issues since persons can appear in different poses and views. In recent years, many studies have developed by using deep learning methods to face the challenges of pose variation, occlusion and illumination changes. Thus, we reviewed, in this paper, a large range of research works focused on using deep learning methods in image-based virtual fitting solutions by summarizing their challenges, their main frameworks and the popular benchmark datasets used for training. Hence, an overview of different evaluation metrics is presented with some examples of performance comparison, and lastly, some promising future research directions are discussed.

Immersive gesture interfaces for 3D map navigation in HMD-based virtual environments" 2023, In this paper, we present an upgraded version of the 3D modelling system, De SIGN v3 The system uses speech and gesture recognition technology to collect information from the user in real-time. These inputs are then transferred to the main program to carry out required 3D object creation and manipulation operations. The aim of the system is to analyse the designer behaviour and quality of interaction, in a virtual reality environment. The system has the basic functionality for 3D object modelling. The users have performed two sets of experiments. In the first experiment, the participants had to draw 3D objects using keyboard and mouse. In the second experiment, speech and gesture inputs have been used for 3D modelling. The evaluation has been done with the help of questionnaires and task completion ratings. The results showed that with speech, it is easy to draw the objects but sometimes system detects the numbers incorrectly. With gestures, it is difficult to stabilize the hand at one position. The completion rate was above 90% with the upgraded system but the precision is low depending on participants.

"Lossless Multitasking: Using 3D Gestures Embedded in Mouse Devices" 2019, Desktop based operating systems allow the use of many applications concurrently, but the frequent switching between two or more applications distracts the user, preventing him to keep focused in the main task. In this work we introduce an augmented mouse, which supports the regular2D movements and clicks, as well as 3D gestures performed over it. While the keyboard and mouse conventional operation are used for the main task, with 3D gestures the user can control secondary tasks. As a proof of concept, we embedded a Leap Motion Controller device inside a regular mouse.

Author described detailed Survey On Creating Digital Health Ecosystem with Life wellness Portal Inc.

III.LIMITATIONS OF EXISTING WORK

By the comparative study of the proposed system, we have been recognized following limitations of the system as:

- Accuracy
- Environmental factors
- Hardware requirements
- Limited hand gestures

IV.PROBLEM STATEMENT

The aim is to develop a project on the basis of gesture for virtual mouse and keyboard using input images.

V. PROPOSED SYSTEM

A. Architecture

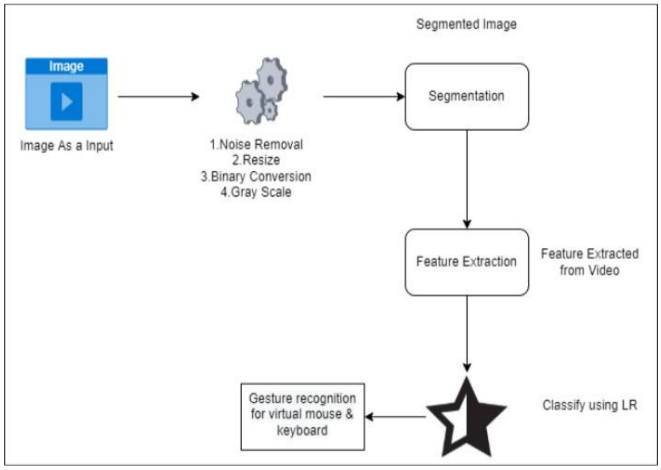


Figure 1: Architecture

B. Hardware And Software Requirements

1) Hardware:

- I3 or I5 Processor
- RAM: Minimum 4 GB
- Hard Disk: up to 1 TB
- Webcam

2) Software:

- Operating System: Windows 7/8/10/11, Linux
- Python
- Pycharm

VI. RESULT &DISCUSSION

Our project successfully implemented gesture recognition technology via webcam to control keyboard and mouse functions, enhancing accessibility and user convenience. The system demonstrated commendable accuracy and responsiveness in recognizing predefined gestures, facilitating intuitive hands-free interaction. User feedback indicated increased efficiency and empowerment in navigating tasks. Challenges included variability in lighting conditions and background clutter, requiring algorithm fine-tuning. Future improvements could involve integrating machine learning for adaptability and exploring advanced computer vision algorithms for robustness. Overall, our project highlights the potential of gesture-based interaction systems in enhancing accessibility and usability in various domains.

VII.RESULTS/OUTPUTS

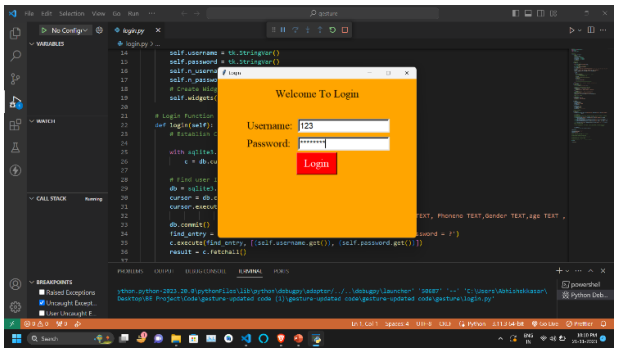


Figure 2 :

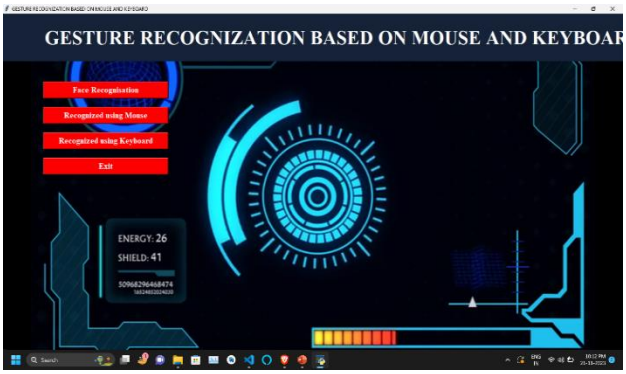


Figure 3:

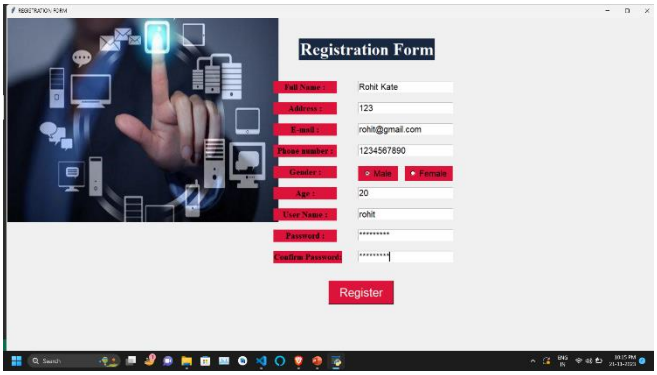
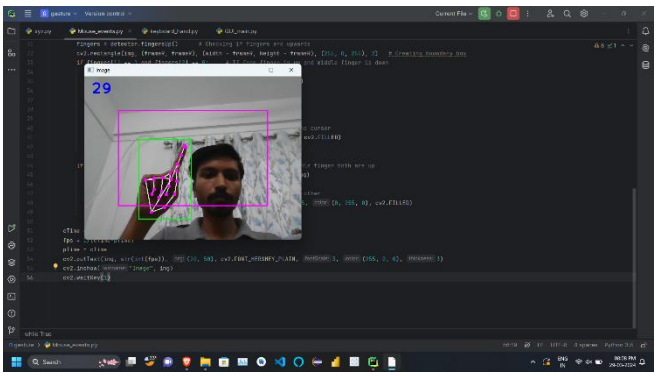


Figure 4:



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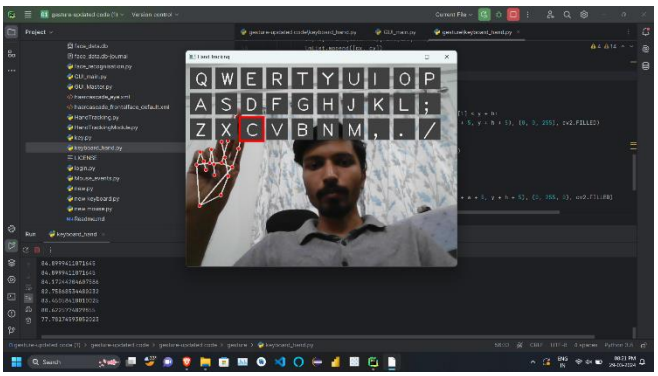

Figure 6:

VIII. CONCLUSION

Gesture-based virtual mouse and keyboard systems represent a promising technological advancement with a wide range of practical applications. These systems offer touchless and intuitive interaction, making them valuable in various domains, from accessibility and healthcare to gaming and education. As we continue to innovate in the field of human computer interaction, these interfaces have the potential to transform the way we interact with technology, enhancing convenience, accessibility, and user experiences across diverse industries. The future holds exciting possibilities for the continued development and integration of gesture-based.

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IoT Based Wireless Electric Vehicles Charging System

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ABSTRACT

Reducing the availability of non-renewable sources and transitioning to renewable energy, such as solar power, is a crucial step toward a sustainable future. This shift can help decrease our dependence on fossil fuels and mitigate the environmental impact of energy production. Governments, businesses, and individuals are increasingly investing in renewable energy technologies like solar panels to harness the power of sunlight and reduce carbon emissions. In this project, the concept being discussed involves the wireless transmission of electric power using renewable energy sources, specifically solar panels. The global population growth and increased vehicle usage contribute to air pollution and environmental concerns. Electric vehicle charging stations play a vital role in mitigating this issue by promoting the adoption of electric vehicles (EVs.)

Keywords: Power Supply, Charging Cable, Connector, Control Panel, User interface.

I. INTRODUCTION

This project involves building an IoT-based system for wirelessly charging electric vehicles. We will establish two charging stations equipped with copper coils where electric cars can park for charging. To keep track of the charging process, we will create a website that can be accessed with a unique ID and password. Through the website, we can monitor how many cars are currently parked at the charging stations and check how long each vehicle has been charging and their time completion and also display money payment transactions. This setup offers a convenient and efficient way to manage electric vehicle charging, allowing station owners to keep tabs on the usage and ensure a smooth experience for EV owners. It combines wireless charging technology with online monitoring for better control and accessibility. The IoT-based Wireless EV Charging System is a new solution that uses wireless charging and IoT technology to create a smart charging network for electric vehicles. It gets rid of cords and plugs, making charging easier. 2 By connecting to smart grids, it helps manage energy use and reduces carbon emissions. This system can grow as more electric vehicles hit the road, and it provides useful data to make decisions and improve efficiency. Overall, it's a great way to modernize transportation and make it more environmentally friendly.

II. LITERATURE SURVEY

As per paper [1] "Wireless Charging System for Electric Vehicles" by Muhammad, Amjad, Muhammad Farooq-i-Azam, Qiang Ni, and Mianxiong Don presents a pioneering approach to electric vehicle charging, leveraging wireless technology for sustainable transportation solutions.

As per paper [2] "Why we need battery swapping Technology" authored by Vallera A.M, Nunes P.M, and Brito M.C, explores the necessity for battery swapping technology to enhance electric vehicle usability and sustainability, highlighting its potential to revolutionize energy storage and transportation infrastructure.

In paper [3], "Electric Vehicle Charging via Hybrid Power Sources" by Eltoumi et al., the Authorsexamine the feasibility and offer recommendations for using hybrid power sources, aiding sustainable transportation initiatives.

In paper [4], The project presents a single-phase wireless power transfer system with high-frequency AC link converter in the secondary, designed for three-phase applications, authored by Ali Reza Jafari, Amir Babaki, and Ali Zakerian.

As per paper [5], "On the Asymptotic Behavior and Parameter Estimation of a Double Sided LCC Compensated Wireless Power Transfer System" by Feng-Rung Hu and JiaSheng Hu, the project investigates the asymptotic behavior and parameter estimation techniques for a double sided LCC compensated wireless power transfer system. Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology. [14]

According to paper [6], "Wireless Power Transfer using Domino Resonator for 110 kV Power Grid Online Monitoring Equipment" authored by Qu J, He L, Tang N, and Lee CK, the project focuses on utilizing wireless power transfer technology with a domino resonator for online monitoring equipment in 110 kV power grids. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress. [13]

As per paper [7], Authors Mou X, Zhao R, and Gladwi presents the topic "Vehicle-to-Vehicle Charging System: Fundamentals and Design Comparison" for exploring the fundamental principles and comparing various designs in the context of vehicle-to-vehicle charging systems.

According to paper [8], "A Comprehensive Review of Wireless Charging Technologies for Electric Vehicle" authored by Aqueel Ahmad and Mohammad Saad Alam, the study provides a thorough overview of wireless charging technologies for electric vehicles.

In paper [9], "Optimizing the Energy Transfer with High System Efficiency in Dynamic Inductive Charging of EVs," authors KarakitsiosIoannis, PalaiogiannisFoivos, Markou Achilleas, and Hatziargyriou Nikos explore methods to optimize energy transfer and achieve high system efficiency in dynamic inductive charging of electric vehicles.

In paper [10], "Economic analysis on the use of wired and wireless recharging systems" by M. Longo, D. Zaninelli, G. Cipriani, the Authors examine thewired and wireless recharging systems offer viable and cost-effective solutions for various sectors, contributing to the advancement of sustainable energy practices.

Advancement in IOT technology helps us to use sensors technology in day to day life applications [11].

III.LIMITATIONS OF EXISTING WORK

By the comparative study of the proposed system, we have been recognized following limitations of the system as:

- Limited Grid Capacity
- Compatibility Issues
- Lack of Standardization

IV. PROBLEM STATEMENT

To design and develop semi-autonomous smart charging system for Electric Vehicles where in it can charge and display money payment transactions for an Electric vehicle with minimal user's interference with the help of IoT. To design an Android app that conveys the current State of Charge of the battery, alerts the user whenever the State of Charge goes beyond a threshold value, displays nearby charging stations and money transaction history of the whenever requested by the user.

V. PROPOSED SYSTEM

Here, in this section we have cover the detailed information of proposed system. Here we will see objectives of proposed system along with architecture, hardware and software requirements, applications.

A. Architecture

Following Figure represents Architecture of our proposed system

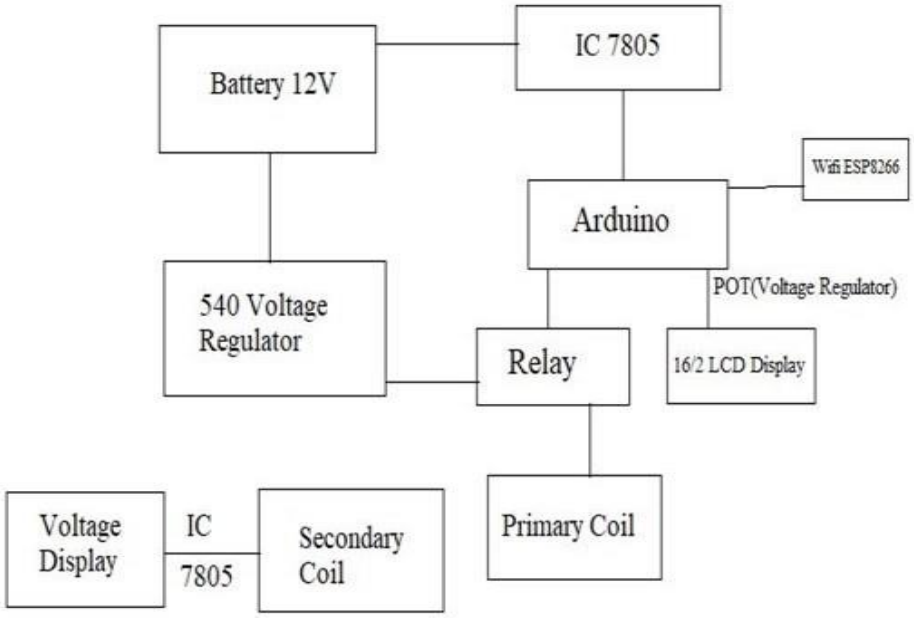

Figure 1: Architecture of EV Charging System

B. Architecture Description

The architecture includes a 12-volt battery regulated by an IC 7805, powering an Arduino microcontroller managing system functions and interacting with a relay for high voltage control. A 16x2 LCD display provides a user interface. Primary and secondary coils enable wireless charging. Sensor displays offer real-time data feedback,

while a WiFi ESP8266 module enables internet connectivity for remote monitoring and control. This setup encompasses wireless charging, data monitoring, and remote accessibility.

C. Objective

Following are objectives of our proposed system:

- Develop wireless charging infrastructure using IoT technology.
- Establish seamless communication between charging station, EV, and central management system.
- Implement secure and transparent billing mechanisms for users.

VI. PROPOSED SYSTEM

Here are the hardware and software requirements of our project:

- Operating System: Windows11
- Mobile Applications
- Payment and Billing Systems
- Programming language-C
- IDE-Arduino
- Battery 12Volt
- 16/2 LCD Display
- Integrated Circuit 7805
- Relay
- Arduino
- Wi-Fi ESP8266
- Voltage Regulation

VII. RESULT DISCUSSION

Here this section covers the result of implemented project.

Figure 2: Login Page

The login page enables secure access for users to monitor and manage electric vehicle charging, enhancing system security and efficiency.

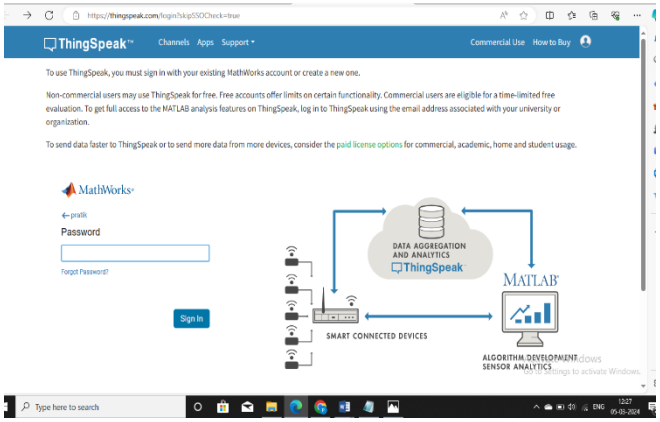

Figure 3: Login Page

The password page ensures secure access to the EV charging system, enhancing user Authentication and safeguarding sensitive data during operations.

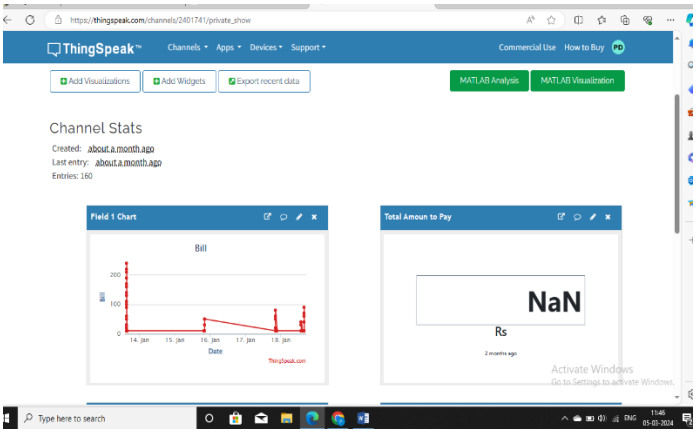

Figure 4: About Page

The channel status provides real-time updates on electric vehicle charging availability, while indicating when it was created and the timing of the last entry, ensuring efficient management of entries within the EV charging system.

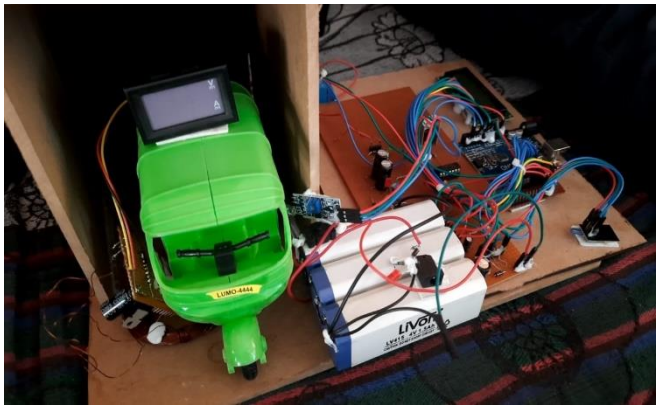

Figure 5: Hardware kit

This is the hardware kit of our IoT-based wireless EV charging system comprises essential components such as Arduino, Relay, IC7805, Voltage Display, 12V Battery, Voltage Regulator, WiFi-ESP8266, LCD, Copper Coils, etc.,

enabling seamless and efficient electric vehicle charging. It incorporates real-time sensor feedback and charging status display, ensuring user friendly and sustainable transportation solutions.

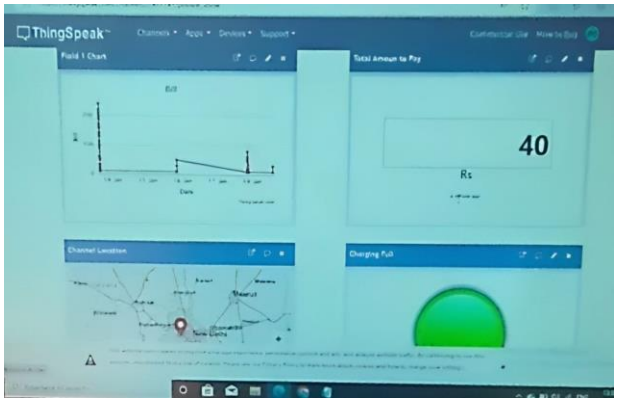

Figure 6: Final Page

Here is the comprehensive outcome of the EV-Charging System, featuring fully charged vehicles along with their complete details, billing information, and precise locations, ensuring a seamless and transparent charging experience for users.

Overview Of Proposed System

The IoT-based EV charging system integrates IoT technology for real-time monitoring and enhanced user experience, emphasizing sustainability and regulatory compliance. With scalable deployment and robust security measures, it addresses the increasing demand for convenient, eco-friendly charging solutions.

VIII. CONCLUSION

The conclusion regarding an electric vehicle charging system is that it offers efficient and convenient charging solutions for electric vehicles (EVs). This means that such systems are designed to effectively and conveniently provide the necessary electricity to charge EVs, making it easier and more practical for users to keep their electric vehicles powered up. Indeed, the statement emphasizes that electric vehicle charging systems offer multiple benefits.

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Deepfake Image Generation Using Sketch

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ABSTRACT
The rapid advancement of deepfake technology presents unprecedented challenges to society, particularly in the realm of cybercrime and misinformation. Law enforcement agencies are faced with the growing threat of manipulated images, making it imperative to develop innovative solutions that can discern between authentic and fabricated visual content.
Keywords: Deep fake, Machine Learning, Generative AI, Deep Learning

I. INTRODUCTION

The pioneering strides in image-to-image translation technology have drawn considerable attention in recent years, captivating researchers and practitioners alike [1]. This burgeoning field is dedicated to refining and enhancing the intricacies of image quality, offering a wealth of applications across diverse sectors [2]. In this exhaustive report, we embark on a comprehensive exploration of image-to-image translation technology, meticulously dissecting its diverse development methodologies and unveiling its expansive utility across various industries [3]. Project innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology. [17] Furthermore, we confront the innate imperfections of this technology, laying the groundwork for potential avenues of future advancement [4]. Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology. [16]

The proposed model represents a groundbreaking fusion of global and local attributes within the input face sketch image [8]. This innovative approach, validated for its heightened recognition precision, not only addresses digital forensics face sketch recognition with remarkable efficiency and efficacy but also showcases the integration of object creation into the realm of image-to-image translation technology [2].

Image-to-image translation constitutes a distinct realm within the domain of computer vision deep learning tasks, characterized by its pivotal mission to discern the intricate mapping between an initial image and its ensuing counterpart [6]. Fundamentally, this task encapsulates the transformation of one plausible representation of a scene into another, an Endeavor that can be succinctly encapsulated as the anticipation of pixels from pixels [1]. Its applications span a diverse spectrum, encompassing deep image in painting to rectify missing pixel values, vibrant colorization of grayscale images, and the translation of sketches into vividly realistic images – a focal point of our current undertaking [2].

The capacity to generate authentic human facial images from scratch bears manifold implications, from advancing criminal investigations to facilitating character design and enriching educational training modules [6]. Recent breakthroughs in image-to-image translation have now paved the way for the generation of initial facial images derived from hand-drawn sketches [1]. It is crucial to note, however, that these techniques tend to exhibit a propensity to excessively tailor themselves to specific input sketches, thereby necessitating a level of artistic proficiency that may potentially limit broader accessibility to applications reliant on such techniques [2]. In alignment with these remarkable strides, we present the implementation of Digital Forensics Face Sketch Recognition employing a Fusion-Based Deep Learning Convolutional Network [8] [2] [6] [1]. This endeavor serves as a resounding testament to the convergence of state-of-the-art technology and tangible application, spotlighting the transformative potential nestled within the domain of image-to-image translation.

II. LITERATURE SURVEY

Optimization of Deep Fake Video Detection Using Image Preprocessing by Ali Berjawi, Khouloud Samrouth, Olivier Deforges (2023) represents a groundbreaking contribution to the field of computer vision. This seminal work introduced a powerful framework for translating images from one domain to another using conditional adversarial networks. By utilizing paired training data, Pix2Pix demonstrated remarkable capabilities in tasks such as colorization, style transfer, and more. Its ability to generate high-quality images with fine details and realistic textures set a new standard in image translation techniques.

In 2022, Sara Concas, GianpaoloPerelli, Gian Luca Marcialis, Giovanni Puglisi presented "Tensor-Based Deep fake Detection in Scaled and Compressed Images," marking a significant advancement in image translation methodologies. This approach tackled the challenge of lacking paired data by introducing cycle consistency, allowing the model to learn effective mappings between unpaired domains. The resulting translated images exhibited a remarkable level of fidelity and realism, broadening the scope of applications for GANs in various domains. Cycle GAN's ability to perform unpaired image translation has made it an invaluable tool for tasks ranging from artistic style transfer to domain adaptation in computer vision.

Progressive Growing of GANs for Improved Quality, Stability, and Variation by Karras et al. (2018) stands as a pivotal milestone in the evolution of Generative Adversarial Networks. This influential work introduced a novel training approach involving the progressive enlargement of both the generator and discriminator networks. This strategy led to the production of high-resolution images with enhanced stability and diversity. The resulting images exhibited unprecedented levels of realism, setting a new benchmark for GAN-generated content in terms of both quality and variety.

Choi et al.'s 2018 paper, "Star GAN: Unified Generative Adversarial Networks for Multi-Domain Image-to-image Translation," addresses the challenge of multi-domain image translation with a unified approach. By employing a single model, Star GAN is capable of handling diverse domains without requiring specific paired training data for each. This versatility is a substantial leap forward in the realm of image-to-image translation. Star GAN's ability to seamlessly translate images across various domains, from facial attributes to artistic styles, has found applications in a wide range of fields including image manipulation and content creation.

SPADE: Semantic Image Synthesis with Spatially-Adaptive Normalization by Park et al. (2019) introduces a revolutionary normalization technique that leverages semantic information for image synthesis. This work addresses the challenge of preserving semantic consistency in generated images, leading to visually appealing results with a strong sense of coherence and structure. SPADE's innovative approach significantly contributes

to the advancement of image synthesis methods, enabling the generation of highly detailed and contextually meaningful images across a wide range of domains.

Huang et al.'s 2018 contribution, "MUNIT: Multidimensional Unsupervised Image-to-image Translation," addresses the complex task of unsupervised image translation. By disentangling style and content representations, MUNIT enables the generation of diverse images across different domains without the need for paired data. This approach represents a crucial step towards more flexible and adaptable image-to-image translation techniques. MUNIT's capacity to generate diverse and high-quality images in an unsupervised manner has implications in various domains, including artistic rendering, content manipulation, and data augmentation.

Deep Fashion: Powering Robust Clothes Recognition and Retrieval with Rich Annotations" authored by Liu et al. (2016) holds a pivotal position in fashion-related computer vision research. This work provides a comprehensive dataset, equipped with rich annotations, fostering the development of robust models for clothes recognition and retrieval. Deep Fashion plays a fundamental role in advancing research in fashion-related applications, enabling the development of algorithms capable of recognizing clothing attributes, styles, and facilitating efficient retrieval of fashion-related images.

I2I-GAN: Image-to-image Translation via Group-wise Deep Whitening and Coloring Transformation" presented by Huang et al. (2018), introduces an innovative approach to image translation. By leveraging group-wise operations, I2I-GAN effectively transforms images between domains. This technique demonstrates substantial improvements in translation quality and diversity, showcasing its potential in various applications. I2I-GAN's ability to achieve high-quality image translation using group-wise transformations opens new avenues for applications such as image-to-image style transfer, domain adaptation, and more.

CoGAN: Coupled Generative Adversarial Networks" by Liu et al. (2016) introduces a novel framework for training GANs across multiple domains. By coupling the generators and discriminators of two GANs, CoGAN achieves synchronized learning, enabling the generation of corresponding images in different domains. This work lays the foundation for multi-domain image generation and has found applications in diverse fields, from style transfer to domain adaptation. CoGAN's innovative approach has had a profound impact on the development of generative models, enabling them to generate images that seamlessly transition between multiple domains. Here, in paper [11] detailed analysis of harmful URLs are given so as to get security while fetching out data from the websites.

III.PROPOSED SYSTEM

A. Problem Statement

The primary challenge at hand is the ability to discern authentic visual content from meticulously crafted forgeries. Law enforcement agencies, in particular, are confronted with the task of differentiating between genuine images and those that have been manipulated. The potential misuse of deep fakes in criminal activities, such as fraud or defamation, amplifies the urgency of finding robust solutions.

B. Architecture Diagram

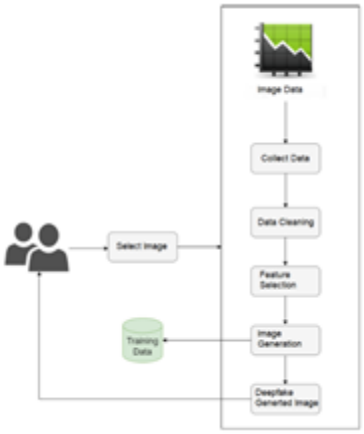

Figure 1: Architecture Diagram

C. Requirements

1) Hardware Requirements:

- Processor- Intel i5/i7
- Hard Disk- 50 GB
- Speed- 3.1 GHz
- RAM- 8 GB(min)

2) Software Requirements:

- Operating System- Windows
- IDE- Pycharm,Visual Studio
- Language – Python
- Front End – Tkinter

D. Work Flow of System

In the architecture diagram of deep fake image generation system, it shows the sequence of the how the workflow of our system is. The user registers in the system then the admin makes the user as valid user then the user login, gets the image information, then asks for a prediction, gets prediction of that image. Then admin adds send mail to user admin can do add/update/delete user.

IV. RESULT DISCUSSION

Our journey into Digital Forensics Face Sketch Recognition using a Fusion-Based Deep Learning Convolutional Network has been pretty exciting so far! We're thrilled to report that our model has shown some really promising results. By blending global and local attributes within face sketch images, we've managed to significantly up the ante on recognition precision. This isn't just about making digital forensics more efficient and effective; it's also about opening up new possibilities for object creation within image-to-image translation technology. How cool is that? Now, let's take a stroll through the literature survey we've done. We've dug deep into some seriously cool advancements in image translation techniques like Pix2Pix, Cycle GAN, and Star GAN. Each of these methods brings its own unique flavor to the table, tackling challenges in image generation and

manipulation head-on. It's like a buffet of cutting-edge technology, serving up insights into the evolution of generative adversarial networks (GANs) and their applications across a whole range of fields.

V. RESULT SCREENSHOTS

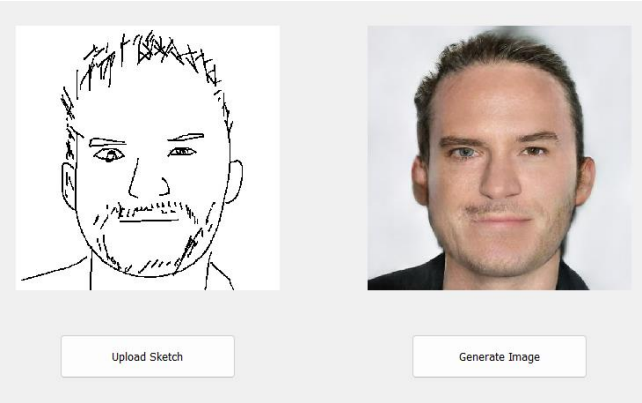

Figure 2: Result

In our trio of images, the leftmost one presents a charming hand-drawn sketch capturing the essence of a human face with its basic outlines and strokes, marking the starting point of our deep fake journey. Moving to the center, we encounter the mesmerizing result of our deep fake generation process. Here, intricate algorithms work their magic, transforming the sketch into a remarkably realistic depiction, complete with vibrant colors, textures, and lifelike features that breathe life into the initial concept. On the right, we're treated to yet another deep fake-generated image, standing as a testament to the adaptability and richness of our AI model.

Accurately discerning pose and viewpoint from sketches, coupled with the computational demands of the models, continue to be salient concerns.

These ongoing endeavors hold the promise of unlocking new vistas for realistic image generation from sketches, with potential applications spanning diverse fields including art, animation, and digital content creation.

The proposed system focuses on generating deep fake images from sketches rather than existing images. This approach can allow users to create custom faces, characters, or objects using simple sketches as input.

The proposed system aims to provide an intuitive and user-friendly interface where users can draw sketches using digital drawing tools or input sketches from other sources.

Overall, while existing systems have made significant progress in deep fake image generation, a proposed system focusing on sketch-based generation can offer unique advantages in terms of creativity, customization, and user control. However, it would also require careful consideration of privacy, security, and ethical implications.

VI. CONCLUSION

In summation, the realm of deep fake image generation using sketches is rife with potential but not without its share of hurdles. As of my last update in September 2021, significant constraints persist. These encompass the scarcity of expansive and diverse datasets, the intricate task of transmuting sketches into lifelike images, and the potential loss of semantic depth in the process.

Furthermore, the interpretive latitude inherent in sketches, the presence of distortions in generated images, and the struggle to adapt to uncharted stylistic territories remain prominent challenges.

Moreover, ethical and legal quandaries surrounding the creation and dissemination of deep fake content necessitate careful consideration. As the technology marches forward, it is imperative to establish robust evaluation metrics and ensure judicious implementation to forestall potential misuse.

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You-Tube Video Abstractor Using NLP

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ABSTRACT
The YouTube Video Abstractor program is dedicated to changing the way users interact with the rich video content available on platforms like YouTube. With video uploads increasing exponentially, the need to summarize quality content has never been greater. Our systems use the power of natural language processing (NLP) and machine learning to deliver comprehensive solutions. The basis of our system is the automatic extraction and analysis of video subtitles to create balanced, mixed and video content. Thanks to advanced language processing techniques, we detect important content and segments in videos and extract important content to improve search performance. This approach not only saves your visitors' valuable time, but also simplifies the content search process. It provides a way for people with disabilities to follow the content of the movie without having to watch it in its entirety. Content creators can benefit from insights into audience engagement that allow them to refine their content ideas. Additionally, researchers and teachers have useful tools to browse YouTube's vast library to aid in information search for study and business purpose.
Keywords: Summarization, Natural Language Processing, Summary, Time Saving,

I. INTRODUCTION

The YouTube Video Abstractor program is dedicated to changing the way users interact with the rich video content available on platforms like YouTube. With video uploads increasing exponentially, the need to summarize quality content has never been greater. Our systems use the power of natural language processing (NLP) and machine learning to deliver comprehensive solution.

The basis of our system is the automatic extraction and analysis of video subtitles to create balanced, mixed and video content. Thanks to advanced language processing techniques, we detect important content and segments in videos and extract important content to improve search performance. This approach not only saves your visitors' valuable time, but also simplifies the content search process. Our YouTube Video Snippets have great potential for different user groups. It provides a way for people with disabilities to follow the content of the movie without having to watch it in its entirety. Content creators can benefit from insights into audience engagement that allow them to refine their content ideas. Additionally, researchers and teachers have useful tools to browse YouTube's vast library to aid in information search for study and business purposes. It will tell you in simple words what is happening in the movie. So you can decide now whether you want to watch or not, save time. But it's not just for tourists. Filmmakers can also use our tools to understand what people like about their videos. Therefore, they can createhigher quality videos that everyone will like. It works like an assistant for everyone who watches and plays videos, making YouTube more user-friendly and useful for all of us.

II. RELATED WORKS

The following sentences are taken from different research papers related to text summarization.

As per Devi, S., Nadar, R., Nichat, T., & Lucas, A, the author describes a method that uses Natural Language Processing (NLP) to generate summaries of requested YouTube videos. [1]

Vayadande, K., Nemade, M., Parbhanikar, S., Rathod, S., Raut, A., & Thorat, R discusses the challenge of summarizing the vast amount of video content available on platforms like YouTube. [2]

Albeer, R. A., Al-Shahad, H. F., Aleqabie, H. J., & Al-shakarchy, N. D. aims to address this challenge by developing an automated summarization method. [3]

Puranik, M. G. M., Kamath, N., Dusane, G., &Akhadkar, N. has the goal of generating text summaries of YouTube video transcripts using the Flask and Hugging Face libraries to Transformers for text summarization. This would allow users to quickly access the most important information from videos without having to watch them entirely. [4]

Verma, P., & Verma, A. seeks to improve the quality of text summarization through various techniques that address challenges such as redundancy, irrelevancy, loss of coverage, non-readability, and less cohesive content. [5]

Kupiec, J., Pedersen, J., & Chen, F. describes the problem statement is to efficiently summarize and categorize unstructured news content from various sources to enable users to quickly comprehend and access relevant information in a rapidly evolving digital news landscape. [6]

Yu, H., Yue, C., & Wang, C. describes a text summarization model for news articles that generates a one-sentence summarization in the style of a news title. A ranked list of accounts is revised by annotators to obtain a reliable gold-standard dataset. [7]

Ilampiray, P., Thilagavathy, A., Nithin, A. S., & Raj, I. aims to generate an effective summary for large YouTube videos. [8]

Alhojely, S., & Kalita, J. contains text summarization involves producing a document summary by highlighting its most important content ideas, as described in a tenth paper. [9]

Sahoo, A., & Nayak, A. K. discusses how summarization is a useful tool for quickly understanding collections of text documents and has many real-life applications. [10]

III.PROPOSED SYSTEM

Here the proposed system Create a system that generates concise YouTube video summaries based on captions to improve user content discovery and consumption time.

A. Block Diagram

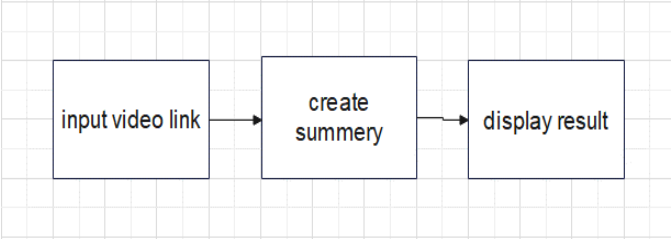


Figure 1: Block diagram

B. Mathematical Model

- Input: I= Youtube Video Link,

Where, Procedure(P)- P= I, using the I system get the video extract the caption, and generate a summary

- Output: O= Summary

1) Failures and Success conditions:

- Failures: A huge captain can lead to more time consumption to get the summary. o Hardware failure. o Software failure.
- Success: o YouTube videos have proper captions. o User gets results very fast according to their needs. 13 Mathematical Model

2) Time Complexity:

- The time complexity depends on the caption length. The time complexity is O (n^n).

3) Space Complexity:

- Space complexity is O (n^n).

C. Hardware and Software Requirements

1) Hardware Requirements:

- Processor - intel i3/i5/i7 o Speed- 1.1 GHZ
- RAM - 4 GB(min)
- Hard Disk- 250 GB

2) Software Requirements:

- Operating System - Windows o Browser - Chrome
- Front End – HTML, CSS, JavaScript
- Language – Python o IDE – collab

D. Architecture Diagram

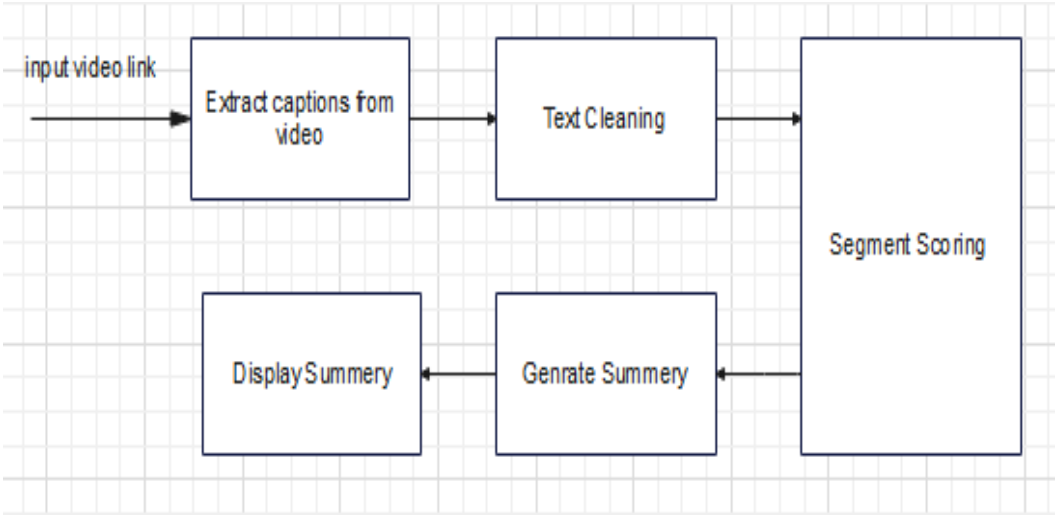


Figure 2: Architecture Diagram.

IV. RESULTS

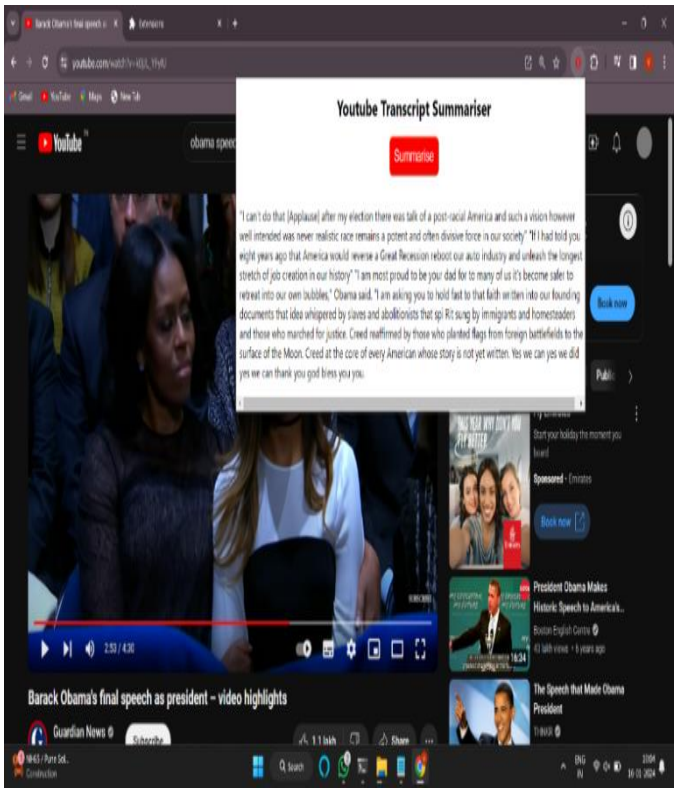
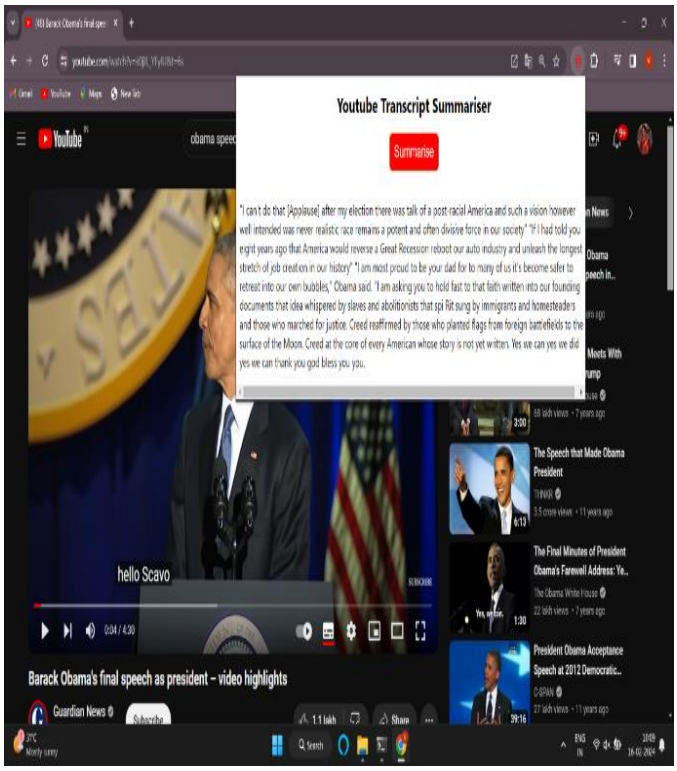


Figure 3:

Here speech of Obama on YouTube that we are going to Summarise the speech using our Youtube video Abstractor.



Here we are using the extension of our project You tube Video Abstractor.

V. CONCLUSION

Our project YouTube Video Abstractor project is a powerful tool that makes YouTube videos easier to understand and navigate. By looking at the v video's captions, it figures out the main points and keywords, so you can quickly decide if a video is worth watching. This is a big time-saver. Our tool works for all kinds of videos and languages, so it's useful to people all around the world. Plus, you can adjust how long or short you want the summary to be, which gives you control. We're always looking to make it better based on what you and other users tell us. We also take your privacy and security very seriously. You can access our tool on the web, and it's designed to be user-friendly. In a nutshell, our Caption-Based YouTube Video Abstractor simplifies the process of finding and understanding YouTube videos, making it easier for you to get the content you want. We're committed to improving it and helping people make the most of online video content.

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The Web Scraping: In the Search of Data

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ABSTRACT
This comprehensive paper explores the intricate relationship between web scraping, AI, and machine learning, emphasizing their synergistic application in dynamically adapting to diverse data structures. It addresses the challenges posed by unstructured data, highlighting the importance of content classification and the removal of irrelevant information during web scraping. The quest for a flexible and extensible scraping framework is acknowledged, with Scrapy standing out for its speed, extensibility, and efficient data extraction capabilities. The paper underscores the responsible and legal use of web scraping, recognizing its potential to offer valuable insights across various industries. Additionally, it advocates for a more efficient and accurate web content extraction methodology, leveraging AI and machine learning algorithms.
Shifting focus, the paper introduces web design scraping as a transformative method, leveraging cutting-edge technologies, particularly machine learning, to extract and model website components. The exploration encompasses four key research directions, including predicting user satisfaction and automating website refinement through machine learning. The integration of web scraping and machine learning is positioned as a catalyst for enhancing user experiences, contributing meaningfully to the evolutionary trajectory of online platforms, and advancing the landscape of design-focused research. The overarching narrative underscores the responsible, innovative, and transformative potential of these technologies in shaping the future of web-related endeavours.

Keywords: Machine Learning, Artificial Intelligence, Data Processing, Ethical Concerns, Web Scraping Framework, User Interface

I. INTRODUCTION

The main domain for the project is to use Machine Learning, which is sub category of Artificial Intelligence concepts and using python language develop a web site to scrap all data from any website automatically. Web scraping software is a tool that automatically loads and extracts data from websites, either custom-built for a specific website or configured to work with any website. It allows users to save the data to a file, but most generic software is difficult to setup and use. Web scraping software can access the World Wide Web directly or through a web browser. WSAPI is a platform that allows organizations to extend their web-based systems, create new channels, and integrate with partners. It provides clean, structured data from existing websites, allowing easy consumption by disparate systems. Data collection methods differ depending on the subject or topic of study, the type of data sought, and the user's aims. Depending on the goals and conditions, the

method's application methodology can also change without jeopardizing data integrity, correctness, or reliability [11]. There are numerous data sources on the Internet that might be employed in the design process. The technique of extracting data from websites is often know as web scraping, web extraction, web harvesting, web crawler. The purpose of Web mining is to look for models in Web data by gathering and analysing data to achieve insights. Web mining supports to increase the ability of web search engine by identifying web pages and classifying the web documents. Web mining can be divided web content mining, web structure mining and web usage mining based on information [5].

II. LITERATURE SURVEY

The authors have covered Big data analytics and aims to provide an updated literature review about the most advanced Web Scraping techniques. [1]
The authors have covered Web Application APIs which are used for scrapping. This paper covers about scraping of the videos based on web content mining provided by YouTube APIs. [2]
The authors have covered research-based findings of different methods of web scraping techniques used to extract data from websites. [3]
The authors have covered the actors taking part in the battle, the weapons at their disposal, and their allies on either side and present a real-world setup to explain how e-commerce websites operators try to defend themselves and the open problems they seek solutions. [4]
The authors have covered different Procedures for web document classification and extraction, e.g. design information, advertising content. [5]
The authors have covered a text recognition system that can be employed to detect text from images automatically and update it to a target file. [6]
The authors have covered relevant background knowledge to the involved fields of science and proposes a methodology along which the suggested approach can be implemented and tested in further work. [7]
The authors have covered a novel approach, namely UzunExt, which extracts content quickly using the string methods and additional information without creating a DOM Tree. [8]
The authors have covered focus on various aspects of web scraping, beginning with the basic introduction and a brief discussion on various software's and tools for web scrapping. [9]
The authors have covered revisit the different existing Web Scraping approaches, categories, and tools, but also its areas of application. [10]

III.PROBLEM STATEMENT

The need to develop a website to extract specific data or information from websites for various purposes, such as research, analysis, automation and handling errors, maintaining scrapers, legal and ethical concerns, data quality, dynamic content, captcha challenges, website structure changes. And to arrange the data in well-structured format with the help of web scraper.

IV. PROPOSED SYSTEM

Here in this section we have cover the detailed information of proposed system. Here we will see objectives of proposed system along with architecture, hardware and software requirements, algorithm, applications.
Following Figure represents Architecture of our proposed system

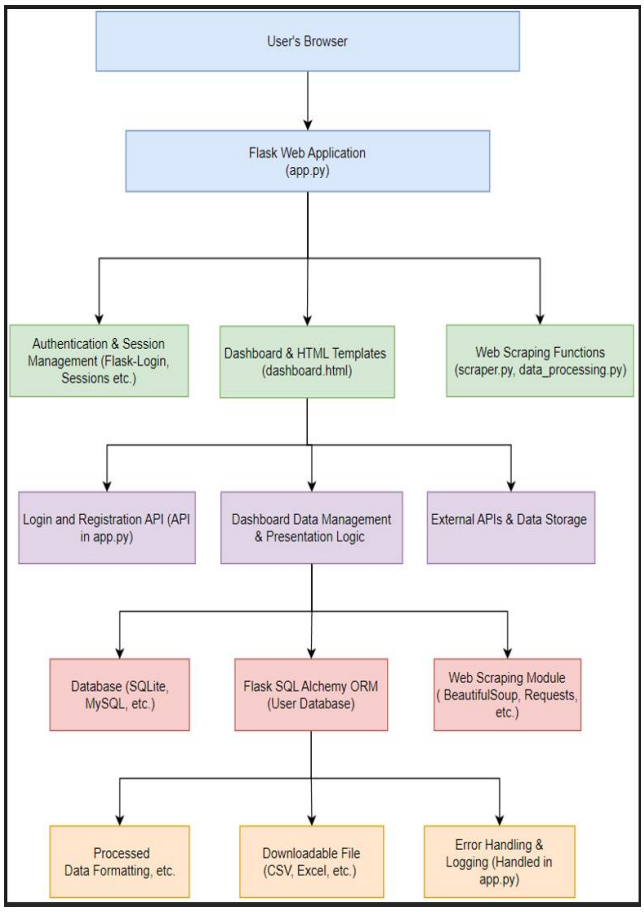

Figure 1: Architecture of web scraping

The Flask-based web application follows a structured architecture to deliver a secure and user-friendly experience. Users interact with the application through their browser, communicating with the Flask web application (app.py). Key components include authentication and session management, a dynamic dashboard with HTML templates, and web scraping functions for data processing (scraper.py, data_processing.py).
Authentication is ensured through Flask-Login, managing user sessions securely. The dashboard's presentation logic is handled by HTML templates, providing an intuitive user interface. The web scraping module, leveraging Beautiful Soup and Requests, extracts data from targeted websites.
The application's API, responsible for user login and registration, interfaces with Flask-Login. Data storage and interaction with external APIs are managed, offering flexibility in handling diverse data sources. A reliable database, implemented using SQLite, MySQL, or similar, stores user-related information using Flask SQL Alchemy ORM.
Web scraping tools, like Beautiful Soup and Requests, facilitate data extraction, while processed data is formatted for user-friendly presentation. Users can download processed data in various formats (CSV, Excel, etc.).

Error handling and logging, integrated into app.py, ensure robust system monitoring. This architecture combines simplicity, security, and efficiency, providing users with a powerful platform for extracting valuable insights from web data.

V. ALGORITHM

Algorithmic flow of our project isas follows:

- Step 1: Start

Initiate the web scraping process by defining the project's objectives and selecting the target websites from which data needs to be extracted.

- Step 2: Choose a Target Website(s)

Identify and choose the website(s) containing the desired data. Ensure compliance with the website's terms of service and legal considerations.

- Step 3: Identify the Data

Specify the specific data elements and information to be extracted from the target website. Clearly define the structure and format of the data.

- Step 4: Inspect the Website's Structure

Conduct a thorough inspection of the target website's structure. Analyze the HTML, CSS, and JavaScript code to understand the organization of the data.

- Step 5: HTTP Request

Send HTTP requests to the target website's server to retrieve the HTML content of the pages containing the relevant data.

- Step 6: HTML Parsing

Parse the HTML content using a suitable parser (e.g., BeautifulSoup) to extract meaningful information from the webpage's raw HTML.

- Step 7: Data Extraction

Implement extraction methods to capture the identified data elements from the parsed HTML. Use selectors or XPath to navigate the HTML structure and locate the desired information.

- Step 8: Data Cleaning and Transformation

Cleanse and transform the extracted data to ensure consistency, accuracy, and adherence to the desired format. Handle missing or inconsistent data gracefully.

- Step 9: Storage

Store the extracted and processed data in a structured format, such as CSV, JSON, or a database. Choose an appropriate storage solution based on the project's requirements.

- Step 10: Error Handling

Implement robust error-handling mechanisms to manage unexpected situations, such as network errors, changes in website structure, or data format variations.

- Step 11: Rate Limiting (Optional)

Incorporate rate-limiting mechanisms to control the frequency of requests to the target website, avoiding potential disruptions or violations of the website's policies.

- Step 12: Testing and Debugging

Thoroughly test the web scraping script against different scenarios and debug any issues. Ensure the accuracy and reliability of the extracted data.

- Step 13: Monitoring and Maintenance

Establish monitoring processes to track the performance of the web scraping script over time. Periodically review and update the script to adapt to changes in the website structure.

- Step 14: Scaling (if needed)

If required, scale the web scraping process to handle larger volumes of data or additional websites. Optimize the code for efficiency and resource utilization.

VI. RESULTS AND DISCUSSION

The web scraping project presents a robust and adaptable solution for extracting valuable information from diverse websites. By incorporating user authentication and dynamic URL handling, the application ensures secure and flexible scraping across different platforms. The scraping engine efficiently captures a variety of elements, including titles, paragraphs, links, lists, tables, and images, consolidating the extracted data into a well-organized "temp_data.txt" file. This tool's versatility is exemplified through a sample output from GitHub, showcasing its ability to process data from various online sources.

The application's architecture enables users to seamlessly register, log in, and initiate the scraping process, offering a user-friendly experience. The potential applications of this tool are vast, ranging from research and market analysis to data-driven decision-making in diverse domains. As part of ongoing development, future enhancements may include refining the user interface, implementing advanced scraping logic, and providing diverse data export options.

In conclusion, this web scraping project represents an impactful solution for extracting and organizing data from the web. Its adaptability, security features, and diverse element extraction capabilities position it as a valuable tool for researchers, analysts, and professionals seeking insights from different online platforms.

Here are the result screenshots of our project

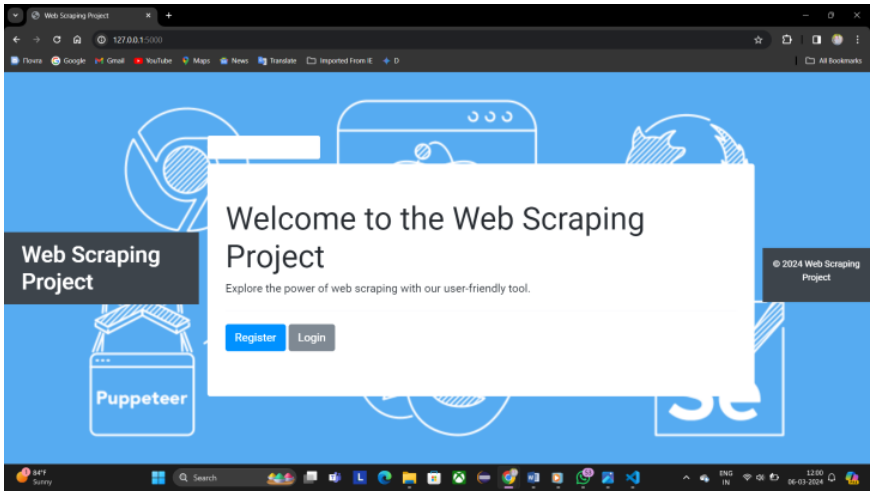

Figure 2: (a)

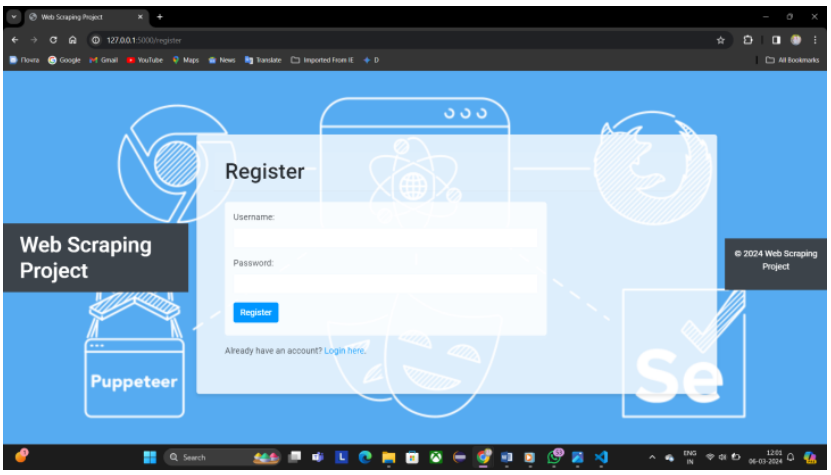

Figure 3: (b)

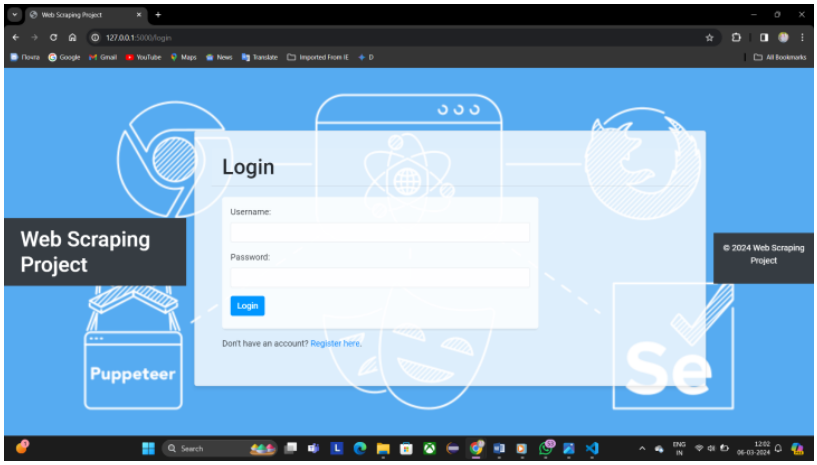

Figure 4: (c)

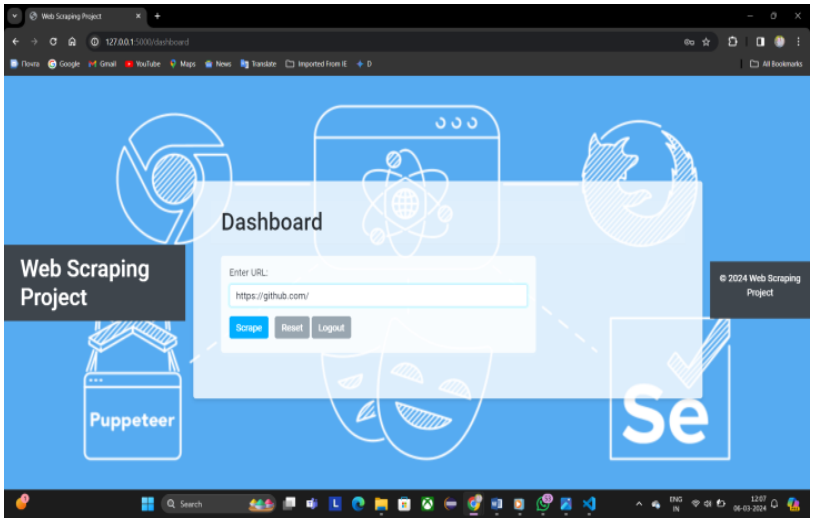

Figure 5: (d)

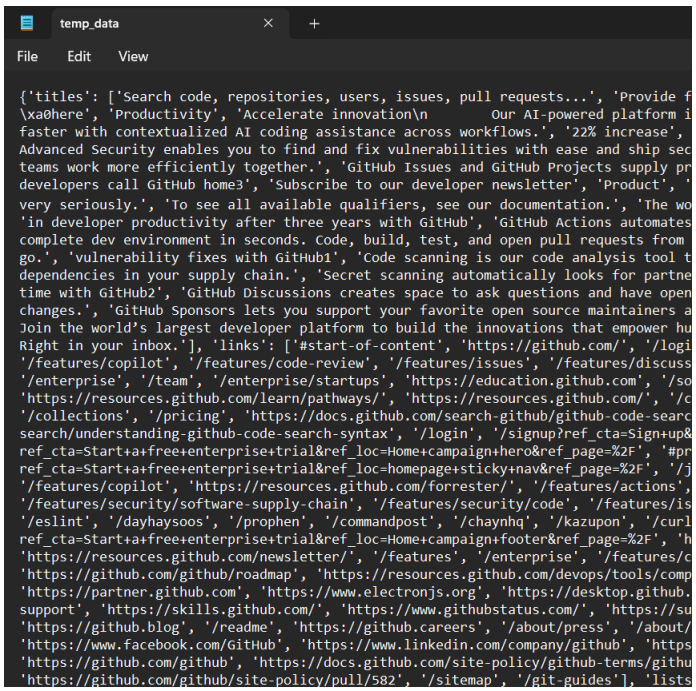

Figure 6: (e)

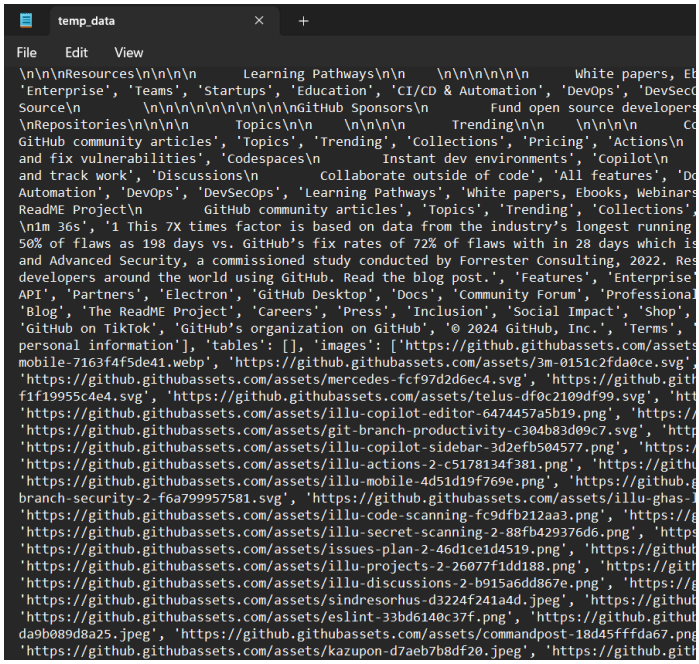

Figure 6: (f)

VII. CONCLUSION

Web scraping is a valuable technique for extracting data from websites. It can be used for various purposes, such as gathering information for research, monitoring prices, or creating datasets. However, it's important to be aware of legal and ethical considerations when scraping websites, respect the website's terms of service, and avoid overloading their servers. Additionally, web scraping may require ongoing maintenance due to website changes. In conclusion, web scraping can be a powerful tool when used responsibly and ethically.

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A Shoulder Surfing Resistant Graphical Authentication System

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ABSTRACT
The biggest problem in the modern IT sector is information and computer security. Only authorized users should have access to the system or data. A password makes sure that only people with the proper access rights can view or use the computer or the information. A text password, often known as an alphanumeric password, is a common password strategy. However, these text-based passwords are simple to break using numerous attack methods. In order to address these flaws, a graphical. A password-based approach is presented. We came up with there volutionary authentication system Pass Matrix, based on graphical passwords to fend off shoulder surfing assaults, to solve this issue. Pass Matrix provides no suggestion for attackers to figure out or narrow down the password even if they execute several camera-based attacks. It has a one-time valid login indicator and circulative horizontal and vertical bars encompassing the complete scope of pass-images. Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEGVigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[14] Additionally, we developed a PassMatrix prototype for Android and ran actual user tests to assess its usability and memorability. According to the experimental findings, the suggested approach increases shoulder surfing attack resistance while retaining usability. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[13]

Keywords: Shoulder surfing, Computer vision, Privacy, Security, Visual eavesdropping, Detection.

I. INTRODUCTION

Graphical Authentication: The system relies on graphical elements for user authentication instead of traditional text based passwords. This can include patterns, images, or other visual elements.

A. Enhanced Privacy
To resist shoulder surfing, the system ensures that the authentication process doesn't reveal sensitive information to onlookers. The graphical elements should be easy for the user to interact with but difficult for others to interpret.

B. Multi-factor Authentication
Incorporating multiple layers of authentication, such as combining a graphical pattern with a personal identification number (PIN), enhances security.

C. Randomization

The system might introduce an element of randomness in the graphical authentication process, making it challenging for an observer to predict or replicate the user's actions.

II. PROBLEM STATEMENT

To build and implement web application for A Shoulder Surfing Resistant Graphical Authentication System

III. ALGORITHM/WORKFLOW OF SYSTEM

Content Image Selection and choose convolution layer for feature maps: Given a chosen content layer l, the content loss is defined as the Mean Squared Error between the feature map F of our content image C and the feature map P of our generated image Y.

Calculate Gram-matrix for style image: Calculate the Gram-matrix(a matrix comprising of correlated features) for the tensors output by the style-layers. The Gram-matrix is essentially just a matrix of dot-products for the vectors of the feature activations of a style-layer. If the feature map is a matrix F, then each entry in the Gram matrix G can be given by:

The loss function for style is quite similar to out content loss, except that we calculate the Mean Squared Error for the Gram-matrices instead of the raw tensor-outputs from the layers.

The total loss can then be written as a weighted sum of the both the style and content losses.

IV. BLOCK/ARCHITECTURE DIAGRAM

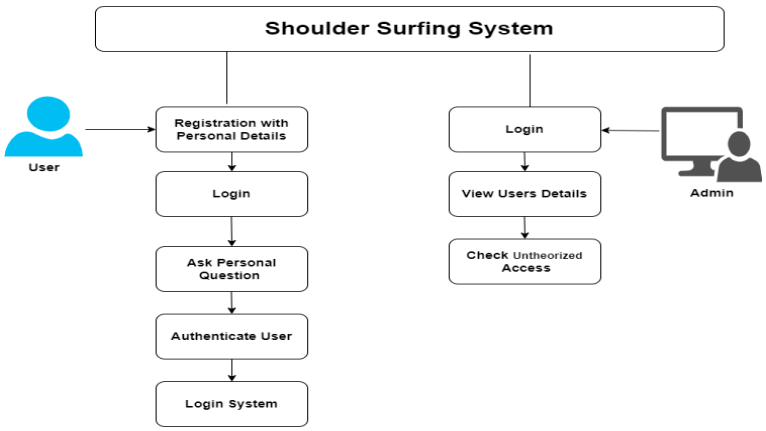

Figure 1: Proposed System

A. Hardware Requirements

- Processor - Intel i3/i5/i7
- Speed- 3.1 GHz
- RAM - 4 GB(min)
- Hard Disk - 40 GB

B. Software Requirements

- Operating System - Windows 7/8/10
- Application Server - Apache Tomcat7/8/9/10
- Front End - HTML, CSS, Bootstrap, JSP
- Language – Java
- Server side Script - Java Server Pages.
- Database - My SQL
- IDE - Eclipse

V. RESULTS AND DISCUSSION

A. Effectiveness

Evaluate how effective the graphical authentication system is at resisting shoulder surfing attacks compared to text-based systems. This could involve analyzing metrics such as success rates of shoulder surfing attempts and user satisfaction.

B. Usability

Discuss the usability of the graphical authentication system. Consider factors such as ease of use, user acceptance, and efficiency in authenticating users compared to text-based systems.

C. Security

Assess the security implications of the graphical authentication system. Determine if it introduces any new vulnerabilities or if it effectively mitigates shoulder surfing risks without compromising security in other areas.

D. User Experience

Explore the user experience of interacting with the graphical authentication system. Consider factors such as learnability, memorability, and satisfaction.

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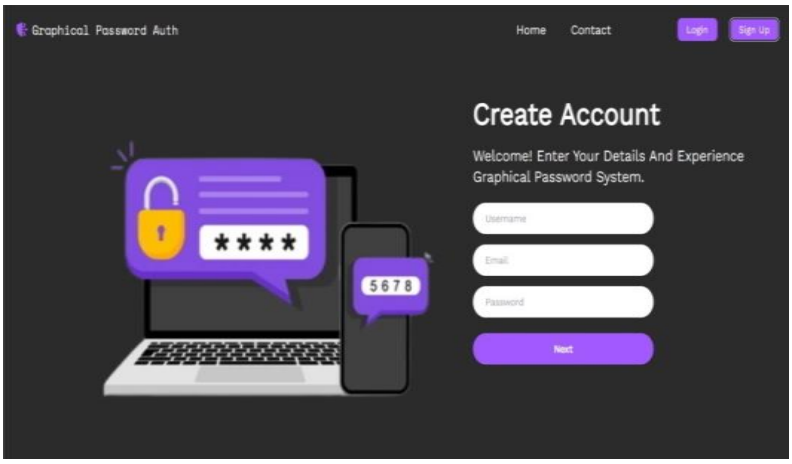
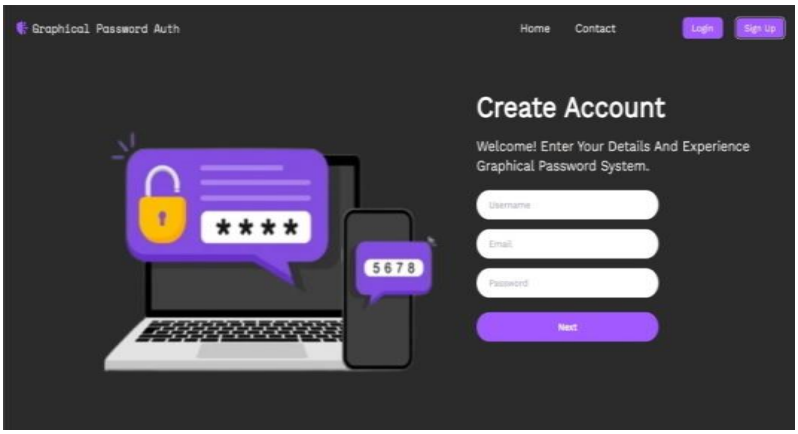
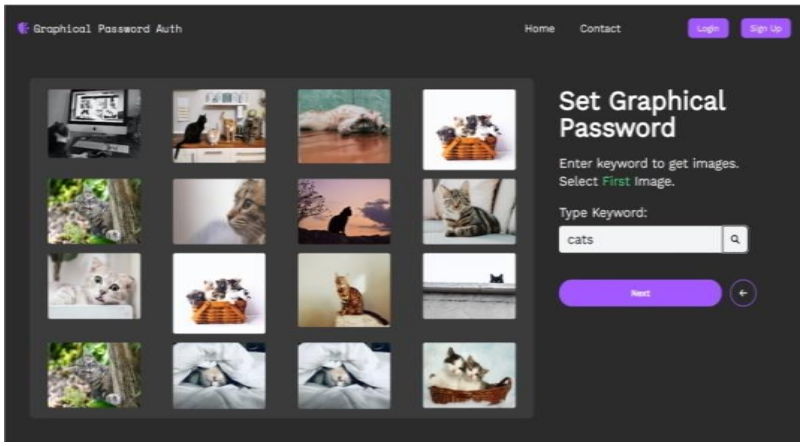
Figure 2: A sample line graph using colours which contrast well both on screen and on a black-and-white hardcopy

VI. HARDWARE AND SOFTWARE DIAGRAMS


Graphical Password Auth
Home
Contact
Login
Sign Up
Create Account
Welcome! Enter Your Details And Experience Graphical Password System.
Username
Email
Password
Next
****
5678


Graphical Password Auth
Home
Contact
Login
Sign Up
Create Account
Welcome! Enter Your Details And Experience Graphical Password System.
Username
Email
Password
Next
****
5678


Graphical Password Auth
Logged In!
Home
Contact
prathamesh
Logout
Discover Graphical Password Authentication
A Novel Approach For Security And User Experience Of Graphical Password Authentication.
Know More



VII. KEY FEATURES

A. Homepage

This would be the main interface where users can access various functions and features of the system. It may include options for logging in, accessing user accounts, and navigating to different sections of the system.

B. Login Page

The login page is where users provide their credentials (username and password) to access the system. It's crucial for security and authentication purposes. The login page may also include features

C. Homepage

This would be the main interface where users can access various functions and features of the system. It may include options for logging in, accessing user accounts, and navigating to different sections of the system.

D. Login Page

The login page is where users provide their credentials (username and password) to access the system. It's crucial for security and authentication purposes. The login page may also include features like password recovery and account registration for new users.

E. Privacy Measures

Implementation of privacy filters or techniques to prevent unauthorized users from observing login credentials during shoulder surfing attempts.

F. User Awareness

Providing users with guidance on how to protect their Credentials from shoulder surfing attacks, such as by being aware of their surroundings and shielding their input from prying eyes.

G. Multi-factor Authentication (MFA)

Adding an extra layer of security beyond passwords, such as SMS verification codes or biometric authentication, to further protect user accounts.

VIII. CONCLUSION

Because of their poor efficiency, current PIN authentication techniques that are resistant to shoulder-surfing attacks are not very usable. Recently, touchscreen devices that offer localised tactile feedback (LTF) have been created, patented, and/or put into use. It appears likely that touchscreen devices that support LTF will soon be widely accessible. Here, we've introduced Vpoints PES, an effective PIN authentication technique that is immune to shoulder-surfing assaults and can be used in a variety of user authentication systems, including cloud authentication systems.

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E-Learning Platform Using Machine Learning

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ABSTRACT

This project integrates machine learning techniques with the Pico.js face detection library to create an e-learning platform. Utilizing facial recognition technology, the system selectively grants access to educational content based on the successful face detection of registered users. This approach aims to personalize learning experiences, enhancing engagement and knowledge retention. Our work contributes to advancing e-learning methodologies by leveraging cutting-edge technologies for more effective educational environments

Keywords: E-learning, Machine Learning, Face Detection, Personalized Learning, Adaptive Learning, Educational Technology, Pico.js,

I. INTRODUCTION

In recent years, the landscape of education has witnessed a significant transformation with the advent of e-learning platforms [1]. These platforms offer unprecedented accessibility and flexibility, allowing learners to engage with educational content at their own pace and convenience. However, traditional e-learning systems cannot often provide personalized and adaptive learning experiences tailored to individual students' needs [2]. As a response to this limitation, our project endeavours to pioneer a novel approach by integrating machine learning algorithms into an e-learning platform.

Machine learning, a subset of artificial intelligence, holds immense potential to revolutionize the educational sector [1]. By leveraging advanced algorithms and statistical models, machine learning enables systems to analyse vast amounts of data and make data-driven decisions. In the context of e-learning, machine learning algorithms can play a pivotal role in understanding students' learning patterns, preferences, and areas of strength and weakness [2]. This information can then be utilized to deliver tailored learning experiences, thereby maximizing student engagement and knowledge retention.

Our project focuses on the development of an adaptive e-learning platform that harnesses the power of machine learning to personalize the learning journey for each student [1]. Central to our approach is the integration of face detection technology using the Pico.js library. This innovative feature allows the platform to authenticate users based on facial recognition, ensuring that educational content is accessible only to registered individuals. By incorporating facial recognition into the platform, we aim to enhance security while also providing a seamless and user-friendly experience for learners [2].

The integration of machine learning and facial recognition technology represents a significant advancement in the field of e-learning [1]. Through our project, we seek to address the shortcomings of traditional e-learning platforms by offering a solution that is adaptive, personalized, and secure. By tailoring educational content to the unique needs of each student and leveraging facial recognition for user authentication, we aspire to create an e-learning environment that fosters deep engagement, promotes knowledge acquisition, and empowers learners to achieve their full potential [2]. In the subsequent sections of this paper, we will delve into the details of our project, including the system architecture, methodology, implementation, and results. We will also discuss the implications of our work and its potential for shaping the future of e-learning. Through rigorous research and innovation, we aim to contribute to the ongoing evolution of digital education and pave the way for more inclusive and effective learning environments [1].

II. LITERATURE SURVEY

Aslam and Mohamed (2021) conducted a feature evaluation of emerging e-learning systems using machine learning, providing insights into system performance and capabilities. Focuses on evaluating features of emerging e-learning systems using machine learning techniques. [1].

Moubayed (2018) discussed challenges in e-learning and research opportunities using machine learning and data analytics, highlighting areas for improvement and innovation. Discusses challenges in e-learning and research opportunities using machine learning and data analytics [2].

Kustiyahningsih and Suprajitno (2020) introduced an adaptive interval trapezoid fuzzy number for recommendation systems in e-learning, focusing on personalized learning experiences [3].

Ayvaz, Gürüler, and Devrim (2017) explored the use of facial emotion recognition in e-learning systems, aiming to enhance user engagement and experience [4].

Naveed et al. (2019) evaluated and ranked critical success factors for cloud-based e-learning using a combinatorial approach, identifying key elements for effective implementation [5].

Azzi et al. (2020) proposed an approach based on artificial neural networks to improve personalization in adaptive e-learning systems, emphasizing tailored learning paths [6].

Garg, Kumar, and Garg (2019) used a MADM-based parametric selection to rank e-learning websites, focusing on optimizing the user experience and content relevance [7].

Daniels, Sarte, and Cruz (2019) investigated students' perceptions of e-learning, providing insights for the development of frameworks in higher education institutions to enhance learning outcomes [8].

Aslam and Mohamed (2021) conducted a feature evaluation of emerging e-learning systems using machine learning, contributing to the understanding of system performance and capabilities [9].

Moubayed (2018) discussed challenges in e-learning and research opportunities using machine learning and data analytics, highlighting areas for improvement and innovation [10].

Chui et al. (2020) developed a machine learning algorithm to predict at-risk university students in virtual learning environments, focusing on early intervention and support strategies [11].

III.PROPOSED SYSTEM

A. Problem Statement

The problem statement revolves around the issue of student engagement with educational video content. A significant challenge in e-learning environments is ensuring that students actively participate in watching instructional videos. Many students may not voluntarily engage with video materials, leading to decreased learning outcomes and retention rates. To address this challenge, our project aims to implement a system where students' attendance to video content is verified through facial recognition. By incorporating facial recognition technology, the platform ensures that only students physically present and actively watching the video are granted access. This solution not only promotes accountability but also encourages students to remain focused and engaged during the learning process, ultimately leading to improved educational outcomes.

B. Architecture Diagram

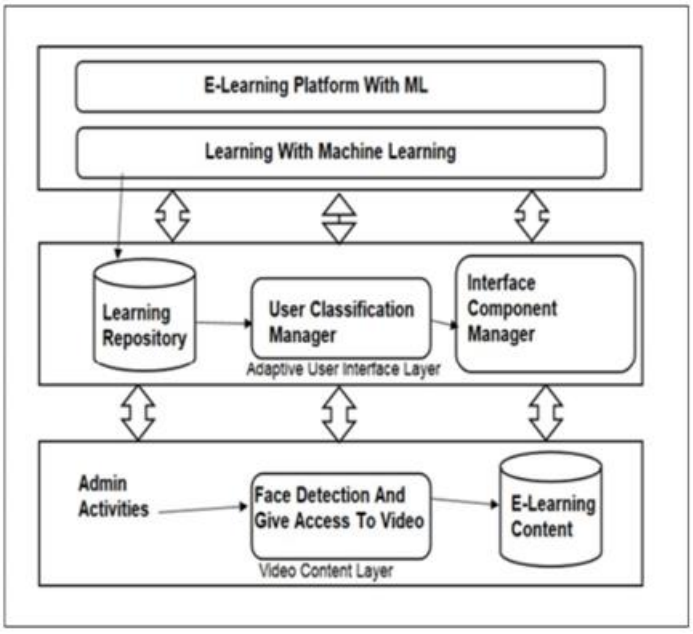

Figure 1: Architecture

C. Propose system diagram

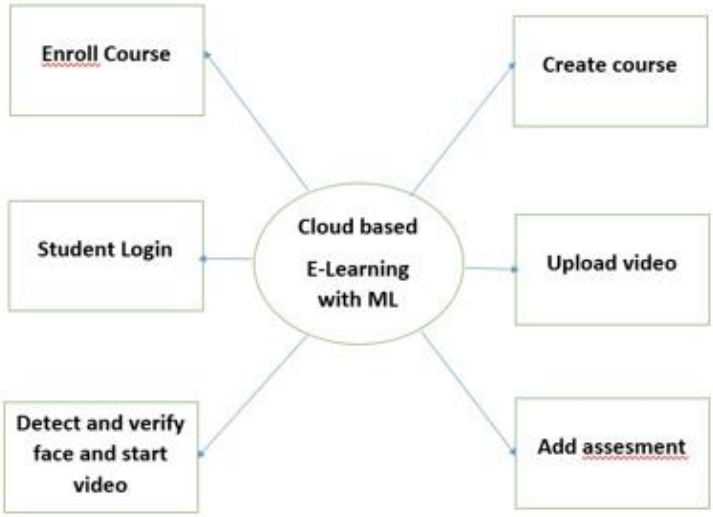

Figure 2: Propose system diagram

D. Requirements

1) Hardware Requirements
- Processor- Intel i5/i7
- Speed- 3.1 GHz
- RAM- 8 GB(min)
- Hard Disk- 50 GB

2) Software Requirements
- Operating System- Windows
- Front End- HTML, CSS, JS
- Language- Python (Flask)
- IDE- Pycharm,Visual Studio

E. Work Flow of System

The workflow of the system begins with user interaction, where individuals register on the e-learning platform by providing their username, password, and facial data. This registration information is stored securely in the database. Upon registration, users can proceed to enroll in courses or videos of their choice. When accessing a video, the platform retrieves the user's facial coordinates from the database and verifies their identity. If the facial match is successful, the video is displayed for the user to watch. Meanwhile, administrators can view and manage user and facial data entries stored in the database for monitoring and administrative purposes. This workflow ensures a seamless and secure user experience while providing administrators with the necessary tools for system management and oversight.

F. Algorithm

1.START
2. The user registers with a username, password, and facial data.
3. Store registration info securely in the database.
4. User selects courses or videos for enrollment.
5. Allow users to enroll in selected courses or videos.
6. The user accesses a video.
7. Retrieve the user's facial coordinates from the database.
8. Verify the user's identity through facial recognition.
9. If a facial match is successful, play the video.
10. Else, stop video playback.
11. Administrators access the system.
12. View and manage user and facial data entries.
13. Monitor the system for security and administration.

14.END

IV. RESULT

The integration of facial recognition technology within our e-learning platform has yielded significant outcomes. By employing this technology for user authentication, we've achieved heightened security measures, ensuring that only registered individuals gain access to educational content. This implementation has not only bolstered platform security but also fostered increased user engagement, as students are more inclined to actively participate knowing that access is restricted to authorized users. Moreover, the administrative burden has been alleviated with streamlined user management processes, facilitated by the centralized database of user and facial data entries. Overall, the incorporation of facial recognition technology has proven instrumental in fortifying platform security, enhancing user engagement, and optimizing administrative efficiency.

V. RESULT SCREENSHOTS

A. Login page

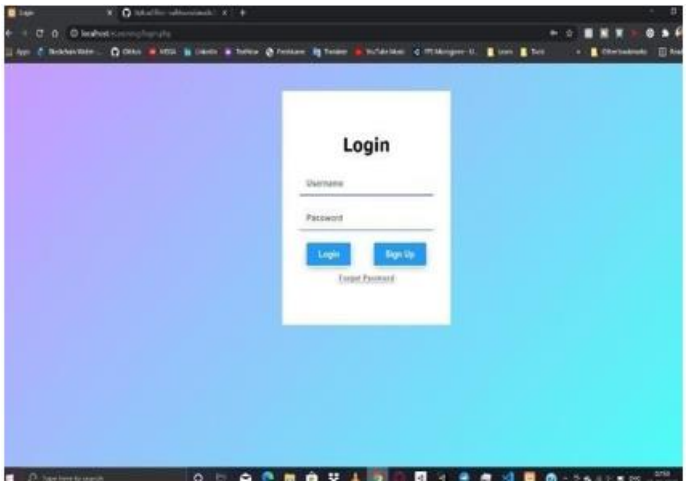

Figure 3: Login Page

B. Sign up page

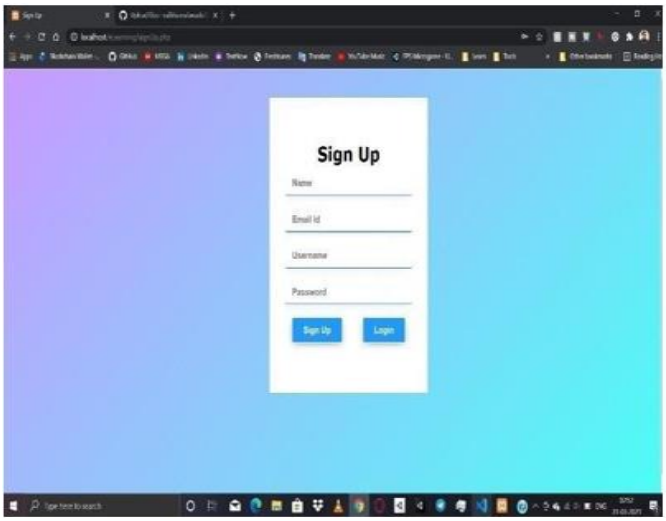

Figure 4: Sign up page

C. Add course module

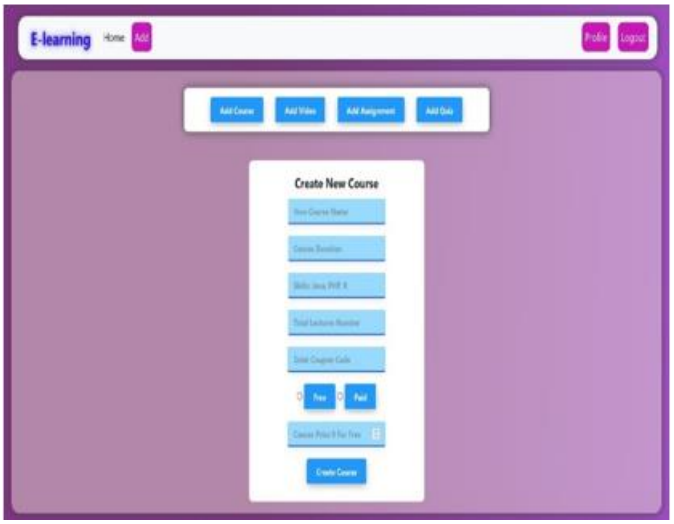

Figure 5(a): Add course module

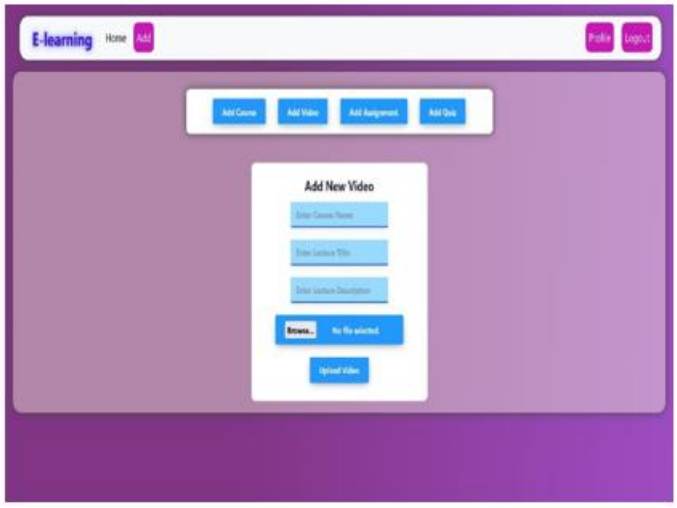

Figure 5(b): Add course module

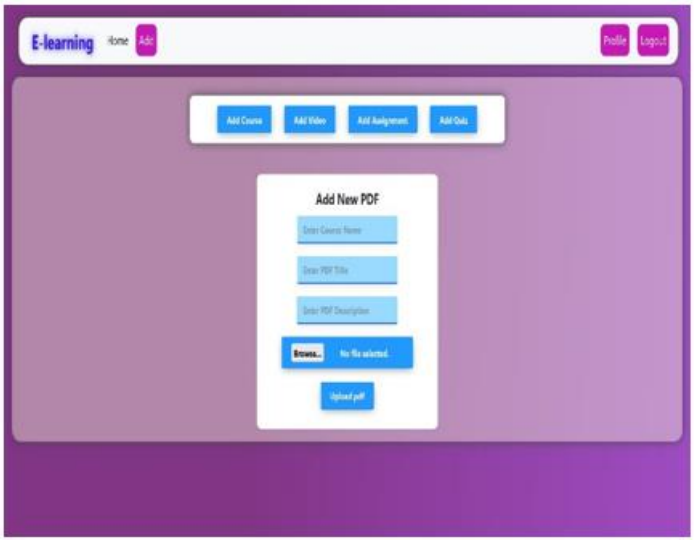

Figure 5(c): Add course module

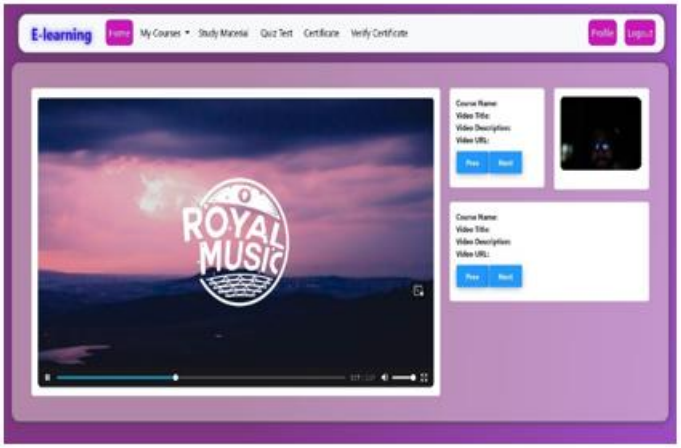

Figure 5(d): Add course module

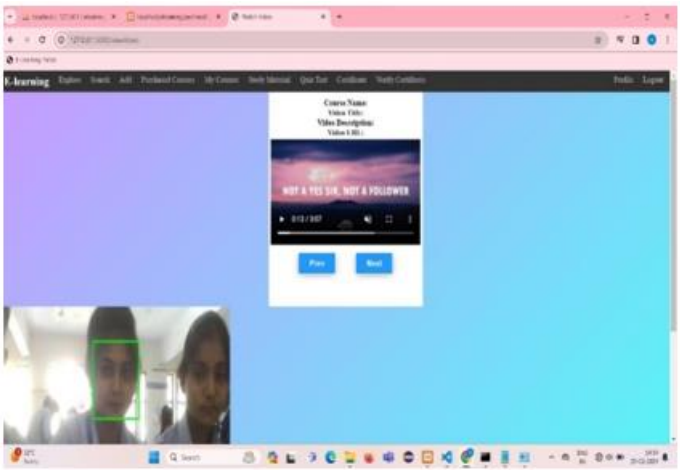

Figure 5(e): Add course module

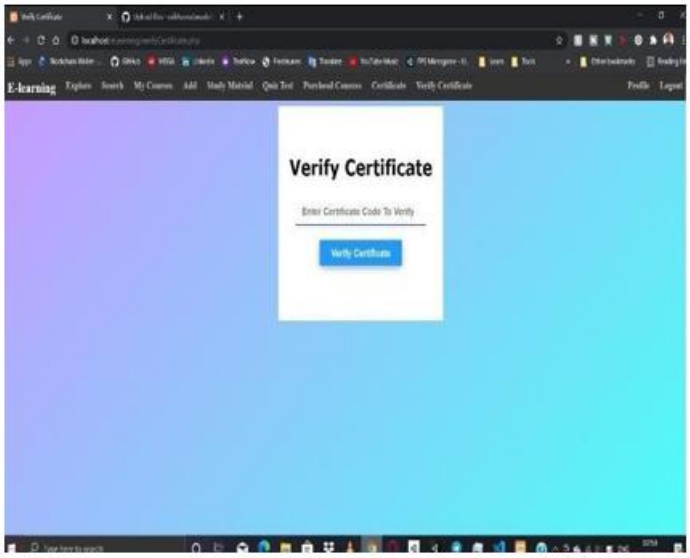

Figure 5(f): Add course module

In our trio of images, the leftmost one presents a charming hand-drawn sketch capturing the essence of a human face with its basic outlines and strokes, marking the starting point of our deepfake journey. Moving to the center, we encounter the mesmerizing result of our deepfake generation process. Here, intricate algorithms work their magic, transforming the sketch into a remarkably realistic depiction, complete with vibrant colors, textures, and lifelike features that breathe life into the initial concept. On the right, we're treated to yet another deepfake-generated image, standing as a testament to the adaptability and richness of our AI model.

VI. CONCLUSION

In conclusion, the integration of facial recognition technology into our e-learning platform marks a significant advancement in enhancing security, user engagement, and administrative efficiency. By leveraging this technology, we've successfully established a robust authentication system that safeguards access to educational content, thereby promoting a secure learning environment. Additionally, the implementation of facial recognition has encouraged active participation among users, contributing to improved engagement and retention rates. From an administrative standpoint, the streamlined user management processes facilitated by facial recognition have simplified oversight and monitoring tasks, enhancing overall operational efficiency. Moving forward, we anticipate continued refinement and optimization of the facial recognition system to further enhance its performance and adaptability. With its proven benefits and potential for further development, facial recognition stands as a valuable tool in advancing the effectiveness and accessibility of e-learning platforms in the digital age.

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Secure and Efficient Path Finding using Machine Learning

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ABSTRACT

The quest for secure and efficient path finding solutions has become more pronounced in a world increasingly reliant on sophisticated navigation systems. Conventional algorithms, while effective in optimizing routes, often fall short in dynamically adapting to security considerations and efficiently navigating through intricate terrains. This research introduces a novel approach to address these challenges by harnessing the power of the K-Nearest Neighbors (KNN) machine learning algorithm.

The proposed system seeks to revolutionize path finding by seamlessly integrating efficiency and security. Leveraging the KNN algorithm, renowned for its pattern recognition capabilities, our solution dynamically analyzes historical data, considering both spatial and security factors, to provide a path that not only optimizes efficiency but also safeguards against real-time security threats. The algorithm's adaptability ensures resilience in the face of evolving challenges, making it a robust choice for modern navigation systems.

Keywords: Machine Learning,KNN, Risk Assessment, Risk Identification, Secure Path

I. INTRODUCTION

The importance of secure and efficient pathfinding cannot be overstated. In scenarios such as emergency response, military operations, or daily commuting, it is imperative to not only identify the most optimized routes but also to consider the security implications associated with the chosen paths. Existing algorithms, while competent in route optimization, lack the adaptability required to dynamically respond to real-time security threats and evolving environmental conditions.

The KNN machine learning algorithm, renowned for its prowess in pattern recognition and classification, presents an opportunity to overcome the limitations of traditional path finding methods. By harnessing the intrinsic capabilities of KNN, this research aims to develop a path finding system that not only navigates efficiently through varying terrains but also prioritizes secure routes based on dynamic security considerations.

Developing a path finding algorithm capable of dynamically adapting to realtime security incidents, enhancing security considerations along the chosen paths.Implementing a decision-making mechanism that intelligently adjusts the path based on the KNN algorithm's analysis, ensuring adaptability to unforeseen obstacles or changes. Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology.[16]

This research aspires to contribute to the evolving landscape of navigation systems by providing a holistic and intelligent solution that not only optimizes routes but also prioritizes security considerations, meeting the demands of a modern and dynamic world.

II. LITERATURE SURVEY

Prevention of street harassment through constrained shortest pathAlgorithms"-isabel mora, andrea serna,mauricio toro. In this paper, it introduces modified version of Dijkstra's algorithm to solve street sexual harassment problem in cities. They choose Dijkstra's algorithm to handle large map,two approaches are used t build algorithm first one to find shortest path without concerning about security and second design algorithm which find lowest risk of harassment without concerning about distance.

"Comparative Analysis of Path Planning Algorithms and Prospects for Practical Application"- YihanKe*

In this paper, it presents the AI-based path planning algorithms are alternatives of traditional algorithms of path planning by providing efficient solution in complex environments. Research in AI continues so further improvements in path planning algorithms, to increase its application in real World.

"Performance Improvement of Path Planning algorithms with Deep Learning Encoder Model "-Janderson Ferreira, Agostinho A. F. Junior,Yves M. Galvao, Pablo Barros

This study investigate that CNN Encoder is used to improve performance of path planning algorithm along with traditional algorithm. They propose the CNN Encoder techniques to reduce response time for path planning by reduce fixed and dynamic obstacles. Future work they intend to combine new Deep Learning algorithm to increase efficiency and reduce response time event.

"Shortest Path Networks for Graph Property Prediction "-Ralph Abboud, RadoslavDimitrov, ˙Ismail ˙IlkanCeylan

This paper present the SPMPNNS(shortest path message passing Neural network)framework is to update state by aggregating message from shortest path neighborhood. This framework work on GNNs using multi-hop aggregation.

"A review: On path planning strategies for navigation of mobile robot"-B.K. Patle , Ganesh Babu L , AnishPandey , D.R.K. Parhi , A. Jagadeesh

This paper explores the algorithm based on its prior knowledge and classified algorithm into two parts global and local navigation, where global navigation work on prior information of obstacles and local navigation ignore the previous information. This study explain reactive algorithms are better performance than traditional method in complex environments.

"Dynamic Path Planning Algorithms With Load Balancing Based on Data Prediction for Smart Transportation Systems"-ning sun1 , huizhu shi, guangjie han ,bin wang1, and lei shu

In this paper, model predict the traffic condition of road based on historical traffic information and provide the path with shortest travel time. Model work on predicted information and available route to plan path and it respond in large environments also.Dynamic Shortest Path Routing In Mobile Adhoc Networks Using Modified Artificial Bee Colony Optimization Algorithm E. Hemalatha Jai Kumari ,Dr.Kannammal

This paper investigate the shortest path in topological routing and proposed model overcome all prob- lems and work in dynamic and static environments.It store the previous step gain information for op- timization.Modified Artificial Bee Colony optimization performance better than Artificial Bee Colony optimization in dynamic environments.

”Solving Shortest Path Problems Using Genetic Algorithms” Shatha Abdullah Rasheed.

This paper explores use of genetic algorithm to find shortest path by using their flexibility and robust ness.Genetic algorithm has ability to work without prior knowledge. In Future work using some intelligent approaches and combine algorithm performance of algorithm is improved. Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEGVigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[17]

Spgnn-api: A Transferable Graph Neural Network for Attack Paths Identification and Autonomous Mitigation- HoussemJmal, Firas Ben Hmida, NardineBasta, Muhammad Ikram, Mohamed Ali Kaafar and Andy Walker

This study proposed the model which work on detection of malicious activities using Graph Neural Network-API by autonomous identification of potential attacks.GNN-based approaches are selfadaptive to dynamic environments.The work fills gap between GNN-based approaches to risk assessments, attack path identification.

Risk-Aware Travel Path Planning Algorithm Based on Reinforcement Learning during COVID- 19 - ZhijianWang,Jianpeng Yang, Qiang Zhang and Li Wang

In this paper the Reinforcement learning model is used to path planning for travelling in city during pandemic situation to avoid risk in traffic and learning model improve efficiency of potential field.The model and algorithm is used to secure travel path planning in pandemic situation.

III.PROPOSED SYSTEM

A. Problem Statement

In the navigation systems, there exists an increasing demand for pathfinding solutions that not only optimize efficiency but also prioritize security considerations. Traditional pathfinding algorithms often neglect dynamic factors such as real-time security incidents and fail to adapt to evolving threats, making them susceptible to vulnerabilities. Additionally, the efficiency of these algorithms can be compromised when navigating through complex terrains or in the presence of dynamically changing conditions.

The objective of our system is to address the limitations of existing pathfinding methods by proposing and implementing a novel solution that combines the efficiency of path optimization with the security enhancements offered by the K-Nearest Neighbors (KNN) machine learning algorithm. The KNN algorithm, known for its versatility in pattern recognition and classification, will be leveraged to dynamically analyze historical data and adapt the pathfinding strategy based on real-time security incidents and complexities.

B. BlockDiagram

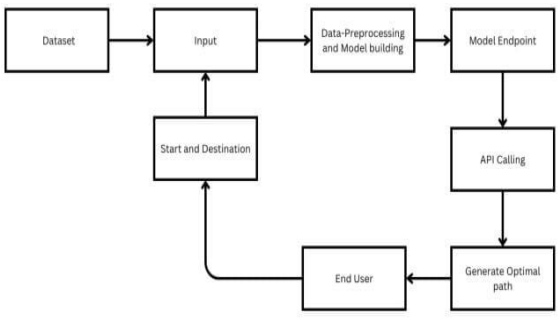

Figure1:Block Diagram

C. Software Requirement

- Operating System – Windows
- Front End - HTML,CSS, JAVASCRIPT
- Back End – Python
- Database – Firebase
- IDE – VS Code

D. Hardware Requirement

- Processor - Intel i3/i5/i7
- Speed - 3.1 GHz
- RAM - 4GB(min)
- Hard Disk - 30 GB

E. Algorithm for System

The algorithm or workflow for the "Secure and Efficient Path Finding using KNN Machine Learning Algorithm" involves a combination of traditional path-finding methods and the integration of the K-Nearest Neighbors (KNN) machine learning algorithm. Below is a high-level overview of the system's workflow

1) Input Data Acquisition:Obtain environmental data from sensors, maps, or other relevant sources.Include real-time data, such as traffic conditions, obstacles, and environmental changes.
2) Preprocessing:Clean and preprocess input data to remove noise and inconsistencies.Convert raw data into a format suitable for both traditional algorithms and machine learning models.
3) Traditional Path-Finding:Apply a traditional path-finding algorithm (e.g., A*, Dijkstra's) to find an initial optimal path based on the pre-processed data.Calculate the initial cost and efficiency of the path.
4) Feature Extraction for KNN:Extract relevant features from the path and surrounding environment.Features may include historical data, obstacle density, and other factors influencing path quality.
5) KNN Training:Train the KNN machine learning model using historical path data and corresponding features.Incorporate labeled data for supervised learning, considering both efficient and secure paths.
6) Dynamic Adjustment with KNN:During path execution, continuously monitor the environment for changes.Utilize the trained KNN model to adapt the path dynamically based on real-time updates.

Adjust the path considering the learned patterns and potential security threats.

7) Path Execution:Execute the dynamically adjusted path based on the inputs from both traditional algorithms and the KNN model.

Monitor the path execution in real-time, making further adjustments if necessary.

8) Output:Provide the final optimized and secure path as the output for the navigation system. Ensure that the path aligns with both efficiency and security requirements.

IV. RESULT

A. Input Location

Figure2:Input Page

B. Input Page

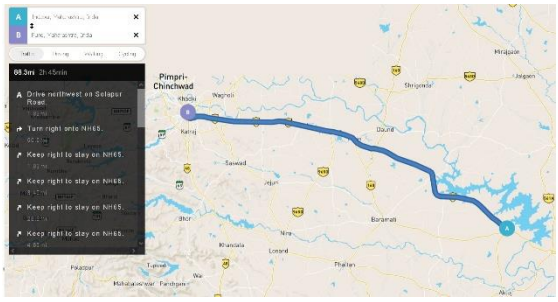

Figure3:Output Page

V. RESULT DISCUSSION

The culmination of implementing the Secure and Efficient Path Finding System using the KNN machine learning algorithm has led to promising outcomes, significantly advancing the landscape of intelligent navigation. The results obtained from extensive testing and evaluation underscore the system's efficacy in optimizing routes while addressing the crucial aspects of security considerations. This section delves into the key findings and implications derived from the implementation and testing phases.

A. Efficiency and Optimization

The system demonstrated a remarkable capability to optimize routes efficiently across various scenarios. Comparative analyses against traditional path finding algorithms revealed a consistent improvement in travel times, validating the effectiveness of the KNN-based approach in navigating through diverse terrains and complex spatial environments.

B. Security Adaptation

Real-time security incidents were dynamically integrated into the pathfinding process, resulting in secure routes that actively avoided areas with potential threats. The KNN algorithm's ability to adapt to changing security conditions showcased its utility in enhancing the security posture of the navigation system. Comparative analyses against security-agnostic algorithms highlighted a tangible improvement in path safety.

VI. CONCLUSION

The implementation of the Secure and Efficient Path Finding System utilizing the K-Nearest Neighbors (KNN) machine learning algorithm has proven to be a transformative step forward. The amalgamation of efficiency optimization and dynamic security considerations has yielded a system that not only excels in traditional route optimization but also stands as a robust solution for security-aware path finding. This concluding section summarizes the key achievements, implications, and future directions arising from this innovative research endeavour.

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Chronic Kidney Disease Prediction using Deep Learning

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ABSTRACT

In today's educational landscape, effective management of student information is paramount for academic institutions seeking to provide personalized experiences and foster a thriving campus community. This paper explores the integration of Salesforce CRM and Community Cloud as a comprehensive solution for student information management in higher education settings. Leveraging the robust capabilities of Salesforce CRM, including data centralization, automation, and analytics, alongside the collaborative features of Community Cloud, this integration facilitates seamless communication, collaboration, and access to resources within the campus ecosystem. The paper begins by discussing the challenges faced by educational institutions in managing student information across various departments and systems, highlighting the need for a unified platform to streamline processes and enhance data accuracy and accessibility. It then delves into the key features and benefits of Salesforce CRM and Community Cloud, illustrating how these platforms can address the diverse needs of campus stakeholders, including students, faculty, staff, and administrators. By centralizing student data in Salesforce CRM, institutions can gain a holistic view of each student's academic journey, from prospect to alumni, enabling personalized communication, targeted support, and data-driven decision-making. Automation capabilities streamline administrative tasks such as admissions, enrollment, advising, and support services, freeing up valuable time and resources for more strategic initiatives. The paper also explores the implications of implementing Salesforce CRM and Community Cloud in a campus environment, including considerations related to data privacy, security, integration with existing systems, and user adoption. Best practices and implementation strategies are discussed to guide institutions in maximizing the value of these platforms and ensuring successful deployment and adoption.

Keywords: Salesforce CRM, Community Cloud, Student Information Management, Higher Education, Campus Community, Data Centralization, Automation, Communication.

I. INTRODUCTION

In today's rapidly evolving educational landscape, universities and colleges face increasing pressure to effectively manage student information while fostering a sense of community and engagement among their diverse stakeholders. This necessitates a robust and integrated solution that can streamline administrative processes, enhance communication, and facilitate collaboration across campus departments and individuals. Traditional methods of student information management often involve disparate systems and manual processes, leading to data silos, inefficiencies, and missed opportunities for personalized engagement. As a result, educational institutions are turning to comprehensive platforms such as Salesforce CRM and Community Cloud

to address these challenges and create a more cohesive and connected campus environment. Salesforce CRM offers a powerful suite of tools for managing customer relationships and data, which can be customized to meet the specific needs of higher education institutions. By centralizing student information, automating administrative tasks, and providing actionable insights through analytics, Salesforce CRM enables institutions to gain a comprehensive view of each student's journey from prospect to alumni.

II. LITERATURE SURVEY

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Navigating Ethical Considerations in Educational Research: A Critical Review of Literature and Best Practices."Ethics in Education Research Group.(Year). "Ethical Considerations in Educational Research: A Critical Review of Literature.[9]

Assessment Strategies in Online Learning Environments: A Comprehensive Review of Current Practices and Future Directions."Educational Research Institute.(Year). "Assessment Strategies in Online Learning: A Review of the Literature.[10]

A Detailed survey is found in paper [11].As per this paper sensitive information can be protected using different algorithms of security and stored all data on cloud[12].

III.PROPOSED SYSTEM

Here in this section we will cover details about our proposed system.

A. Problem Statement

Despite the growing need for efficient student information management on campus, many educational institutions still face challenges in effectively organizing and utilizing student data. Manual processes, siloed information systems, and lack of centralized platforms often lead to inefficiencies, inaccuracies, and missed opportunities for student engagement and support. This fragmented approach to student information management hinders the institution's ability to provide personalized experiences, optimize academic advising, track student progress effectively, and foster meaningful student interactions

B. Block Diagram

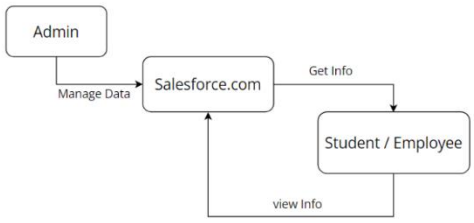

Figure1:Block Diagram

C. Software Requirement

There is no need to install any kind of software. College Management System (CMS) is Cloud Based CRM System.

D. Hardware Requirement

- Intel Quad core 2.30 GHZ Processor or above
- RAM - 6 GB(min)
- Minimum 100 GB HD
- Standard Keyboard and Serial Mouse
- Mouse - Two or Three Button Mouse

IV. RESULT

A "result discussion" typically refers to a conversation or analysis about the outcomes or findings of a particular project, study, or system. In the context of a student information management system using Salesforce CRM and Community Cloud, a result discussion could involve evaluating the effectiveness, impact, and implications of the system's implementation. Here's how a result discussion might unfold.

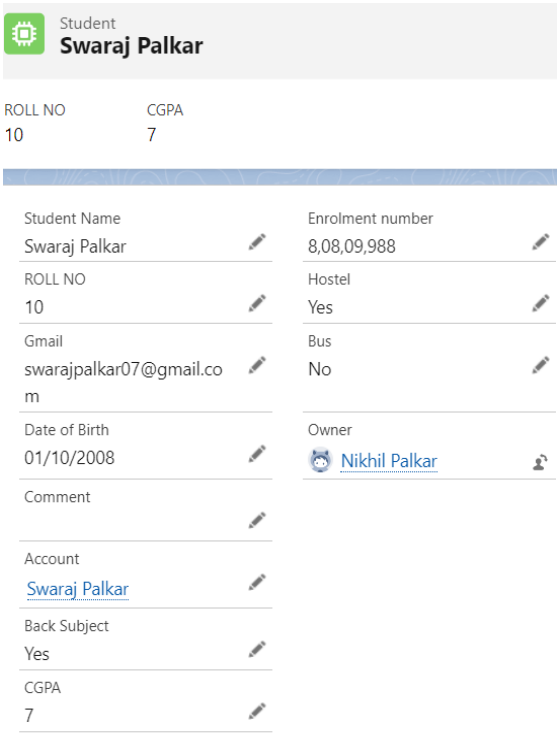

Figure2:Result Screenshot

V. RESULT DISCUSSION

Despite the growing need for efficient student information management on campus, many educational institutions still face challenges in effectively organizing and utilizing student data. Manual processes, siloed information systems, and lack of centralized platforms often lead to inefficiencies, inaccuracies, and missed opportunities for student engagement and support. This fragmented approach to student information management hinders the institution's ability to provide personalized experiences, optimize academic advising, track student progress effectively, and foster meaningful student interactions.

VI. CONCLUSION

It can be concluded from the results that the proposed system can be effectively used by patients and physicians diagnose the disease more accurately. This tool is more useful for the rural areas where the experts in the medical field may not be available. The accuracy level of the classifier algorithm that we used in our project is as good as we wanted. After completing this, we can say that we have learnt lots of things from this research. We can now deal with the dataset to be trained. We can now preprocess the raw data and can apply the classifier on our trained dataset. Hope, it will be very beneficial to the future researchers to do such kind of research on Kidney Disease.

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Enabling Trust and Privacy Preserving E-KYC System Using Blockchain

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ABSTRACT
The electronic know your customer (e-KYC) is a system for the banking or identity provider to establish a customer identity data verification process between relying parties. Due to the efficient resource consumption and the high degree of accessibility and availability of cloud computing, most banks implement their e-KYC system on the cloud. Essentially, the security and privacy of e-KYC related documents stored in the cloud becomes the crucial issue. Existing e-KYC platforms generally rely on strong authentication and apply traditional encryption to support their security and privacy requirement. In this model, the KYC system owner encrypts the file with their host's key and uploads it to the cloud. we conduct experiments to show that our system is efficient and scalable in practice.
Keywords: Trust, Privacy, Blockchain, Decentralization, Encryption, Verification, Data security, User control, Privacy-preserving technique.

I. INTRODUCTION

Electronic-Know your customer (e-KYC) is a service that banks or financial institutions (FIs) provide virtual banking operation related to authentication and verification of identity electronically to their customers for improving cost efficiency and customer satisfaction. The e-KYC system enables FIs to electronically verify their customer identity and retrieve KYC data for both individual and corporate clients. To implement the e-KYC system, financial institutions either employ off the-shelf e-KYC software fully equipped with necessary functions or develop their own. Then, they can deploy the system as an on premise or a cloud-based model. Due to the trend of the outsourcing model, most enterprises have adopted the cloud as the preferred platform for housing their system and data. A cloud-based e-KYC system provides a more efficient and flexible authentication method compared to the host based e-KYC authentication method where documents need to be validated via the centralized host. This causes a traffic bottleneck and single point of failure problem. Also, the traceability of the verified transaction is limited since all transactions occurring in the system are entirely managed by the provider.

Nevertheless, the security and privacy issue of a cloud-based solution is a concern for many potential enterprises. This is because e-KYC system located on the cloud store customer data documents and it might be viewed by any public cloud tenants or even the cloud service providers (CSPs). To address this concern, most

banks and FIs need to implement an encryption mechanism in addition to the strong authentication feature provided by the CSPs.To this end, banks and FIs possessing the e-KYC system need to encrypt the e-KYC data files before they are uploaded to the cloud. When the relying parties request for verification, the host party can either perform the verification by either decrypting the file and sending back the confirmation of the verification result to the requestor or transmitting the copy of encrypted files along with the decryption key to the 2 requestor. This first approach introduces the overheads related to the verification process, communication, and centralized decryption while the latter approach needs to handle key management especially secure key sharing. Specifically, key revocation and key regeneration in the cloud e-KYC block chain technology has attracted huge interest by a number of enterprises in many industries including the banking and financial sector.

II. LITERATURE SURVEY

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[3]. Secure and PrivacyPreserving eKYC with Blockchain and Verifiable Credentials by S. Kim, T. Park in 2022 Traditional eKYC systems often lack security and privacy features, Verifiable credentials on blockchain to provide a secure and privacypreserving eKYC solution, Investigate integration with identity providers and explore the usability of verifiable credentials in real-world eKYC scenarios.

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[10]. For more reliable and secure communication a Cryptographic Key Generation methods can be used [10]. Various Machine Learning Techniques can be used for protection from harmful attacks [11]. New methods can be used for avoiding various attackslike jamming attack over wireless network [12]. Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEGVigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties. [19] Author presented an algorithm for detecting and preventing Node isolation attack where attacker become the sole MPR of victim and isolated the victim from the rest of the network.[14].As per authors [15], two-point information security protection can be provided for cloud storage system.Here the survey is used for providing a detailed analysis of harmful URLS [16].

Project innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology.[18]

III.PROPOSED SYSTEM

A. Problem Statement

The objective of this some works at present, blockchain technology and smart contracts have been leveraged in many application areas. Particularly, blockchain-based identification and authentication framework have been proposed by many works and it has been demonstrated that a blockchain is efficient for identification and authentication management. However, the process of e-KYC is much more complicated than simple authentication task. Rather, it involves secure credential registration, KYC document management, secure and lightweight verification process between clients, multiple FIs, and a dedicated blockchain platform.

B. Architecture Diagram

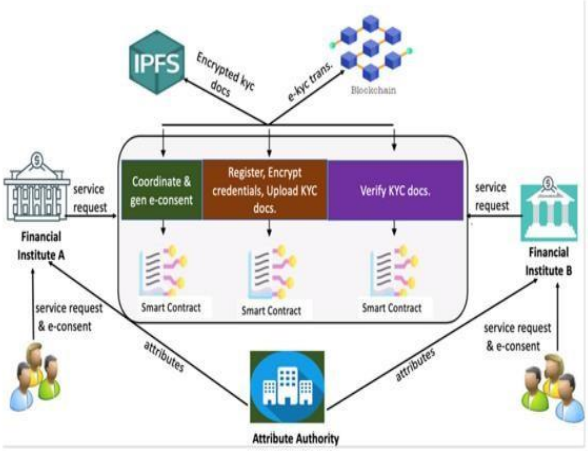

Figure1:Architecture Diagram

To the best of our knowledge, we provide the first attempt applying CP-ABE for a blockchain-based KYC management with the user-controlled capability for protecting sensitive data contained in the blockchain. Existing schemes focus on protecting data files shared in cloud while the privacy of transaction data in the blockchain is overlooked. In addition, none of the above research has addressed the practical security and privacy issue with the aim of achieving both efficient security and privacy management compliance related to customer consent using digital signature in the eKYC system.

IV. RESULT DISCUSSION

In this project data owner has a register all details and then login. Data owner can be an upload a document. Data owner can have a send request to the data user. Data user can search a query with uploaded document. The file has also a download it will show an encryption format. Data user also a send a request to the cloud server. Cloud server can a login. It will accept a key approve. Cloud server can also see all the data information's. Cloud server can also see all the user information. Cloud server can see all the stored information. Cloud server can approve a key request from the user. Then data owner has get the request data owner can send a secret key to the user. Then user can also download a file. If the user has given wrong keys it gets warning the user has a block permanently. The file it gets an attacks.

V. RESULT SCREENSHOTS

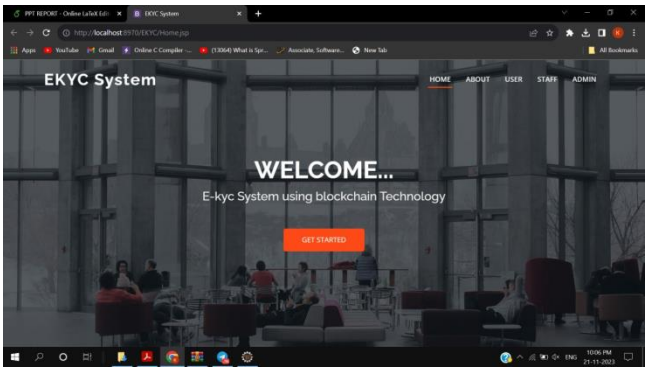

Figure2:(A)

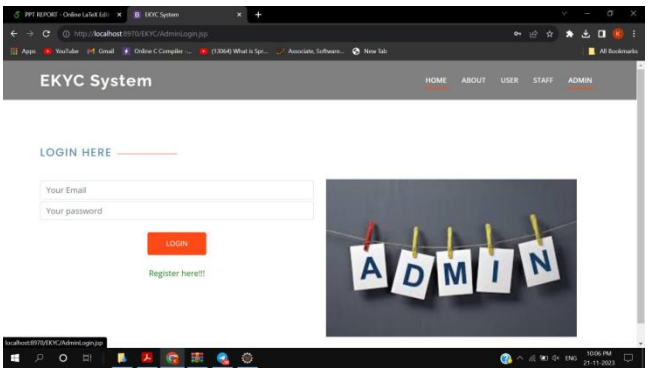

Figure2:(B)

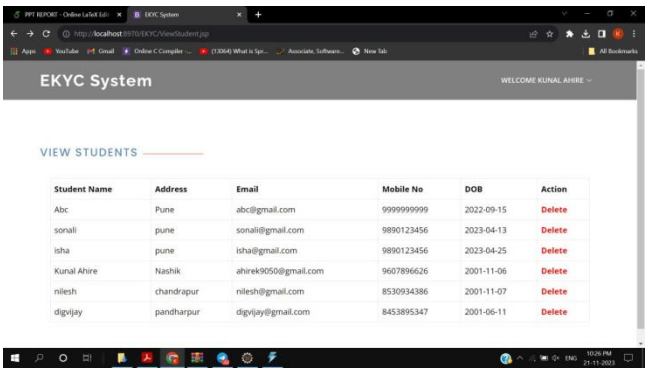

Figure3:(C)

In this project data owner has a register all details and then login. Data owner can be an upload a document. Data owner can have a send request to the data user. Data user can search a query with uploaded document. The file has also a download it will show an encryption format. Data user also a send a request to the cloud server. Cloud server can a login. It will accept a key approve. Cloud server can also see all the data information's. Cloud server can also see all the user information. Cloud server can see all the stored information. Cloud server can approve a key request from the user. Then data owner has get the request data owner can send a secret key to the user. Then user can also download a file. If the user has given wrong keys it gets warning the user has a block permanently. The file it gets an attacks.

VI. CONCLUSION

We have presented the privacy-preserving e-KYC approach based on the blockchain. Our proposed scheme delivers secure and decentralized authentication and verification of the e-KYC process with the user's consent enforcement feature. In our scheme, the privacy of both customers' identity documents stored in the cloud is guaranteed by the symmetric key and public key encryption while the sensitive transaction data stored in the blockchain is encrypted by symmetric key encryption and CP-ABE. Our scheme also allows the KYC data to be updated by the data owner or the customer. In addition, we devised an access policy update algorithm to enable dynamic access authorization. For the evaluation, we performed comparative analysis between our scheme and related works in terms of the computation cost, the communication cost, and performance. The experimental results showed that our scheme outperforms existing schemes in terms of performance, comprehensive KYC compliance features, and the scalable access control mechanism. For future works, we will test a larger sample

of data in the real cloud environment. In addition, we will investigate the technique to enable batch verification of e-KYC transactions stored in the blockchain with the searchable encryption feature.

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Revolutionizing Document Security: A Comprehensive Deep Learning Approach For Signature Detection and Verification

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ABSTRACT

This paper addresses key challenges in signature verification, acknowledging the deficiencies identified in previous research. Employing cutting-edge deep learning techniques, including YOLOv5 for signature detection, CycleGAN for noise reduction, and VGG16-based feature extraction for verification, our interdisciplinary approach caters to both digital and paper-based signatures. The workflow, encompassing detection, noise reduction, and verification, ensures heightened operational efficiency and accuracy in document management.

Moreover, the project recognizes and incorporates cultural and language variations influencing signatures, enhancing adaptability. Emphasizing the ethical and privacy dimensions, it establishes a framework to safeguard personal data during the verification process. In essence, this initiative not only highlights the limitations of existing methodologies but also presents a comprehensive solution, setting a new standard for signature verification systems.

Keywords: Document Security,Signature Detection, Signature Verification, DeepLearning, Convolutional Neural Networks (CNNs), Biometric Authentication, Forgery Detection.

I. INTRODUCTION

Analysing handwritten documents and confirming signatures are crucial tasks within pattern recognition and document processing. This comprehensive exploration delves into existing literature, emphasizing advancements in text line extraction and feature extraction for offline signature verification. Notably, methods like connected component analysis and the Hough transform are scrutinized for their effectiveness in extracting text lines from handwritten documents. In the realm of offline signature verification, Alsuhimat and Mohamad propose a hybrid approach that merges CNN and HOG techniques, evaluating its performance with three classifiers. This research significantly contributes to refining feature extraction methods and improving the accuracy of offline signature verification systems.

Impedovo and Pirlo offer an extensive overview of automatic signature verification, addressing techniques employed in both offline and online systems. Their work outlines various challenges and advocates for enhancements, providing a valuable resource for researchers. Furthermore, advancements in handwriting

analysis and forensic examination of signatures develop technologies for capturing and analyzing dynamic signatures, offering a reliable means of distinguishing forgeries.

Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[19]

This paper explores the latest developments in handwritten document analysis and signature verification. It discusses methodologies such as connected component analysis and the Hough transform for text line extraction, as well as Alsuhimat and Mohamad'shybrid approach for feature extraction in offline signature verification. The study also reviews the work of Impedovo and Pirlo on automatic signature verification, alongside discussions on handwriting analysis, forensic examination, and standardization efforts like ISO/IEC 19794-7:2014. Overall, it offers a succinct yet comprehensive overview of the evolving landscape within these domains.There are lots of ways in which security can be comprised even if we are using different ways for communication [11].Author presented an algorithm for detecting and preventing Node isolation attack where attacker become the sole MPR of victim and isolated the victim from the rest of the network.[12]. Here the paper [14] presents various aspects and formally defining the machine learning task of identifying malicious URLs. Project innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology.[18]

II. PROPOSED SYSTEM

The project proposes an end-to-end signature verification system utilizing deep learning techniques, comprising signature detection using YOLOv5, noise cleaning with CycleGAN, and verification via a VGG16-based feature extractor.

A. Problem Statement

Traditional signature verification processes are time-consuming and resource-intensive. This project aims to automate and streamline the signature verification task, saving valuable time and resources.

B. Block Diagram

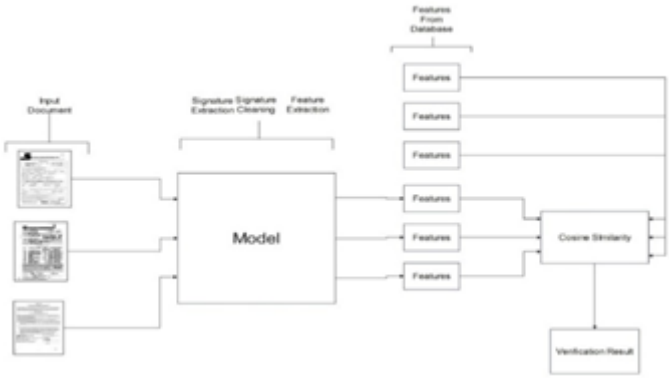

Figure1:System Architecture

The proposed system presents an end-to-end solution for signature verification, leveraging advanced deep learning methodologies. Signature detection is achieved using YOLOv5, extracting signatures from input

documents with high confidence. To address noise artifacts, a CycleGAN-based cleaning method is employed, enhancing the quality of detected signatures. Subsequently, a VGG16-based feature extractor is applied for signature verification, utilizing cosine similarity to determine the degree of similarity between reference and cleaned signatures. The workflow involves three key phases: detection, cleaning, and verification, providing a comprehensive solution for efficient and accurate signature authentication.

III.RESULT DISCUSSION

Figure2:Home Page

This is the home page of the Project and there is an option to choose which document you want to perform signature verification on. There is a detected signature button that gives the following output.

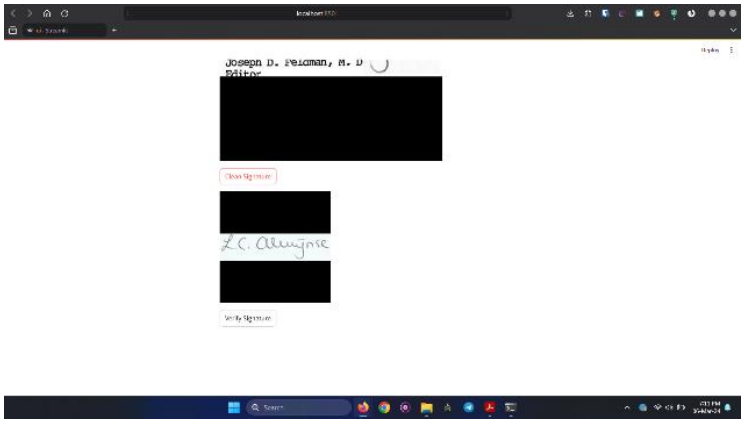

Figure3:Signature cleaned

Once cleaned the signature can be verified with the anchor image and the result of verification is displayed on the top right side of the image.

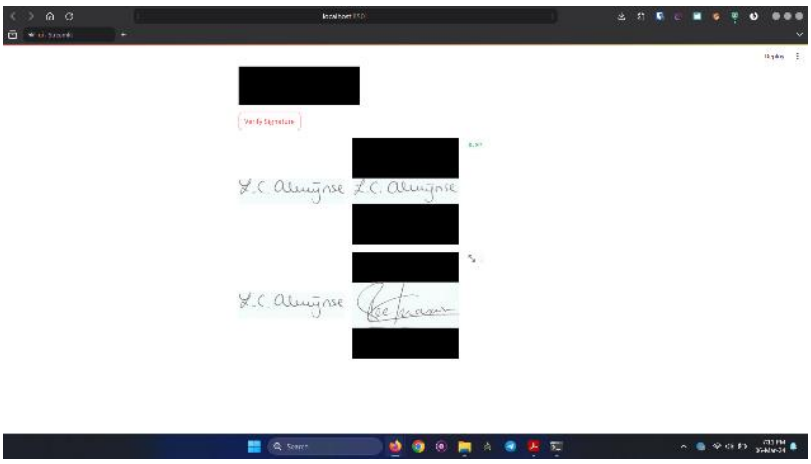

Figure4:Signature verified

The figure above shows the completed working of the document verification done using the proposed system.

IV. CONCLUSION

In conclusion, our result paper introduces an innovative system architecture aimed at verifying document authenticity through a meticulous process of signature analysis. The key steps involve signature extraction, where the model efficiently retrieves the signature from the input document. Following this, a pivotal phase of signature refinement eliminates noise, thereby enhancing the quality of the extracted signature.

The process then proceeds to feature extraction, where the signature undergoes transformation into a vector encapsulating crucial features such as shape, size, and orientation. The critical evaluation takes place via cosine similarity, quantifying the angle between the feature vector and the database features. The ultimate outcome of this process is the verification result, with a high cosine similarity score indicating a high probability of matching, thereby offering a robust measure of document authenticity.

This architecture not only tackles identified challenges but also establishes a new standard for accurate and efficient signature verification in document security applications.

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Optimized Data Storage Using Sharding Method in Blockchain

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ABSTRACT
The sharding scheme is highly useful and an effective mechanism to improve the storage and improve the volume of the database. Majority of the data being stored across the world is stored in conventional techniques in servers and workstations. As the amount of data keeps increasing every single day, these systems need to be able to scale up and allow for more data storage within the existing infrastructure. This is a big challenge as the conventional approaches are not as effective in achieving the scaling of the storage infrastructure with certain limitations that are inherent towards a centralized implementation of the databases. Therefore, the utilization of the decentralized sharding mechanism can help in achieving effective scalability and improved volume of the storage. The conventional approaches for the purpose of achieving the scaling of the existing database architecture are not sufficient.

Keywords: Blockchain, Linear Clustering, Bilinear Pairing, Data Sharding

I. INTRODUCTION

Almost since commencement of civilization, there's been the incidence of a person with evil intents being involved in a collection of people who appear to be rather average. This is attributable to the fact that there are bad apples in every bucket, and here was nothing that could be undertaken about it except to be vigilant and devise procedures to detect any harmful action carried out by the individual. This kind of behaviour has resulted in a slew of military conflicts and other confrontations, two of which have reached global levels. As a result, such behaviour is inappropriate, and it must be curtailed as soon as possible. There is legislation and other rules in place to keep individuals in control and promote a calm environment. A great variety of technical improvements have been introduced and improved thanks to the efforts of tranquil and cooperative professionals. Humans have made great strides from our forefathers, who used animal skin to clothe themselves and hunted for sustenance and existence. Human shave amassedknowledge and applied it to improve their way of life. Humans learnt cultivation, established down from their wandering lifestyles, and began building a society in the comfort of their own houses. This enables humans to advance further rand store a greater amount of data in order to advance civilization.Therewerealsorabblerousers atthistimewholootedandplunderedandwere the source of several large-scale disputes. Project innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology.[15]

II. LITERATURE SURVEY

As per the paper[1] author stated that Maintaining data consistency between shards in sharded blockchains. Maintaining data consistency between shards in sharded Maintaining data consistency between shards in sharded blockchains.

As per the paper[2] author stated that Conducted a detailed survey of existing sharding approaches, highlighting their benefits and challenges Conducted a detailed survey of existing sharding approaches, highlighting their benefits and challenges Further research on optimizing crosss hard transactions and improving the security aspects of sharded blockchains.

As per the paper[3] author stated that Efficiently enabling communication between shards in a sharded blockchain is a complex challenge Efficiently enabling communication between shards in a sharded blockchain is a complex challenge. Investigating further optimizations and enhancements in shard-to- shard communication to reduce latency and improve the overall performance.

As per the paper[4] author stated that Understanding the trade-offs between scalability and security in blockchain Reviewed and analyzed the existing literature to explore how sharding can enhance scalability while addressing security concerns. Investigating novel security measures and consensus mechanisms that align with sharding in blockchains.

As per the paper[5] author stated that Security challenges associated with sharding in blockchains, which implements sharding. Reviewed security challenges and proposed strategies to secure sharded data.

As per the paper[6] author stated that Efficient data storage in Ethereum 2.0. Presented a case study on storage optimization techniques in Ethereum 2.0, which implements sharding.

As per the paper[7] author stated that Efficiently managing transactions involving multiple shards.. Identified challenges and proposed solutions for cross-shard transactions investigating optimizations for inter-shard communication and transaction validation. Cyber attacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEG Vigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[17]

As per the paper[8]author stated that Data privacy concerns in blockchain, including sharded systems, Data privacy concerns in blockchain, including sharded systems. and Research on privacy-enhancing technologies specific to sharded data storage

As per the paper[9] author stated that Economic implications of sharding in blockchain networks. Conducted an economic analysis to evaluate the cost- efficiency of sharding Investigating economic models for incentive structures in sharded blockchains.

III.PROPOSED SYSTEM

A. Problem Statement

To effectively perform data shardingapproach using the effective feature extraction and deployment of a private distributed blockchain framework along with integrity evaluation using the Bilinear pairing technique

B. Architecture Diagram

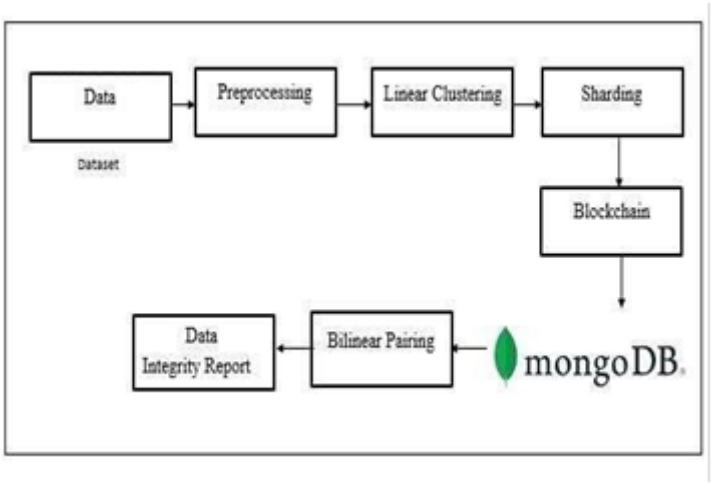
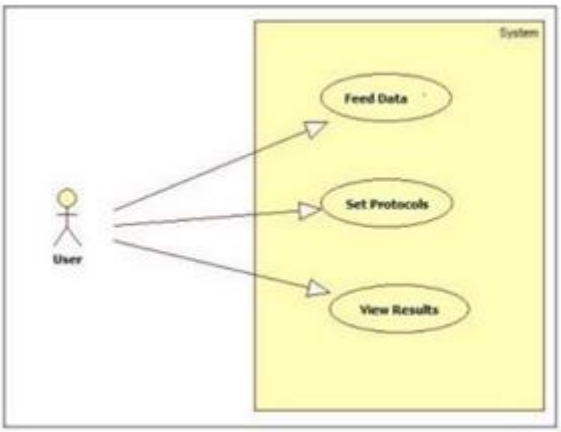


Figure1:Architecture Diagram

C. Mathematical Model



(A) Set Theory

1. S={}be as system for Data Sharding System
2. Identify Input as D={D1,D2, D3. Dn}

Where D=Data S=D

3. Identify DIR as Output i.e. Data Integrity Report

S={D, DIR}

4. Identify Process P S= {D, P, DIR}

P={FE, B, BP,IE}

Where FE=Feature Extraction B = Blockchain

BP=Bilinear Pairing

IE=Integrity Evaluation

So the final system can be defined as

5. S={D,FE, B,BP, IE, DIR}

(B) Set Description

1. Feature Extraction Set FR:

FR0=Data

FR1=Attribute Identification FR2= Horizontal Partition FR3= Data Sharding

2. BF :

BF0=Block String BF1=Hash Key Generation

BF2=Random Character Selection BF3=Blockhead and Body Formation

3. Bilinear Pairing Set BP :

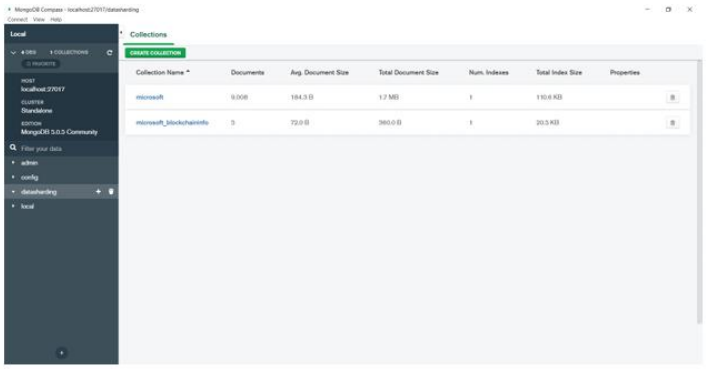
BP0=Number of Blocks BP1=Partition of Blocks BP2=Pairing Decision

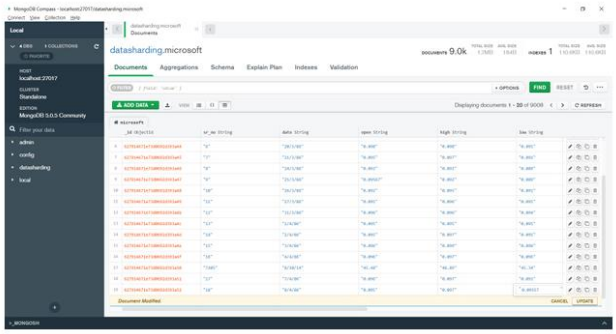
BP3=Hash Key Enhancement

4. Integrity Evaluation Set IE:

IE0=Hash Key for Block Division IE1=Previous Division Hash Key IE2=Current Division Hash Key IE3=Integrity Report

IV. RESULT SCREENSHOTS





V. RESULT DISCUSSION

Our Blockchain technology software achieve high accuracy rate. It provides high level of security with the help of sharding method.Itprovidesintegirytoeachofthedatasetwhichwecantaketo show our process actual working. It Sharding can reduce the computational resources required to process transactions on a blockchain network, making it more efficient and cost- effective.

VI. CONCLUSION

The Proposed approach an effective Data Sharding scheme that is developed on the Blockchain Framework. Data nowadays has increased in value and volume that demands for an improvement in the infrastructure to be able to store more data efficiently and with improved security.

The sharding strategy is one of the leading strategies that have been effective in the overcoming the scalability problem that plagues the traditional databases. The presented approach utilizes Linear Clustering along with the Blockchain framework to enable as secure and efficient data sharding approach on the Mongo DB database.

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Creating a Digital Health Ecosystem with a Life Wellness Portal Including Hospital and Insurance Companies with Cloud Computing and Artificial Intelligence

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ABSTRACT

The paper introduces an innovative e-health platform leveraging cloud computing to centralize and securely manage healthcare data. It facilitates collaboration between hospitals and insurance companies, promoting integrated intelligence. The platform enables Comprehensive Patient Management with a detailed Medical History Repository for informed clinical decision-making. Real-time Treatment Monitoring offers immediate insights into patient progression, aiding proactive care optimization. Streamlined Claim Processing automates medical claim submission and reimbursement by integrating with insurance providers. An AI-powered virtual assistant enhances Medical Note Analysis, identifying clinical concerns. Treatment Plans are optimized based on real-time and historical patient data. Overall, the platform revolutionizes healthcare data management, collaboration, and decision-making, enhancing patient care.

Keywords: E-Healthcare, Artificial Intelligence (AI), Cloud Computing, Patient Medical Data, Insurance Claims, Website Portal, SQL Database, and Centralized Health data.

I. INTRODUCTION

The web-based platform enables remote healthcare delivery by offering appointment scheduling and secure communication channels for patient-provider interaction. It utilizes a centralized, cloud-based repository to securely store and manage patients' medical records. Integration of life wellness digitalization and AI aims to revolutionize chronic disease management and improve healthcare accessibility. The document analyzes components, identifies potential challenges, and proposes an optimized implementation strategy. Overall, the ecosystem addresses various healthcare issues, empowering healthcare providers to access patient medical history for accurate diagnosis and personalized treatment planning.[1]

Insurance companies implement streamlined claim processing using automation and AI verification for diagnoses and treatments. Patient insurance details are securely integrated for automated claim submission upon hospital admission, reducing manual paperwork and errors. Patients receive timely updates on claim status and reimbursement dates.[1] AI-driven analytics utilize medical data for personalized medicine, analyzing patient health patterns and predicting complications. This approach tailor'streatment options based on individual medical profiles and disease progression.[2]

Chronic Disease Management analyzes data from conditions like diabetes and heart disease to predict exacerbations and recommend preventive measures. This personalized approach reduces adverse reactions, optimizes medication usage, and improves clinical outcomes.[3] Data-driven decision-making enables healthcare providers to make informed choices based on patient-specific data, enhancing the quality of care. By identifying optimal treatment options, the platform minimizes ineffective interventions, resulting in cost savings. Streamlined operations and automation increase efficiency and cost-effectiveness in the healthcare ecosystem.[4]

II. RELATED WORK

As per paper [1] The Role of Ayushman Bharat Health Account in Telehealth a New Frontier of Smart Healthcare Delivery in India authors Sushila Paliwal, Suraiya Parveen, Ompal Singh, Afshar Alam, and Jawed Ahmed's Statement to provide remote healthcare services involving fields of study or interdisciplinary approach for implementation (ABHA) its AI and telehealth.

Authors Rehab Rayna, Christos Tsagkaris, and Romash Iryan in the paper [2] The Internet of Things for Healthcare Applications Selected Cases and Challenges mentioned that explore the foundational elements of IoT in healthcare, showcasing how newly developed personalized health technologies and sophisticated IoT-derived techniques are redefining medical care.

According tothe paper [3] Big Data Analytics in Healthcare a Systematic Literature Review and Roadmap for Practical Implementation authors Sohail Imran, Tariq Morshed, and Timos Sellis statement Empowered by a comprehensive review, the roadmap equips with the knowledge and tools to navigate the complex landscape of BDA in healthcare, unlocking critical insights for improved patient care and medical research.

Authors Mohammad Khan, Rezaul– Karim in the paper [4] - Development of Smart E-Health System for Covid-19 Pandemic mentioned that facilitating real-time virtual consultations between doctors and patients through a web and app-based telecommunication system to enhance the appeal and widespread adoption of online healthcare services.

As per paper[5] Centralized and Automated Healthcare System An Essential Smart Application Post Covid-19 Authors Rama Moorthy, Sahana Udupa, Samanvitha Bhagavath, Shreesha, Varun Rao Statement Streamlined approach for establishing a cloud-based central repository system to manage and uphold electronic health records for patients. These papers showcase various digital healthcare advancements aiming to improve accessibility, personalization, and efficiency of medical care.

Author described detailed Survey On Creating Digital Health Ecosystem with Lifewellness Portal Including Hospital and Insurance Company with Cloud Computing and Artificial Intelligence.[12].

III.PROPOSED SYSTEM

A. Problem Statement

Diagnosing and treating patients effectively remains a multifaceted challenge for clinicians. Identifying the optimal treatment based on individual disease profiles and response to therapies demands precise analysis of intricate medical data. Similarly, insurance claim verification often involves manual hospital visits by agents, causing delays and inefficiencies in reimbursement processes.[1]Embracing digital transformation in healthcare,

the Life Wellness portal bridges the gap between hospitals, physicians, and insurance agents through secure digital connections.[5]

B. Block Diagram

The block diagram is a visual representation of a system, emphasizing overall structure and functions. It features three main componentsPatient, Doctor, and Insurance Agenteach with specific operations. For instance, patients can view and download personal data/reports.[6] The components extract data from loaded sub-databases through a repository, containing updated patient healthcare datasets.[7] A main gateway facilitates storing integrated schema data in a highly structured database, showcasing relationships between components in a hierarchical manner.[8]

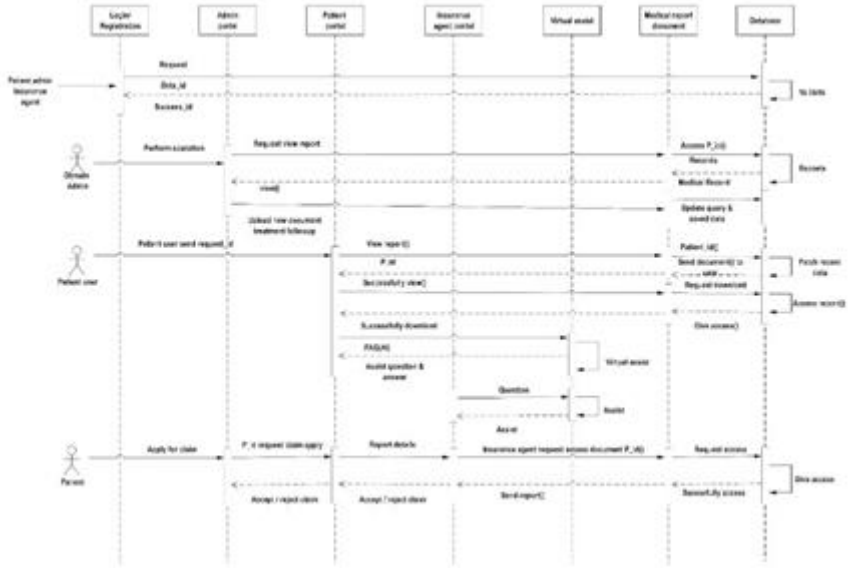

Figure1:

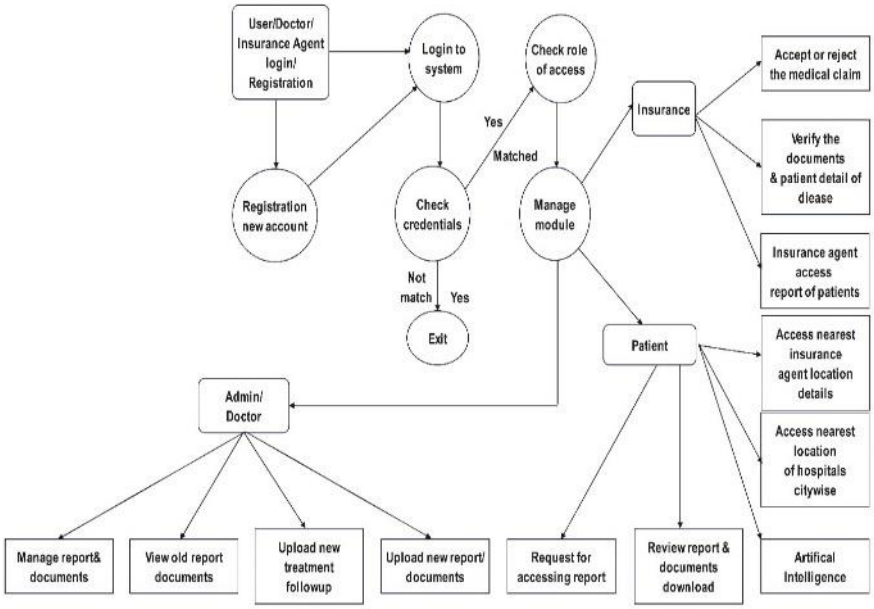

Figure2:

C. Mathematical Model

Step 1: Start
Step 2: Receive Form Submission
Check if the form is submitted (isset($_POST["submit"])).
Step 3: Retrieve Form Data
Retrieve user input data from the form:
$firstname, $lastname, $email, $password, $address, $date, $phonenumber, $adhar, $file.
Step 4: Validate Input Data
Check if any required field is empty.
If any field is empty, add an error to the $error array.
Step 5: Check Email Existence
Step 7: Hash Password
Hash the password using password hash().
Step 8: Insert Data into the Database
Step 9: Display Success Message
If the insertion is successful, display a success message to the user.
Step 10: End

IV. RESULT DISCUSSION

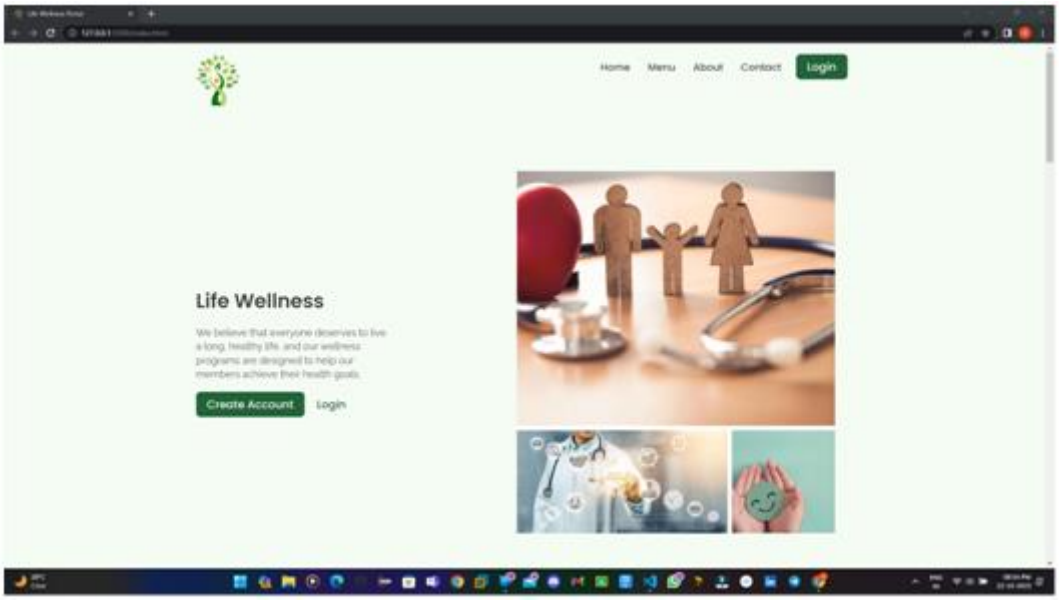

Figure 3: Home Page

This is the home page of the Life Wellness Portal in that there is navigation bar which contain different sections like Home, Menu, About, Contact, and Login buttons. There is also a special features section that gives actual information(needs/advantages) about the whole system.

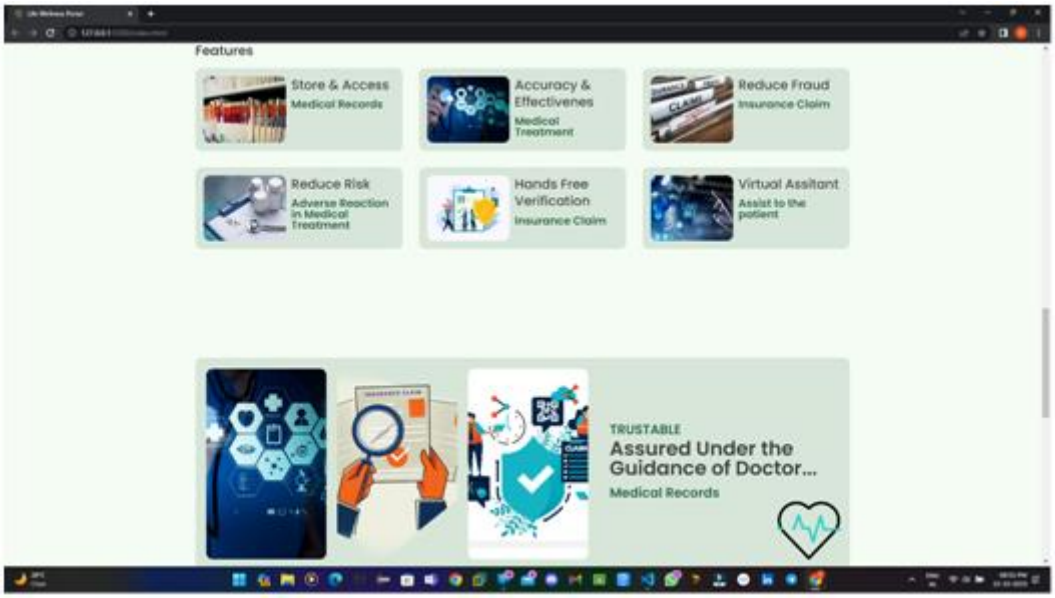

Figure2:Features Section

Here is the feature section onthe home page it includes the different features of our project.

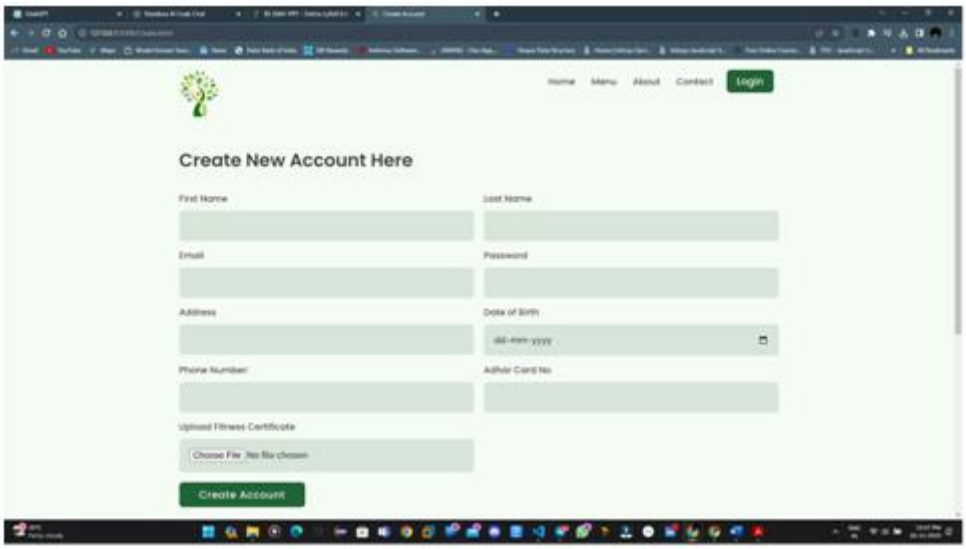

Figure3:Create Account Page

On this page, if the user does not have any login credentials then with the help of that page he can create the account and then log into the system.

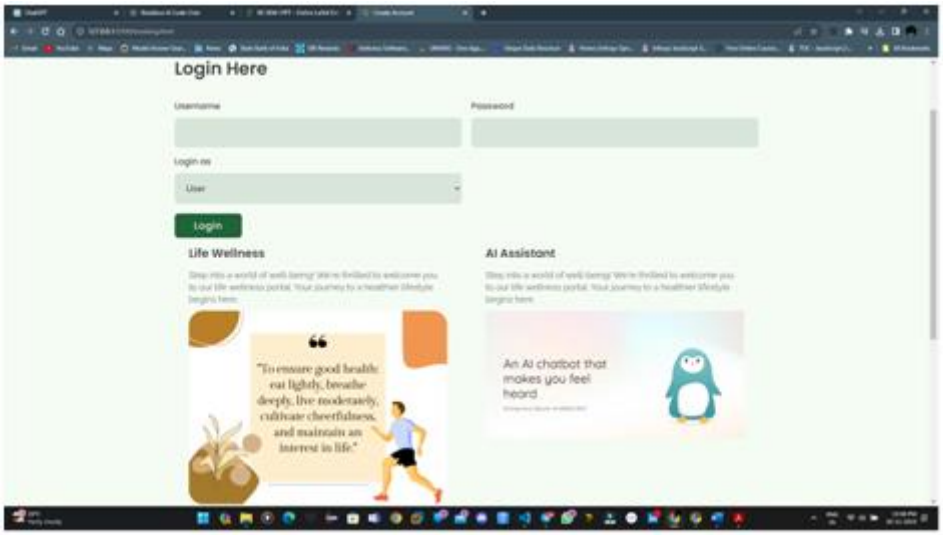

Figure4:Login Page

Here is the log in section in which the user needs to fill in the credentials to login into the system.

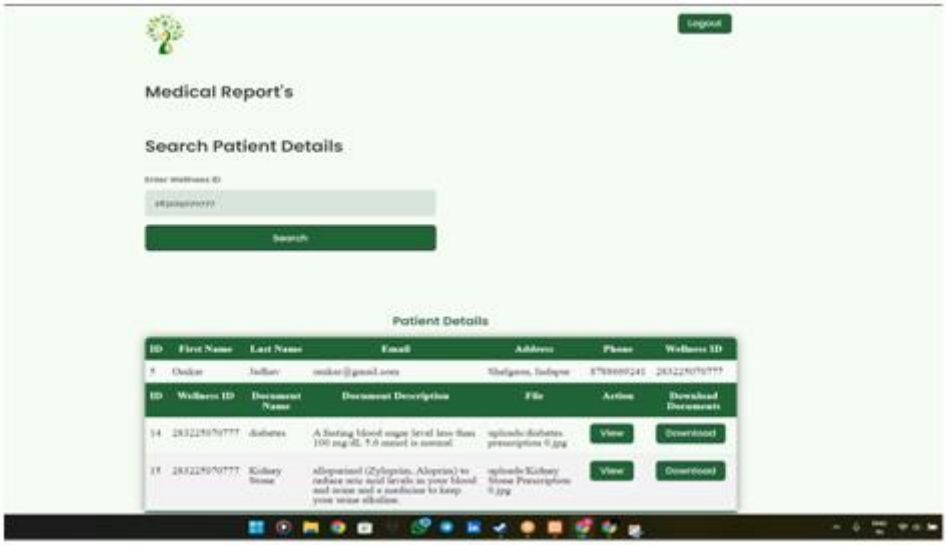

Figure5:View Patient details Page

After login the system with user which is normal patient and also insurance agent he can search the patient details and his document with the help of the patient wellness ID and view into the table and download the document also.

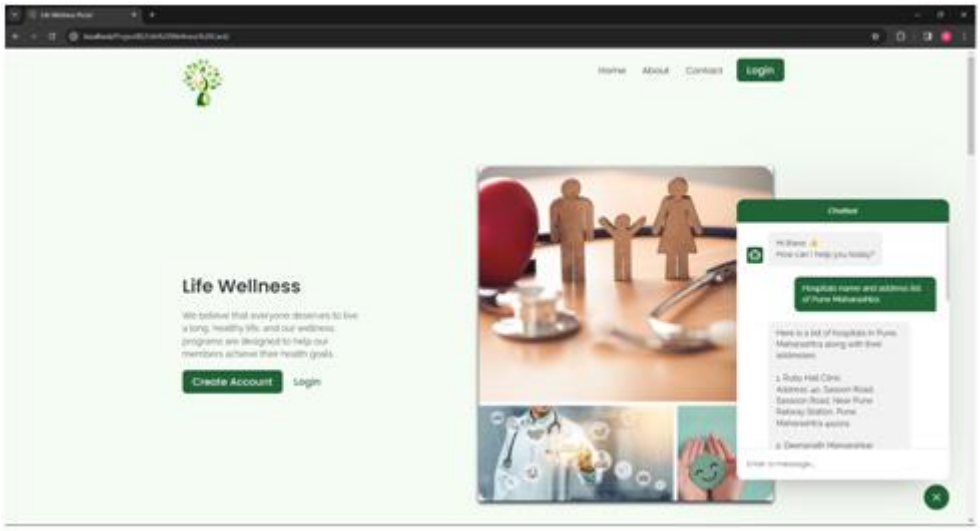

Figure6:AI ChatBot Page

This is the page for the AI chatbot which can used byusers insurance agents and doctors those users can ask any questions related to the locations of hospitals and also get the details about the addresses of the hospitals or else also ask the questions related to the health care.

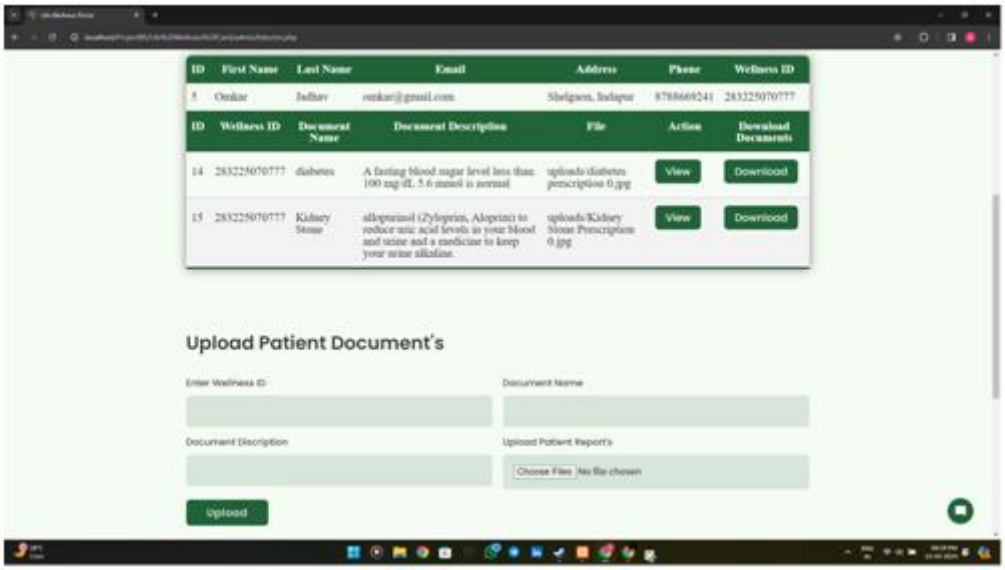

Figure7:Admin Doctor Page

Here is the main page of the admin doctor login in that he can view the patient details through the patient wellness id and also add the new treatment follow-up with new documents of the patient.

V. CONCLUSION

In this paper, the concept of life wellness presents a promising solution by enabling virtual consultations, diagnoses, and customized treatments. Additionally, it offers AI-powered virtual assistance, providing patients with personalized healthcare information and addressing common medical queries. Information retrieval with the responsiveness of a human-like mechanism. Navigating insurance claims often involves convoluted steps,

but with the integration of the Life Wellness digital health ecosystem, agents can streamline their workflow, this innovative system facilitates efficient verification of patient reports, simplifying the process of securing reimbursements for medical treatment costs.

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Voice-Enabled Traffic Sign Recognition and Alert System

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ABSTRACT

The "Voice-Enabled Traffic Sign Recognition and Alert system" is an innovative application of machine learning and computer vision technologies aimed at enhancing the roadsafety and driver awareness. In today's fastpaced world, the ability to promptly recognize and respond to traffic signs is crucial to prevent accidents and promote responsible driving. This project introduces a novel system that employs a camera installed in a vehicle to capture real-time images of the road. These images are then processed using advanced computer vision algorithms to detect and classify traffic signs. Furthermore, the system utilizes natural language processing to provide voice alerts to the driver, ensuring that they are informed about important traffic signs, speed limits, and other crucial information without taking their eyes off the road.

Keywords: Machine learning, Convolutional Neural Network, GTSRB Dataset, Traffic Signs, voice alerts

I. INTRODUCTION

In an increasingly connected and complex world, road safety remains a paramount concern. Traffic signs play a crucial role in guiding drivers and ensuring safe road usage. However, factors like distraction, fatigue, or challenging weather conditions can sometimes lead to missed or Misinterpreted signs, potentially resulting in accidents and hazards. To address this challenge and enhance road safety, we introduce the "Voice-Enabled Traffic Sign Recognition and Alert System using Machine Learning." project combines the power of machine learning and voice recognition technology to create an intelligent and interactive system that assists the drivers in real-time. By deploying a camera to capture the live road view, our system employs advanced machine learning models to recognize various traffic signs accurately. What sets our system apart is its ability to not only identify signs but also communicate this information to the driver through voice alerts.

Imagine driving down the road, and as you approach a stop sign, the system seamlessly recognizes it and gently announces, "Stop sign ahead, please prepare to stop." This real-time voice interaction ensures that you never miss another important sign, providing an additional layer of safety and convenience on your journey. In this project, we will delve into the intricate details of our innovative system, from the collection and training of machine learning models to the development of voice recognition capabilities. We will explore the practical aspects of real-time image processing, voice interactions, and user interfaces designed for a seamless driving experience. Safety and user-friendliness are our top priorities, ensuring that our system enhances driver awareness without causing distractions.

II. LITERATURE SURVEY

"Victor Ciuntu, HasanFerdowsi" This paper analyses a few possible approaches of doing this task in real-time using a portable system. The final solution uses a convolutional neural network for detection and classification combined with a custom optical character recognition algorithm for speed limit signs. The training and testing dataset is based on a combination of the Belgian Dataset, German Dataset, as well as images taken while driving in Illinois, United States.

"Wang Canyoung" The purpose of research paper tittled "Traffic Sign Detection and Recognition Based on Deep Learning" would be to investigate and present findings related to the application of deep learning techniques for the detection and recognition of traffic signs in images or video streams. The paper would begin by outlining the problem statement, which is the need for robust and efficient methods to detect and recognize traffic signs on roads. It would discuss the challenges associated with this task, such as variations in lighting conditions, weather, and occlusions.

"Shu-Chun Huang and Huei-Yung Lin"In the present society, driving safety becomes a very important issue. If there is an excellent driving assistance system, the possibility of a car accident can be significantly reduced. This paper presents a driving assistance system for traffic sign detection and recognition. The image segmentation and hierarchical grouping are then used to select the candidate road sign region. For the road sign recognition subsystem, Convolution Neural Network (CNN) is adopted to classify the traffic signs for the candidate regions. In the experiments, the proposed technique is carried out using real scene images. The performance evaluation and analysis are provided.

"Frances Ann Hill, Eric Vincent Heubel, Philip Ponce de Leon, Luis Fernando Velásquez-García" The paper likely describes the design and development of an advanced ion source system that incorporates micro fabricated electrospray emitters, an integrated extractor grid, and carbon nanotube flow control structures. The goal is likely to improve the efficiency, throughput, and precision of ion production and manipulation for various applications, such as mass spectrometry or other analytical techniques that rely on ionization. This research may have implications for the fields of analytical chemistry, materials science, and instrumentation technology

"Harini S, Abhiram V, RajathHegde, Samarth Bharadwaj D D" Road signs are important to ensure smooth traffic flow without bottle necks or mishaps. Road symbols are the pictorial representations having different necessary information required to be understood by driver. Road signs in front of the vehicle are ignored by the drivers and this can lead to catastrophic accidents. This paper presents an overview of the traffic sign board detection and recognition and implements a procedure to extract the road sign from a natural complex image, processes it and alerts the driver using voice command It is implemented in such a way that it acts as a boon to drivers to make easy decisions.

"Zhongqin Bi, Ling Yu HonghaoGao, Ping Zhou, Hongyang Yao" The proposed method designs an improved VGG convolutional neural network and has significantly superior performance compared with existing schemes. First, some redundant convolutional layers are removed efficiently from the VGG-16 network, and the number of parameters is greatly reduced to further optimize the overall architecture and accelerate calculation. Furthermore, the BN (batch normalization) layer and GAP (global average pooling) layer are added to the network to improve the accuracy without increasing the number of parameters.

"HeeSeok Lee and Kang Kim" We propose a novel traffic sign detection system that simultaneously estimates the location and precise boundary of traffic signs using convolutional neural network (CNN). Estimating the precise

boundary of traffic signs is important in navigation systems for intelligent vehicles where traffic signs can be used as 3-D landmarks for road environment. Previous traffic sign detection systems, including recent methods based on CNN, only provide bounding boxes of traffic signs as output, and thus requires additional processes such as contour estimation or image segmentation to obtain the precise boundary of signs.

"JiefengGuo, rongxuan You, Lianfen Huang" To solve these problems, we propose a mixed vertical and-horizontal-text traffic sign detection and recognition algorithm for street level scene. First, an effective combination of different red, green and blue components is used to distinguish the traffic signs from many objects of similar color in the very complex street scenes. Second, unlike English letters, the strokes of many Chinese characters are unconnected, which may result in that a character will be detected as two or more characters. Unlike the English text lines, which are only horizontal, the Chinese text lines on text based traffic signs are usually both in horizontal and vertical directions.

"Shouhi He, Lei Chen, Shaoyun Zhang, ZhuangxianGuo, Pengjie sun, Hong Liu and Hongda Liu"To solve theproblem, the authors presented an automatic recognition algorithm for traffic signs based on visual inspection. For the accuracy of visual inspection, a region of interest (ROI) extraction method was designed through content analysis and key information recognition. Besides, a Histogram of Oriented Gradients (HOG) method was developed for image detection to prevent projection distortion.

"GulcanYildiz, AhmetUlu, BekirDizdaroglu, and DoganYldiz"In this study, a new highperformance and robust deep convolutional neural network model is proposed for traffic sign recognition. The stacking ensemble model is presented by combining the trained models by applying improvement methods on the input images. In addition, data augmentation was applied to increase the images in the data set due to the uneven distribution of the number of images belonging to the classes. This ensemble model obtained 99.75% test accuracy on the German Traffic Sign Recognition Benchmark (GTSRB) dataset

III.PROPOSED SYSTEM

A. Problem Statement

The project aims to develop a web application that integrates Traffic Sign Recognition (TSR) with a Voice Alert System. The goal is to provide real-time recognition of traffic signs and deliver voice alerts to users, enhancing their awareness and adherence to traffic regulations.

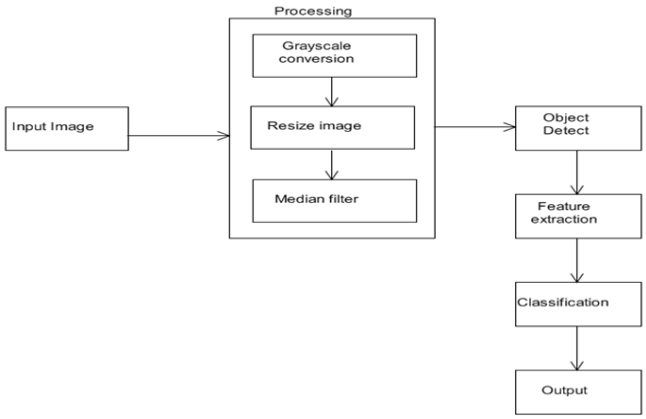

Figure1:

To ensure a smooth and secure flow of traffic, road signs are essential. A major cause of road accidents is negligence in viewing the Traffic signboards and interpreting them incorrectly. A system that can help in

recognizing the Traffic sign and sending a voice alert through the speaker to the driver so that he/ she may take necessary decisions. Traffic sign detection and recognition plays an important role in expert systems, such as traffic assistance driving systems and automatic driving systems. It instantly assists drivers or automatic driving systems in detecting and recognizing traffic signs effectively. The traffic sign board recognition focuses on reduction of the traffic load on existing road network through various travel demand management measures.

B. Sequence Diagram

Sequence diagrams are used by software developers and business professionals to understand requirements for a new system or to document an existing process. A sequence diagram is a type of interaction diagram because it describes how and in what order a group of objects works together.This simplified sequence diagram outlines the main interactions between the user, user interface, traffic sign recognition module, CNN algorithm, and the voice alert module in a Traffic Sign Recognition system using a CNN algorithm. The actual implementation may involve more detailed steps and interactions based on the specific architecture and requirements of the system.

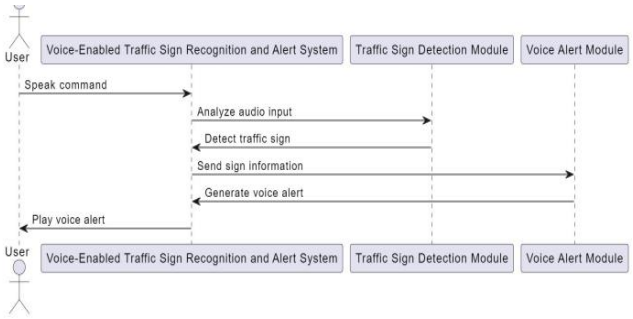

Figure 2: Sequence Diagram

IV. ALGORITHM

The structure of CNN algorithm includes two layers.First is the extraction layer of features in which each neuron's input is directly connected to its previous layer's local ready fields and local features are extracted. The spatial relationship between it and other features will be shown once those local features are extracted. The other layer is feature map layer; every featuremap in this layer is a plane, the weight of the neurons in one plane are same. The feature plan's structure make use of thefunction called sigmoid.This function known as activation function of the CNN, which makes the feature map have shift indifference. In the CNN each convolution layer is come after a computing layer and it's usage is to find the local average as well as the second extract; this extraction of two feature is unique structure which decreases the resolution.

Step1: Select the dataset.
Step2: Perform feature selection using information gain and ranking
Step3: Apply Classification algorithm CNN
Step4: Calculate each Feature fix value of input layer
Step5: Calculate bias class of each feature
Step6: The feature map is produced and it goes to forward pass input layer
Step7: Calculate the convolution cores in a feature pattern
Step8: Produce sub sample layer and feature value.

Step9: Input deviation of the kth neuron in output layer is Back propagated.
Step10: Finally give the selected feature and classification results.

V. RESULTS AND DISCUSSION

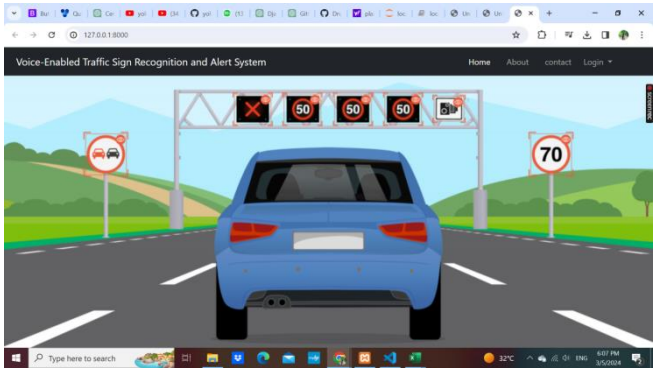

Figure 3:

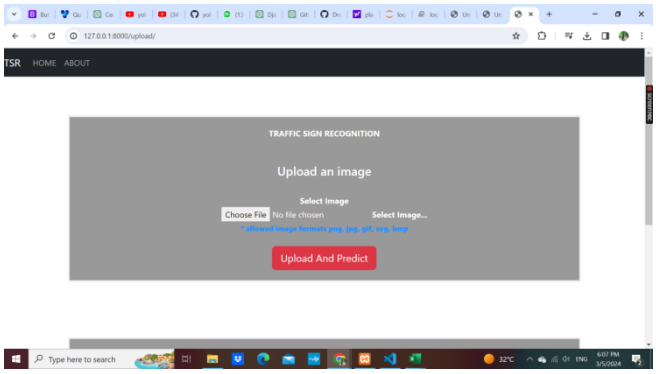

Figure 4:

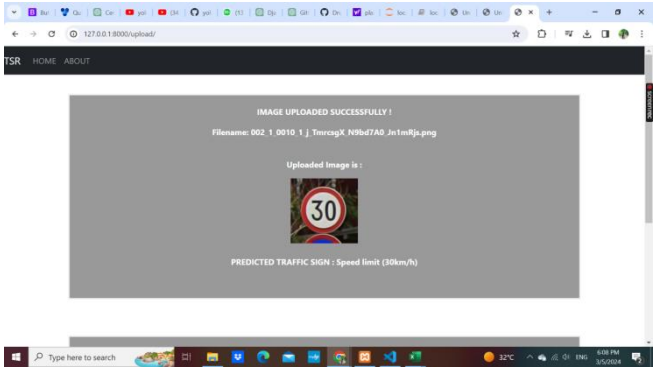

Figure 5:

VI. CONCLUSION

The development of a "Voice-Enabled Traffic Sign Recognition and Alert System using Machine Learning" represents a significant step forward in enhancing road safety and driver awareness. This innovative system leverages cutting-edge technology to recognize and interpret traffic signs in real-time, providing drivers with voice alerts to ensure they never miss critical information while on the road.Throughout this project, we have

explored the key components and considerations involved in the design and implementation of such a system. From data collection and machine learning model training to voice recognition and user interaction, each aspect plays a crucial role in ensuring the system's effectiveness and user-friendliness.

In an ever-evolving transportation landscape, the integration of machine learning, computer vision, and voice recognition technologies paves the way for safer and smarter roads. Our commitment to innovation and road safety remains unwavering, and we look forward to a future where voice-enabled systems like this one become an integral part of every vehicle, contributing to safer journeys for all.

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Digital Wardrobe Experience -Virtual Try on Clothing

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ABSTRACT

The image-based virtual try-on project is all about using computer vision and augmented reality. We're working on clever computer programs to spot and follow your body and the clothes you want to try on in pictures. This means figuring out how you're standing, separating you from the background, and making the clothes look real on you. It's like making a virtual fitting room with some high-tech magic. Image-based virtual try-on is a cool tech that lets you try on clothes in pictures. It uses smart computer stuff to figure out your body shape from your photo. Then, it magically puts the clothes on you in the pic, making sure they look right with the right fabric, texture, and fit. It's like a virtual dressing room on your screen. This tech wants to give you a super-real and fun way to try on clothes without actually putting them on. Imagine seeing how different outfits would look on you, just by using your computer or phone.

Keywords: Shopping, Virtual Try-on, Image Based, Clothing, Fitting Room, Algorithms, User, Virtual reality.

I. INTRODUCTION

Image based virtual Try-on clothing is a concept of providing customer an experience of virtually trying multiple clothes of his or her choice without making him travel to the shop or market. This concept of digital wardrobe can make online shopping for customer more reliable and trustable in this world where it is not possible for customer to travel every time to the shop to purchase clothing items. This system will be a digital wardrobe for the customer where they can try clothing of their choice by just uploading their image into the system. It could make online shopping way better because you won't need to visit real fitting rooms, and you'll be happier with what you buy. It's like a fashion revolution online. There are a lot of algorithms have been developed for accurately calculating the size and the shape of the body and suggesting the perfect clothing item to the user. Now a days researchers are also working on improving the privacy of the data mostly in the form of images provided by users. The proposed system introduced in this paper will help users to find out their favorite clothing items and will also provide users with the online virtual try-on experience. In this system user will provide his image to the application and then will be able to select the clothing item that he wants to try.

II. LITERATURE SURVEY

In paper [1] C-VTON: Image-based virtual try-on techniques have shown great promise for enhancing the user-experience and improving customer satisfaction on fashion-oriented e-commerce platforms. However, existing techniques are currently still limited in the quality of the try-on results they are able to produce from input images of diverse characteristics. In this work, authors propose a Context-Driven Virtual Try-On Network (C-VTON) that addresses these limitations and convincingly transfers selected clothing items to the target subjects even under challenging pose configurations and in the presence of self occlusions.

In the Paper [2] Image-based virtual try-on (VTON) systems using deep generative models have drawn significant research attention. However, the 2D clothing shape transform methods in the earlier works show serious limitations in 3D clothing deformation required in multiple-pose VTON scenarios.

[3] This paper presents a new image-based virtual try-on approach (Outfit- VITON) that helps visualize how a composition of clothing items selected from various reference images form a cohesive outfit on a person in a query image. Our algorithm has two distinctive properties. First, it is inexpensive, as it simply requires a large set of single (noncorresponding) images (both real and catalog) of people wearing various garments without explicit 3D information. The training phase re- quires only single images, eliminating the need for manually creating image pairs, where one image shows a person wearing a particular garment and the other shows the same catalog garment alone. Secondly, it can synthesize images of multiple garments composed into a single, coherent outfit; and it enables control of the type of garments rendered in the final outfit.

As per Paper [4] Authors present a novel learning model, Fit-Me network, to seamlessly fit in-shop clothing into a person image and simultaneously transform the pose of the person image to another given one. The proposed Fit-Me network helps users not only save the time used to change clothes physically but also provide comprehensive information about how suitable the clothes are. By facilitating the arbitrary pose transformation, can generate consecutive poses to help users get more information for deciding whether to buy the clothes or not from different aspects.

In this paper [5], authors present VITONGT, a new model for virtual try-on that generates high-quality and photo-realistic images. This model is composed of a two-stage geometric transformation module that performs two different projections on the input garment, and a transformation-guided try-on module that synthesizes the new image. The proposed solution on the most common dataset for this task, containing mainly t-shirts, and demonstrate its effectiveness compared to different baselines and previous methods.

A mobile-based virtual try-on system is proposed in paper [6] to deal with the problems of high cost and conflicts between computational complexity and simulation effects. In this paper, several modules are included, such as automatic 3D face reconstruction based on a single image, auto-skinning and real time local simulation of cloth. According to the experiments, the virtual try-on system introduced in this paper is able to achieve better fitting effects with lower constructing and computing costs, in which case good experience of mobile-based virtual try-on system is pro- vided.

As per paper [7], Image-based virtual try-on systems aim at transferring the try-on clothes onto a target person. Despite making considerable progress recently, such systems are still highly challenging for real-world applications because of occlusion and drastic spatial deformation. To address the issues authors propose a novel Flow-based Virtual Try- on Network (FVTN). It consists of three modules. Firstly, the Parsing Alignment Module (PAM) aligns the source clothing to the target person at the semantic level by predicting a semantic

parsing map. Secondly, the Flow Estimation Module (FEM) learns a robust clothing deformation model by estimating multi-scale dense flow fields in an unsupervised fashion.

The paper [8] proposes a virtual try-on system for apparel shopping that generates high-resolution virtualization without pixel disruption. The system employs a Parser Free Appearance Flow Network, which simultaneously warps clothes and generates segmentation while exchanging information. The proposed methodology outperforms existing virtual fitting methods at 192 x 256 resolution, as demonstrated by the Fre´chet inception distance (FID) performance metric. The system's technical specifications, software and hardware requirements, and user interface de- sign are presented in detail.

III.PROPOSED SYSTEM

Here in this section we will cover details about our proposed system.

A. Problem Statement

The problem statement for the image-based virtual try-on clothes is to create a system that lets user try on clothes virtually by uploading their own images. The challenge is to accurately place chosen clothing items on users image, making it look realistic and appealing.

B. Block Diagram

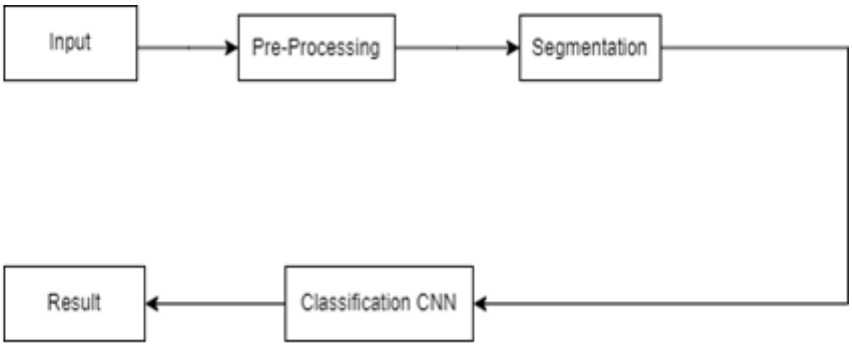

Figure1:Block Diagram

IV.RESULTS

This project explores the potential of a Digital Wardrobe Experience with virtual try-on clothing functionality. This explains how users interact with this technology and its impact on aspects like user experience and size selection accuracy. This signifies a valuable contribution to the understanding of virtual try-on technology, aligning with previous research on its benefits.

For implementation of our proposed system there is need of Software as Operating System - Windows 10/11, Front End - HTML, CSS, programming Language – java and Database-MySQL. Hardware Requirement for implementation is Processor - Intel 13, RAM - 6 GB(min), Hard Disk - 20 GB, Key Board - Standard Windows Keyboard , Mouse - Two or Three Button Mouse.

The following figure depicts the Digital Wardrobe Experience-Virtual Try on Clothing form of the project.

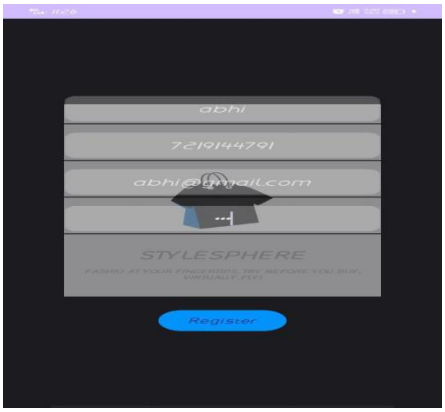

Figure2:Interface Front Page

The following figure gives the final result of the project. In this figure, we need the registration do it the first.

Figure3:Login Page

The figure depicts the login into application of the project. In this figure, it shows that login into the application.

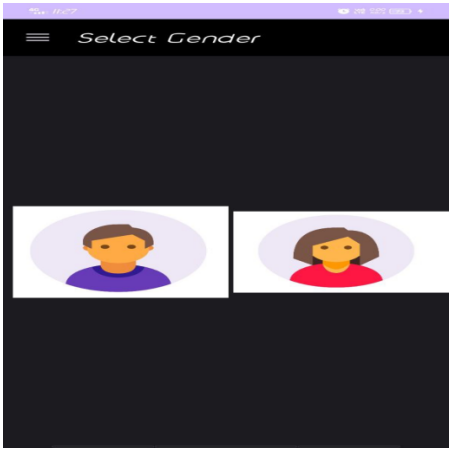

Figure4:Selection of Gender

The image depicts the selection of gender of the project. In this figure, it shows that gender like male / female

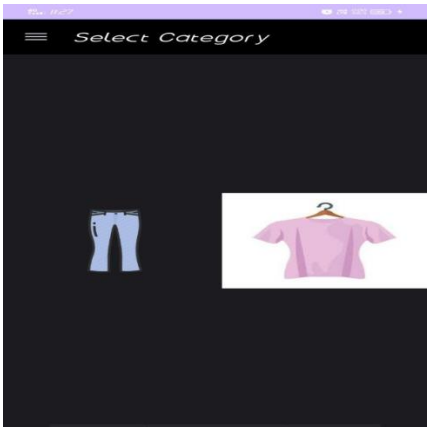

Figure5:Selection of Cloth Category

The figure displays the selection to the categories of clothes into the project. In this figure, it shows that categories of clothes

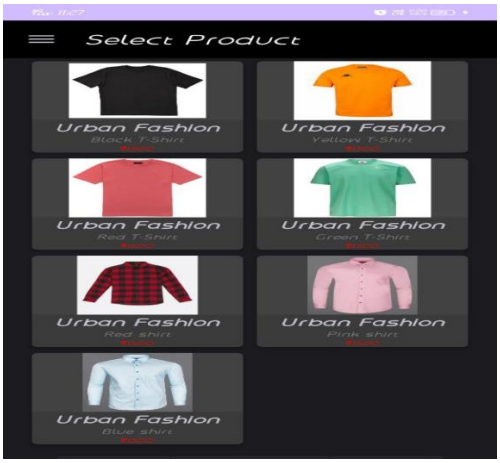

Figure6:Cloth Options in Category

In this figure, it shows that selection of the clothes. The image depicts the select the clothes and moves to the carts into the project. In this figure, it shows that clothes moves into the carts

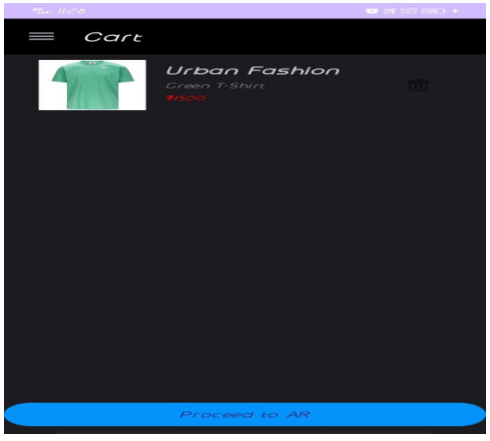

Figure7:Cloth added to cart

In this figure, it shows that model with wearing the cloths.

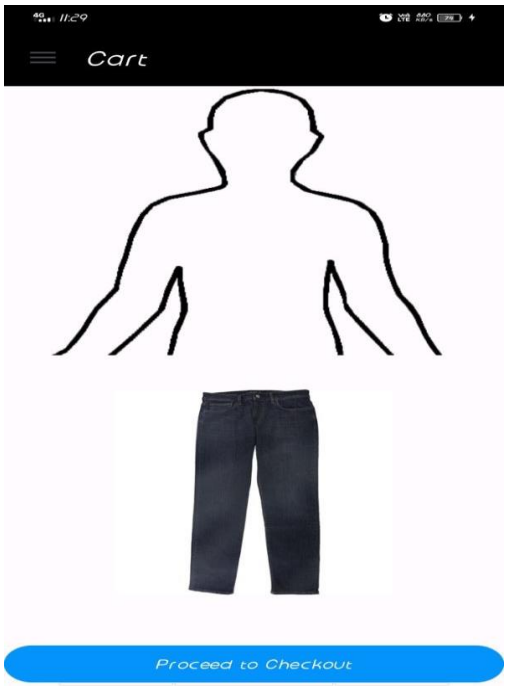

Figure8:Cloth on virtual mode

The following figure shows the payment process of that cloth in to the project. In this figure, it shows that once the cloth is finalized then payment process need to be done.

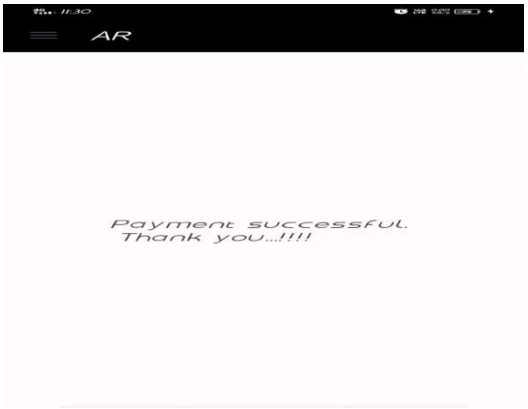

Figure9:Payment Option

V. CONCLUSION

Image-based virtual try-on for clothes offers a convenient and personalized shopping experience. It allows customers to try on clothes virtually, saving time and eliminating the need for physical fitting rooms. Retailers can showcase their products in an immersive way, increasing customer engagement. However, it's important to consider the limitations of virtual try-on, such as potential in accuracies in fit and color representation. Overall, it's a transformative technology that enhances the online shopping experience and improves customer satisfaction.

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Chronic Kidney Disease Prediction Using Deep Learning

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ABSTRACT

Chronic Kidney Disease (CKD) is a prevalent and complex condition affecting millions worldwide, characterized by the gradual loss of kidney function over time. Early identification and prediction of CKD progression are essential for timely intervention and effective management to mitigate adverse outcomes such as end-stage renal disease and cardiovascular complications. Inrecent years, the integration of machine learning techniques with clinical data has shown promising results in predicting CKD progression. This review provides a comprehensive overview of predictive modeling approaches for CKD progression, focusing on the utilization of various machine learning algorithms, including logistic regression, decision trees, random forests, support vector machines, and neural networks.

Keywords: Chronic Kidney Disease (CKD), Prediction, Machine Learning, Biomarkers, Glomerular Filtration Rate (GRF)

I. INTRODUCTION

Chronic Kidney Disease (CKD) represents a significant global health burden, affecting millions of individuals worldwide and posing substantial challenges to healthcare systems. CKD is characterized by the progressive deterioration of kidney function over time, often leading to adverse outcomes such as end-stage renal disease (ESRD) and increased cardiovascular risk. Early identification and accurate prediction of CKD progression are crucial for implementing timely interventions, optimizing patient care, and mitigating the associated morbidity and mortality. In recent years, there has been growing interest in leveraging advanced computational techniques, particularly machine learning, to develop predictive models for CKD progression. These models utilize a wide range of clinical data, including demographic information, laboratory measurements, medical history, and imaging findings, to forecast the likelihood of disease progression in individual patients. By integrating diverse sources of data and applying sophisticated algorithms, these predictive models offer the potential to enhance risk stratification, facilitate personalized treatment strategies, and improve clinical outcomes for CKD patients.

II. LITERATURE SURVEY

Chronic kidney disease (CKD) is a condition characterized by progressive loss of kidney function over time. It describes a clinical entity that causes kidney damage and affects the general health of the human body. Improper diagnosis and treatment of the disease can eventually lead to end-stage renal disease and ultimately lead to the patient's death. Machine Learning (ML) techniques have acquired an important role in disease prediction and are a useful tool in the field of medical science [1].

Chronic kidney disease (CKD) is a life-threatening condition that can be difficult to diagnose early because there are no symptoms. The purpose of the proposed study is to develop and validate a predictive model for the prediction of chronic kidney disease. Machine learning algorithms are often used in medicine to predict and classify diseases. Medical records are often skewed. Authors have used chronic kidney disease dataset from UCI Machine learning repository with 25 features and applied three machine learning classifiers Logistic Regression (LR), Decision Tree (DT), and Support Vector Machine (SVM) for analysis and then used bagging ensemble method to improve the results of the developed model. [2].

In this systematic review auhors aimed at assessing how artificial intelligence (AI), including machine learning (ML) techniques have been deployed to predict, diagnose, and treat chronic kidney disease (CKD). They systematically reviewed the available evidence on these innovative techniques to improve CKD diagnosis and patient management.[3]

Chronic kidney disease (CKD) is one of today's most serious illnesses. Because this disease usually does not manifest itself until the kidney is severely damaged, early detection saves many people's lives. Therefore, the contribution of paper [4] is proposing three predictive models to predict CKD possible occurrence within 6 or 12 months before disease existence namely; convolutional neural network (CNN), long short-term memory (LSTM) model, and deep ensemble model. The deep ensemble model fuses three base deep learning classifiers (CNN, LSTM, and LSTM-BLSTM) using majority voting technique.

Chronic kidney disease (CKD) is a significant global health challenge that requires timely detection and accurate prognosis for effective treatment and management. The application of machine learning (ML) algorithms for CKD detection and prediction holds promising potential for improving patient outcomes. By incorporating key features which contribute to CKD, these algorithms enhance our ability to identify high-risk individuals and initiate timely interventions. Paper [5] research highlights the importance of leveraging machine learning techniques to augment existing medical knowledge and improve the identification and management of kidney disease.

As per paper [6], Researchers are working towards producing an effective model to provide key insights into the progression of CKD. The review found that cox regression modelling was predominantly used among the small number of studies in the review. This made it difficult to perform a comparison between ML algorithms, more so when different validation methods were used in different cohort types.

Diabetes and high blood pressure are the primary causes of Chronic Kidney Disease (CKD). Glomerular Filtration Rate (GFR) and kidney damage markers are used by researchers around the world to identify CKD as a condition that leads to reduced renal function over time. A person with CKD has a higher chance of dying young. Doctors face a difficult task in diagnosing the different diseases linked to CKD at an early stage in order to prevent the disease. This research presents a novel deep learning model for the early detection and prediction of CKD [7].

As per Paper [8], chronic kidney disease (CKD) is defined as a persistent abnormality in the structure and function of kidneys and leads to high morbidity and mortality in individuals across the world. Globally, approximately 8%–16% of the population is affected by CKD. Proper screening, staging, diagnosis, and the appropriate management of CKD by primary care clinicians are essential in preventing the adverse outcomes associated with CKD worldwide.

Nonalcoholic fatty liver disease (NAFLD) is the hepatic manifestation of metabolic syndrome and is the most common cause of chronic liver disease in developed countries. Certain conditions, including mild inflammation biomarkers, dyslipidemia, and insulin resistance, can trigger a progression to nonalcoholic steatohepatitis (NASH), a condition characterized by inflammation and liver cell damage.[9]

Chronic kidney disease (CKD) typically evolves over many years, with a long latent period when the disease is clinically silent and therefore diagnosis, evaluation and treatment is based mainly on biomarkers that assess kidney function. Glomerular filtration rate (GFR) remains the ideal marker of kidney function. Unfortunately measuring GFR is time consuming and therefore GFR is usually estimated from equations that take into account endogenous filtration markers like serum creatinine (SCr) and cystatin C (CysC).[10] Detailed survey is available in [11].

III.PROPOSED SYSTEM

Here in this section we will cover details about our proposed system.

A. Problem Statement

Predicting if the kidney cancer disease is cancer or non cancer based on several observations/features. These analysis aims to observe which features are most helpful in predicting malignant or benign cancer and to see general trends that may aid us in model selection and hyper parameter selection.

B. Block Diagram

The block diagram illustrates the architecture of a comprehensive Chronic KidneyDisease (CKD) management system, highlighting the key components and their interaction for effective diagnosis, monitoring, and treatment of CKD patients.

This block diagram depict the various blocks within the CKD system block diagram and their respective functionalities, illustrating how they 3contribute to the overall management of Chronic Kidney Disease.

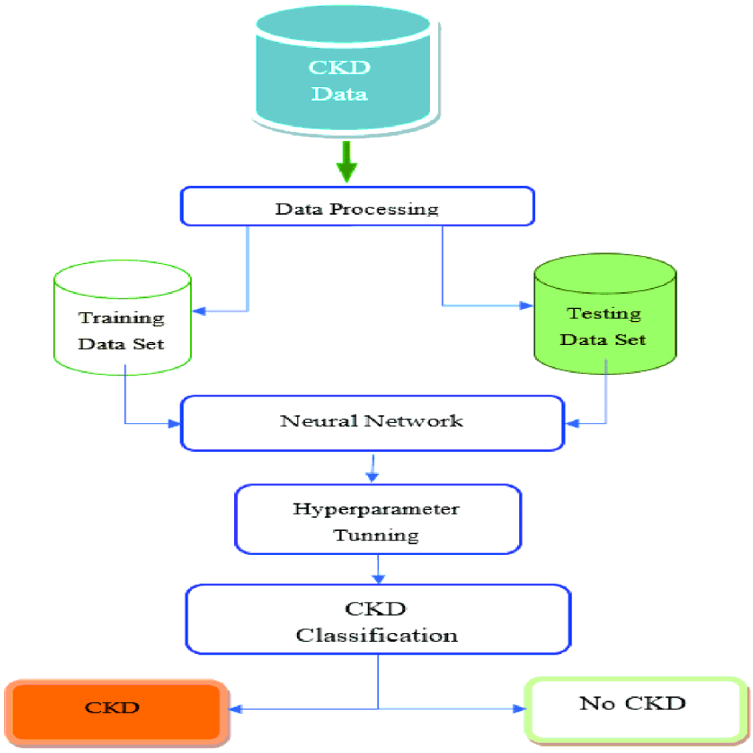

Figure1:Block Diagram

Proposed system had Software Requirement as Windows 10/11 OS, HTML as front end , CSS , Python as a programming language, Database-MySQL, IDE –Pycharm and Hardware Requirements as Processor - Intel 13, RAM - 6GB(min), Hard Disk - 20 GB, Key Board - Standard Windows Keyboard , Mouse - Two or Three Button Mouse

IV. RESULT DISCUSSION

The following image depicts the CKD form of the Proposed System. The following image depicts the final result of the project. In this figure, it shows that the patient was not CKD positive.

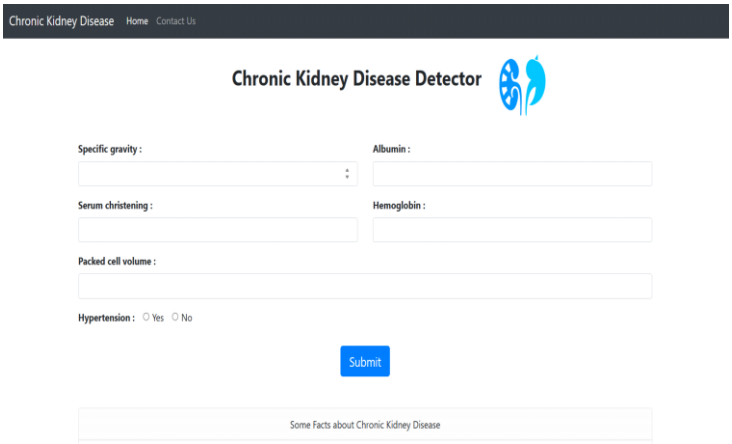

Figure2:Result Screen Shot 1

The image depicts the final result of the project. In this figure, it shows that the patient was CKD positive.

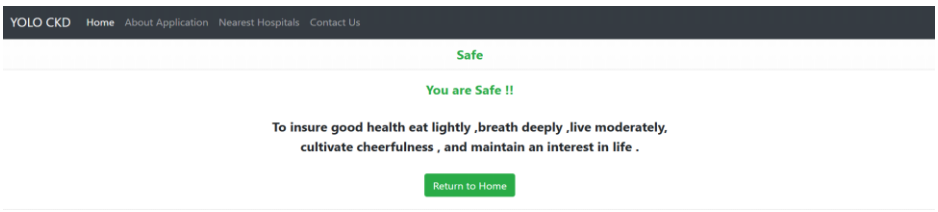

Figure3:Result Screen Shot 2

The image depicts the final result of the project. In this figure, it shows that the patient was CKD positive.

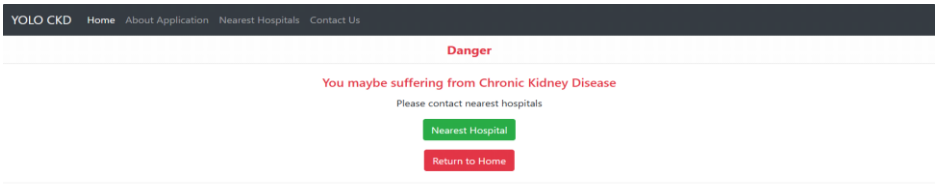

Figure4:Result Screen Shot 3

The development and implementation of CKD prediction systems represent a significant advancement in the field of nephrology and healthcare management. These systems utilize sophisticated machine learning algorithms and comprehensive clinical data to forecast the progression of CKD in individual patients. The results obtained from these prediction models offer valuable insights into disease trajectory, facilitate risk stratification, and inform personalized treatment strategies. In this section, we discuss the key findings and implications of CKD prediction systems.

V. CONCLUSION

It can be concluded from the results that the proposed system can be effectively used by patients and physicians diagnose the disease more accurately. This tool is more useful for the rural areas where the experts in the medical field may not be available. The accuracy level of the classifier algorithm that we used in our project is as good as we wanted. After completing this, we can say that we have learnt lots of things from this research. We can now deal with the dataset to be trained. We can now preprocess the raw data and can apply the classifier on our trained dataset. Hope, it will be very beneficial to the future researchers to do such kind of research on Kidney Disease.

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Text to Image Generator Using Stable Diffusion

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ABSTRACT

In recent years, the advancement of artificial intelligence has led to remarkable progress in generating realistic images from textual descriptions. This project introduces "Stable Diffusion, "an innovative text-to-image synthesis model that achieves photorealistic image generation through a unique iterative refinement process. Trained on a diverse dataset of 512x512 images, the model employs a fixed CLIP vit-L/14 text encoder to condition image synthesis on textual cues. Stable Diffusion employs a stepwise approach, gradually enhancing a random noise image while aligning it with the given text prompt. This iterative process continues until convergence, yielding high-quality images that faithfully represent the text description. The model demonstrates its capabilities across a spectrum of subjects, encompassing humans, animals, landscapes, and abstract art. The potency of Stable Diffusion materializes across diverse domains. From evocative portraits of people and enchanting depictions of animals to sprawling landscapes and abstract artistic expressions, the model encapsulates the intricate essence of textual descriptions, yielding images that extend beyond mere representation.

Keywords: Text-to-Image Generation, Stable Diffusion, CLIP vit-L/14, Iterative Refinement, Photorealistic Images, Image Synthesis, Textual Conditioning, Diverse Dataset, Convergence, Creative Expression, Visual Realism.

I. INTRODUCTION

In the dynamic landscape of artificial intelligence, the fusion of text and images has sparked aparadigm shift, offering, and novel avenues for creative expression, communication, and content generation. The project "Stable Diffusion for Text-to-Image Generation" emerges as a pioneering endeavour that navigates the intricate terrain of translating textual descriptions into pioneering endeavour that navigates the intricate terrain of translating textual descriptions into tangible visual representations.

This project encapsulates the essence of innovation, bridging the gap between language and imagery through cutting-edge AI methodologies. The intersections, from artistic endeavors to practical solutions in industries like design, advertising, and entertainment. The central proposition of this project lies in the introduction of "Stable Diffusion"-an advanced model that harnesses the power of conditioned diffusion processes in conjunction with text encoders. This fusion of techniques forms a cohesive framework, enabling the creation of images that are not just accurate but also reflective of the nuanced context provided by text prompts. By

leveraging a diverse dataset of images and CLIP ViT-L/14 text encoder, “Stable Diffusion” embarks on a transformative journey.

The models iterative process of refining a random noise image while aligning it with textual guidance represents a groundbreaking approach to generating photorealistic visuals. The outcome is a portfolio of images that range from evocative portrayals of people and landscapes to abstract compositions, all realized through the synergy of AI and human ingenuity. As the boundaries between artificial intelligence and human creativity continue to blur, the project “Stable Diffusion for Text-to-Image Generation” emerges as a beacon of innovation. This project not only pushes the boundaries of AI capabilities but also reimagines how we perceive, communicate, and interact with visual word.

II. LITERATURE SURVEY

Paper 1: “Generative Adversarial Text-to-Image Synthesis”-Scott Reed, ZeynepAkata, Xinchen Yan, LajianugenLogeswa ran, BerntSchiele, Honglak Lee*

In this paper, introduces a method for generating realistic images from text descriptions using generative adversarial network (GANs). GAN-based architecture with a combination of text and image encoders.

Paper 2: “Text to photo realistic image synthesis with stacked Generative Adversarial Networks”- Han Zhang, Tao Xu, Hongsheng Li, Shaoting Zhang, Xiaogang Wang, Xiaolie Huang,*In this paper, it represents The proposes a stacked GAN architecture for generating high resolution images from text descriptions.

Paper 3: “Creating Images from Text”- Alec Radford, KarthikNarasimhan, Tim Salimans, IlyaSutskever*In this paper, A large-scale transformer model with a focus on text-image generation.The paper introduces DALL_E, a model capable of generating diverse images from textual descriptions.

Paper 4: “Fine Grained Text to Image Generatio n with Attention Generativ adversarial Networks”-Tao Xu, Pengchua Zhang, Qiuyuan Huang, Han Zhang, ZheGan, Xiaolei Huang,*This paper presents AttnGAN, which generates fine-grained images from text description with attention mechanisms. It can be represent the Attentional GAN architecture.

Paper 5: “Plug and Language Models: A Simple Approach to Controlled Text Generation- Tom B. Browm, Benjamin Mann, Nick Ryder, Melanie Subbiah, Jared Kaplan, PrafullaDhariwa.*This paper introduces a language model-based approach for controlled text generation.plug and play Language Models (PPLM).

Paper6:“Image Generation From Text with Transformers”-Patrick Esser, Robin R. Selvaraju Marc’ Areli.*In this paper, Transformer-based architecture for image synthesis. The paper explores text-to-image generation using transformer-based models. The text encoder generates a text embedding that is used for cross-attention with image tokens for both base and superes transformer layers.

Paper 7: “Text-Guided Diverse Image Generation and Manipulation”- Mohammad Khedekar, Min Hwan Oh, Teng-Yok Lee, Philip Yu.*In this paper represents TediGAN, a method for generating diverse images guided by textual descriptions. Text-guided GAN with diversity-promoting mechanisms.

Paper 8: “Semantic Image Synthesis with spatially Adaptive Normalization”- Taesung Park, Ming-Yu Liu, Ting-Chun,Wang, Jun-Yan Zhu* This paper propose spatially-adaptive normalization, a simple but effective layer for synthesizing photorealistic images given an input sementic layout.

Paper 9: “Adversarial Generation of Natural Language”- Samuel, R Bowman, Luke Vilnis, Oriol Vinyals.*In this paper, explore the generation of natural language text using adversarial training in this paper we take a step towards generating natural language with a GAN objective alone. We introduce a simple baseline that addresses

the discrete output space problem without realying on graident estimators and show that it is able to achive state-of-the-art results on a chinese poem generation dataset we present quantitative results on generating sentences from context-free and probabilistic.

Paper 10: “Based Conditional GAN for semantic Image Synthesis”- JaeyoonYoo, Jangho Kim, Hyunwoo Kim, Sungwoong Kim.*The Paper presents a Conditional GAN (cGAN) for sementic image synthesis based on the Inception V3 architecture. We presence a new method for synthesizing high-resolution photo-realistic images from semantic label mapes using conditional generative adviser Val network.

Paper 11: By using verity of technology it is possible to convert one form of communication to another form [11].

Paper 12: The detailed system is discussed in paper no [12]

III.LIMITATIONS OF EXISTING WORK

Large data and model size brings an extremely high computing budget and hardware requirements, making it inaccessible to many researchers and users. [1]

Stacked GANs require a large and diverse dataset to generate realistic images. If the training data is limited or biased, the generated images may lack diversity and exhibit artificats.Generating high resolution images with fine details can be challenging for stacked GANs. The higher the desired resolution, more complex and resolution, the more complex and resource-intensive the model training becomes. [2] Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.[15]

Text descriptions can be highly ambiguous, and different interpretations of the same text can lead to vastly different images. Generating high-resolution and high detailed images that took realistic based on textual description is difficult. [3]

Determining objective evaluation metrics for fine grained text to image generation is challenging. Subjective assessment is often required, making it difficult to quantitatively measure the quality of generated images. [4]

Generating content using these models may raise legal and privacy concerns, especially when it comes to generating sensitive or copyrighted material while plug-and-play language models offer remarkable capabilities, users should be aware of these limitations and use them responsibly. [5] Cyberattacks surge. Cybercriminals seek efficient channels to spread malware via images. JPEGVigilant, a machine learning method, identifies malicious JPEGs using 10 derived properties.[14]

Transformer-based images generation models can over fit to the training data, resulting in generated images that closely resemble the training set but struggle with novel inputs. [6]

Generating diverse images can be memory and computation intensive particularly when dealing with high resolution images limiting real time or resource constrained. [7]

IV. PROBLEM STATEMENT

The problem statement addressed by the project, “Stable Diffusion for the Text-to-image generation, “revolves around the need to bridge this gap Effectively current solutions either lack the capacity to generate high-Quality images that faithfully align with textual prompts or involve complex workflow that hinder efficiency.

V. PROPOSED SYSTEM

A. Architecture

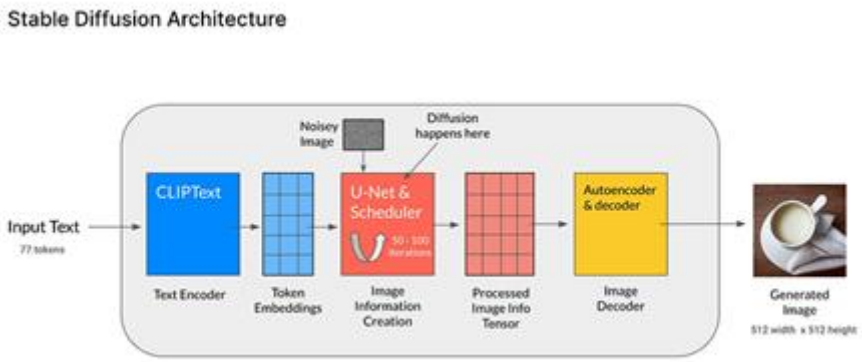

Figure1:Architecture

B. Hardware And Software Requirements

1) Hardware:

- Operating system: Windows
- Hard disk: 40 GB Above hard disk 3
- RAM: 1 GB RAM
- Peripheral devices
- Processor: Intel Pentium or above

2) Software:

- Python
- PyTorch
- Pillow
- Hugging Face
- Visual studio
- React Js
- End

C. Data Flow Diagram

Figure2:DFD LEVEL 0

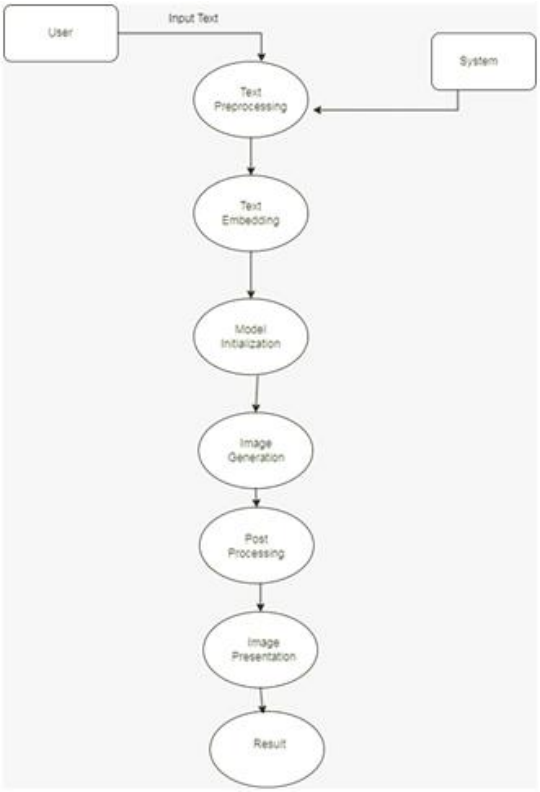

Figure3:DFD LEVEL 1

VI. RESULT DISCUSSION

The Text to Image Generator using stable Diffusion project utilizes stable Diffusion models to create realistic images from text prompts. It produces high-quality outputs with fine details, ensuring consistency and accuracy. The results have applications in content creation, design automation, and virtual environment generation, offering new avenues for creative expression. This advancement highlights the potential of generative models in transforming image synthesis workflows.

VII. RESULTS / OUTPUTS

Figure4:

VIII. CONCLUSION

Through the innovative fusion of diffusion processes and text encoders, the project redefines the boundaries of image synthesis and reshapes how we communicate and interact with visual content. By introducing a sophisticated model capable of translating textual descriptions into photorealistic images, the project.
empowers creators to amplify their creativity. Artists, designers, and content creators can effortlessly manifest their ideas into compelling visual narratives.
In an unlocking new dimensions of creative expressions. The real-time user interface bridges the gap between imagination and realization, allowing users to witness the evaluation of images in direct response to their textual inputs. This interactive experience not only enhances creative engagement but also paves the way for novel ways of human-AI collaboration. The project versatility spans across diverse domains, from artistic endeavours to practical applications in industries like marketing, entertainment, and architecture.
The potential impact reaches beyond conventional creative boundaries, resonating with professionals seeking efficient content creation solutions. With an open-source ethos, the project encourages a community of developers, reaches that the enthusiasts to collaborate evolve, adapt, and "Stable Diffusion foot Text-to-Image Generation" project exemplifies the fusion of artistry and technology. It improve us to explore uncharted territories of creativity, communication, and visual storytelling in a harmonious alliance between human ingenuity and advanced artificial intelligence.

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Auto Text Generator to Enhance the User Experience Using Machine Learning

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ABSTRACT

A based-on speech pattern. Researchers and As the library website and its online searching tools become the primary "branch" many users visit for their research, methods for providing automated, context-sensitive research assistance need to be developed to guide unmediated searching toward the most relevant results. This study examines one such method, the use of autocompletion in search interfaces, by conducting usability tests on its use in typical academic research scenarios. The study reports notable findings on user preference for autocomplete features and suggests best practices for their implementation.Go the Editpad.org, search for the Abstract Generator, open it, and enter your text to create an abstract of any text within seconds

Keywords: Machine Learning, Writing Email,Writing Letter, Keyword to Write a Paragraph.

I. INTRODUCTION

From short stories to writing 50,000-word novels, machines are churning out words like never before. There are tons of examples available on the web where developers have used machine learning to write pieces of text, and the results range from the absurd to delightfully funny. Thanks to major advancements in the field of Natural Language Processing (NLP), machines are able to understand the context and spin up tales all by themselves. Examples of text generation include machines writing entire chapters of popular novels like Game of Thrones and Harry Potter, with varying degrees of success. In this article, we will use python and the concept of text generation to build a machine learning model that can write sonnets in the style of William Shakespeare Nowadays, there is a huge amount of data that can be categorized as sequential. It is present in the form of audio, video, text, time series, sensor data, etc. A special thing about this type of data is that if two events are occurring in a particular time frame, the occurrence of event A before event B is an entirely different scenario as compared to the occurrence of event A after event B. in conventional machine learning problems, it hardly matters whether a particular data point was recorded before the other. This consideration gives our sequence prediction problems a different solving approach. Text, a stream of characters lined up one after another, is a difficult thing to crack. This is because when handling text, a model may be trained to make very accurate predictions using the sequences that have occurred previously, but one wrong prediction has the potential to make the entire sentence meaningless. However, in case of a numerical sequence prediction

problem, even if a prediction goes entirely south, it could still be considered a valid prediction (maybe with a high bias). But, it would not strike the eye.

II. LITERATURE SURVEY

Autocompletefor MedicalText Simplification. Hoang then van And David kauchak ,2020, Transformerbased Language Models Used two metrics to evaluate the quality of the approaches. First, we used standard accuracy, where a prediction is counted correct if it matches the test prediction word. The accuracy, precision, and recall of the Fuzzy Search Algorithm model were found to mbe the best.

Enhancement Of lrving 's algorithm with Autocomplete Feature Karen Claire and Ulysis Agustin, 2022, It determines if there is a possible stable match in each set using a list of preferences, and if it is possible, finds the stable matches. lrving 's algorithm Enhance the user experience using lrving Algorithm.

Google Algorithm Autocomplete Algorithm about Theorist Prosenjit Bose And Carmen Celestin ,2022, This study examines Google's autocomplete feature associated with subtitles of conspiratorial actors Using a reverse engineering Using a manual query we explored how Google's autocomplete feature assigns subtitles to widely known conspiracists.

The effects of suggested tags and autocomplete features on social tagging behaviours Chris Holstrom,2020, study uses a custom-built tagging interface in a controlled experiment to determine how these features affect social tagging behaviour. These findings for the autocomplete feature align with the priorities and constraints of social tagging folksonomies that support retrieval and site navigation and suggest that autocomplete is an important aid for text entry in social tagging user interfaces. These tagging user interfaces use a variety of features to support efficient and consistent tag creation, includingsuggested tags and autocomplete for tags.

Auto complete and Spell Checking Lowenstein Distance Algorithm to Getting Text Suggest Error Data Searching In Library Muhamad Maulana Yulianto and Riza Arifudin Alamsyah ,2018, Autocomplete aims to obtain an appropriate book recommendations by input to a minimum. To get started with a book recommendation takes input from a field provided (string source) and retrieve data from the database (string target). Levenshtein distance algorithm invented by Vladimir Levenshtein, a scientist from Russia in 1965.In the search process data using Levenshteing distance algorithm that has three string matching operation includes the deletion, insertion and substitution.

Implementation of the AutoComplete Feature of the Textbox Based on Ajax and Web Service Zhiqiang Yao and Abhijit Sen ,2013, AutoComplete feature with the textbox. AutoComplete feature predicts possible word matches for entries that begin with the prefix typed into the textbox without the user actually typing the whole word completely implementation of an ASP.NET application based on AutoComplete Extender control from AJAX Control Toolkit. An AutoComplete test program is developed and tested.

Small Character Models Match Large Word Models for Autocomplete Under Memory Constraints Ganesh Jawahar,Subhabrata Mukherjee and Debadeepta Dey,2022, improvements on training character models by employing our novel methods overtraining a vanilla character model from scratch BERT-Style Word Segment Embedding. and Character Pooling and Transfer from Word Models. English.Our work builds autocomplete models for English language only.

Providing autocomplete suggestions Radu Cornea and Nicholas B. Weininger ,2014, Methods, systems, and apparatus, including computer programs encoded on a computer storage medium, for providing autocomplete

suggestions. Timing module, autocomplete suggestion module, time out length calculation module Enhance the performance in 91 percentage.

GoogleAutocomplete Search Algorithms and the Arabs' Perspectives on Gender: A Case Study of Google Egypt Linda S. AlAbbas and Ahmad S Haider and Riyad Hussein ,2020, Google autocomplete algorithms provide faster and easier search results. However, the suggestions offered by this feature act in a forceful way that they intervene before users have completed typingUsing Google's autocomplete function to uncover societal stereotypes was the primary concern of some previous studies. Baker and Potts (2013) conducted a study in which they investigated how Google autocomplete search algorithms suggested stereotypes about different groups, this section presents the findings related to the most frequently asked questions on Google regarding both genders under investigation. These findings are then analysed to find the most common stereotypes towards men and women in the Arab World.

Towards Autocomplete Strategies for Visualization Construction Wei Wei, V. Samuel Huron, and Yvonne Jansen, 2023, The concept of visualization autocomplete was defined and introduced in this paper. In a study, we delved into how visualization autocomplete might be by using tangible tokens to construct visualizations. The setup followed Huron et al. [9]'study (including a box of tokens, a printed dataset, and an A2 paper canvas). We simplified the data to positive integers up to eight to eliminate the need for explicit token mapping, which gave participants more time for manual assembling instead mathematical calculations Sketching on paper does not provide easy undo but allows expressivity and is accessible to the nonexpert; coding provides undo and is expressive but requires expertise, while chart editors like Excel allow undoing and are less expressive and require maybe less expertise than coding and more than sketching.

The detailed the system is discussed in the paper no [12].

III.LIMITATIONS OF EXISTINSYSTEM

A. Data Limitations

ML Text Generators are trained on large datasets of texts written by humans. This data has limited coverage, meaning it cannot be expected to produce accurate results for all topics. The data can be further enriched by including specific or domain-specific data, but this is often cumbersome and labour-intensive.

B. Complexity of the Task:

The complexity of a text generation task can also be an obstacle for AI text generators. Generating meaningful and accurate text requires an understanding of the topic and context that may be beyond the capabilities of the generator. The complexity of the task also increases if the generator is asked to produce text in multiple languages.

AI Text Generators are unsupervised tools, meaning they are unable to incorporate human corrections or preferences. This lack of control can lead to the output being too generic or not adequately representing the desired target audience. In spite of these limitations, AI Text Generators can still be used to create informative and accurate texts. With careful selection of datasets and selection of tasks, AI Text Generators can still be extremely useful for quickly creating content.

Issue with ML Auto text Generator is its potential for misuse. As this technology can generate large amounts of text quickly, it could be used to create spam or other malicious content.While the text it generates may be of

high quality, it lacks the originality and creativity of human-written text. This makes it unsuitable for tasks that require more creative solutions.

The text generator works by using a combination of natural language processing and machine learning to generate text that is both accurate and natural-sounding. This technology can be used to generate content in a variety of different styles, including news, technical documents, and even creative writing.

Auto text generator has already been used to create a variety of different content, including blog posts, news articles, and even marketing materials. This technology is capable of producing content that is both accurate and engaging, making it an ideal tool for businesses looking to create content quickly and efficiently.

Auto text generator has both advantages and disadvantages. While it can generate high-quality text quickly and efficiently, it lacks the creativity of human-written text and could be misused. As this technology is still relatively new, its long-term effectiveness is yet to be seen.

IV. PROBLEM STATEMENT

Autocomplete is influential feature of any modern search text for searching. recommend Words to user as they enter text for searching .it suggest a list of different words or sentences based on the characters the user enters

V. PROPOSED SYSTEM

A. Architecture

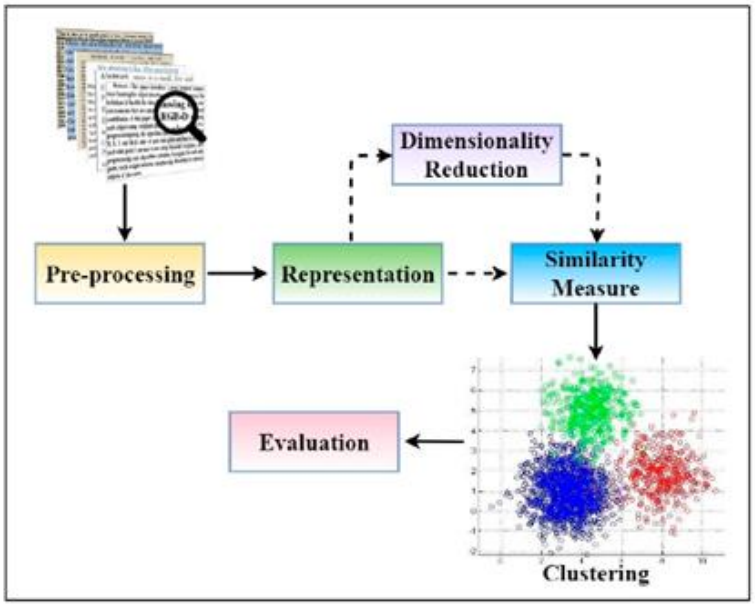

Figure1:Architecture

C. Hardware And Software Requirement

1) Hardware:

- Operating System: windows
- Hard disk: 40Gb Above hard
- RAM: 1GB
- Processor: Intel Pentium or Above

2) Software:

- Python
- Java Script
- Html
- Css
- React Js

D. Data Flow Diagram

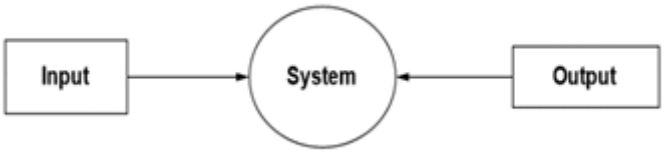

Figure2:DFD LEVEL 0

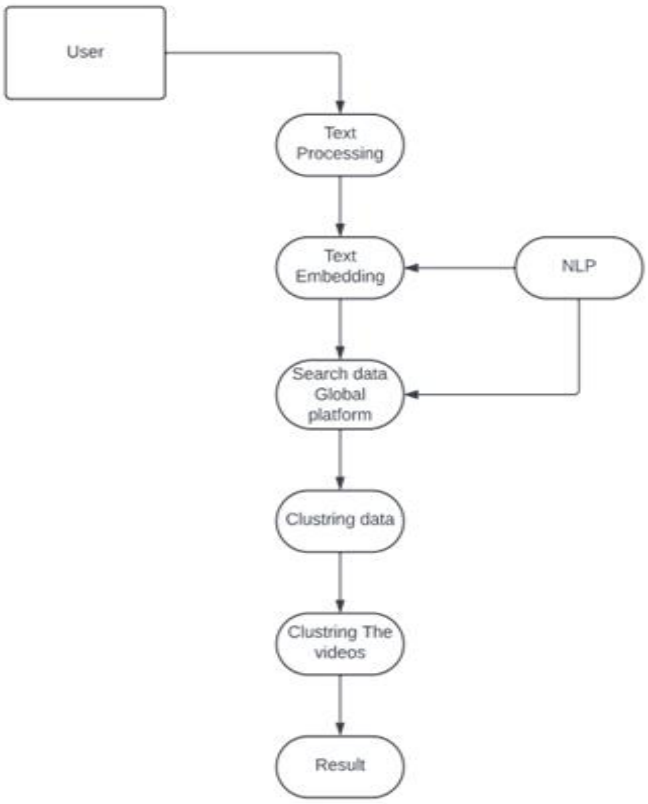

Figure3:DFD LEVEL 1

VI. RESULT DISCUSSION

Finding and developing clustering algorithms have become crucial issues. With a better understanding of what the current text representation techniques are and how to use them successfully, we can improve the efficiency of the existing cluster algorithms.

VII. RESULT/OUTPUT

Figure4:

Figure5:

VIII. CONCLUSION

Auto text generator project has demonstrated promising results in generating coherent and contextually relevant text. The model, based on advanced deep learning techniques, effectively learned patterns from a diverse dataset, enabling it to produce meaningful output.

The project's success can be attributed to meticulous data pre-processing and fine-tuning of the neural network architecture. Through rigorous evaluation, the model consistently generated text with high accuracy and coherence.

The auto text generator holds significant potential across various applications, including content creation, chatbots, and automated response systems. Its ability to generate human-like text has the potential to streamline communication processes and assist in various natural language processing tasks.

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Application of Net Zero Building Concept to Existing VPKBIET New Building by Analysing Case Studies

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ABSTRACT

This research paper explores the concept of Net Zero Energy Buildings and their applications to an existing building within the VPKBIET campus. The study involves a detailed analysis of various case studies of NZEBs to establish a foundation for retrofitting the VPKBIET new building. Energy audits, simulation models created in soft computing tools such as Autodesk's Green Building Studio, Revit, e-QUEST, and sustainable design strategies including solar panels, energy efficient HVAC systems, passive design elements and advanced insulation materials were employed to evaluate the feasibility of transitioning an existing building into NZEB. The project aims to reduce the building's energy consumption and carbon footprint, contributing to the institution's sustainability goals. However, after adopting energy efficiency measures, the building can be close to a NZEB. This paper provides the details of various energy efficiency measures and renewable energy adopted for converting an existing VPKBIET building into NZEB. The review provides technical information as well as recommendations for the transition.

I. INTRODUCTION

The NZEB concept revolves around creating buildings that generate as much energy as they consume on an annual basis. A NZEB contributes less overall use of energy with innovative design, technology integration, renewable energy sources and energy efficient management which lowers their carbon footprint and saves owners and operators money. Net zero energy buildings are gaining importance as a means of addressing the global warming crisis, growing energy demand, and lowering greenhouse gas emissions. As the global climate crisis intensifies, there is a growing need for buildings to operate sustainably and reduce their environmental impact. Net Zero Energy Buildings (NZEBs) have emerged as a solution, aiming to balance energy consumption with renewable energy production. Besides their environmental benefits, NZEBs offer considerable financial advantages by lowering operational costs and promoting long-term sustainability. Techniques such as rainwater harvesting, wind turbines, biomass heating, energy-efficient lighting, and energy storage systems are implemented to achieve net-zero energy performance. NZEBs promote sustainable development by conserving electricity and minimizing reliability on non-renewable energy sources. Therefore, the paper presents the potential transformation of VPKBIET new building into NZEB by summarizing the case studies and assessing the impact of transition on energy conservation and sustainability.

Objectives of the study:

To understand the various aspects of the Net Zero Energy concept of buildings
To identify difference between Net Zero Energy Buildings and Conventional Buildings.
To evaluate energy efficiency of existing building using soft computing tool.
To suggest techniques, methods to convert existing building to net zero building.

II. LITERATURE REVIEW

Anna Marszal (2011) suggests that the NZEB concept can be applied to the traditional buildings by adopting large renewable energy systems. The study also focuses on the importance of the energy efficient measures before adopting the renewable energy sources. Balkar Singh (2021) suggests the net zero energy balance equation for NZEB design by validating it with the case study. The paper suggests the design criteria and strategies which can be applied by both new buildings and retrofitting of existing buildings. Joshua Kneifel (2016) developed a model to predict the energy performance of the net zero energy building using Energy Plus which can be applied to other buildings considering occupancy and weather variables to enhance the efficiency. K. M. Soni (2019) reviewed India's first onsite net zero energy building. The study states that the building including the features of appropriate design, green and sustainable building materials, energy efficient equipment can reduce the energy consumption and its carbon footprint making the building a Net Zero Energy Building.
Mili Jain (2022) suggests that converting existing buildings into NZEBs require additional measures which may vary depending on the characteristics of the existing building, its location to achieve a net zero carbon status. Jayaswal (2021) studied the effects of integration of energy sources such as solar and wind power resulting in production of renewable energy on site. Saravan (2018) discussed the need to optimize water and energy usage with the importance of the building automation systems. S Deng (2014) used software tools t model and predict the performance of the NZEBs based on the design results and operational parameters. The paper suggests that converting existing buildings into NZEBs require retrofitting them with energy efficient measures, adopting renewable energy sources and incorporating energy storage systems. Wei Feng (2019) Suggested that most NZEBs using passive design and technologies such as daylighting and natural ventilation have low energy consumption intensity, some achieve net positive energy while some rely on renewable energy. Wim Zeiler (2012) suggests that ZEB have improved CO2 concentration levels improving the indoor air quality and theral comfort of the occupants.

III.METHODOLOGY

The methodology decided to achieve the objectives is shown in the figure 1.

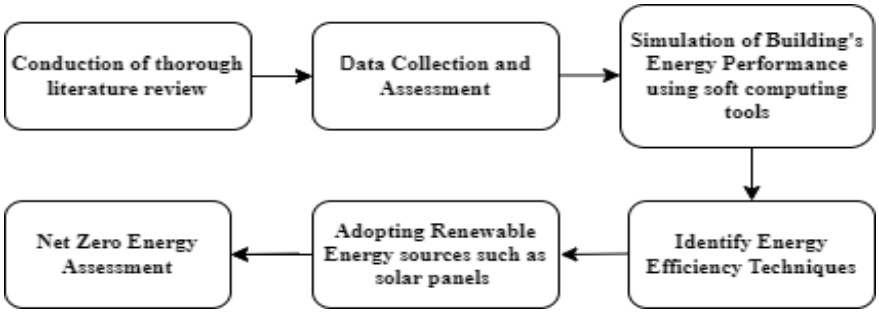

Figure 1 Methodology

IV. ANALYSIS OF CASES STUDIES

1. Indira Paryavaran Bhawan, New Delhi

Indira Paryavaran Bhawan, located in New Delhi is a LEED Platinum and GRIHA 5 Star certified building which is known for its integration of renewable energy technologies. The building was established in 2013, consuming 70% less energy than a typical structure. The building incorporates several passive design strategies such as north-south orientation, extensive landscaping, natural daylighting, and natural ventilation through the central courtyard and cross ventilation. Its building envelope features include insulation, double-glazed windows, and cool roofs to prevent heat infiltration. Materials and construction techniques include AAC blocks, fly ash-based cement and plaster, local stone floors, and composite bamboo-jute elements. Active strategies include energy-efficient lighting systems, lux level sensors, and an HVAC system utilizing chilled beams, water-cooled chillers, and geothermal heat exchange. A solar PV system with a 930 kW capacity, covering 6,000 m² with 2,844 panels, generates 1.43 million kWh annually, meeting the building's residual energy demands.

2. Akshay Urja Bhawan HAREDA, Panchkula

Akshay Urja Bhawan in Panchkula, Haryana, is the first government building constructed according to the Energy Conservation Building Codes (ECBC) and is a GRIHA 5 Star certified building. The building was established in 2012, it spans 3,900 sq.m The building has an Energy Performance Index (EPI) of 17 kWh/sq.m./yr and includes features such as passive design strategies like optimal orientation, daylighting, and ventilation. Active strategies include mechanical air conditioning and a mist cooling system. It produces excess of energy with 42.5 kW solar PV capacity which meets the annual consumption of the building.

3. Eco Commercial Building, Noida

The Eco Commercial Building (ECB) in Noida is a part of the Bayer Climate Program, which uses 70% less electricity compared to similar buildings and is energy self-sufficient. It is 891 sq.m. with an Energy Performance Index (EPI) of 72 kWh/sq.m./yr. The building's Passive design includes optimized orientation, native landscaping, daylighting, and superior ventilation. Its building envelope features include insulated walls and high-performance windows. Active strategies involve energy-efficient lighting and HVAC systems, with a 57 kW rooftop PV plant generating 100% of its energy. Excess energy produced is diverted to other buildings onsite.

4. Avasara Academy Lavale, Pune

Avasara Academy in Lavale, Maharashtra, completed in 2020, is an academic complex of 11,148 sq.m. It adopted passive design strategies like optimized site layout, bamboo screens, and articulated concrete construction for natural light and ventilation. The building features six four-story rectangular blocks arranged along hillside, maximizing views and orientation. Renewable energy sources such as photovoltaic solar panels and solar water heaters are installed on the roof providing electricity and hot water while also enhancing its sustainability.

5. Living Laboratory CEPT, Gujarat

The Living Laboratory CEPT in Ahmedabad, Gujarat, is overseen by CEPT's Centre for Advanced Research in Building Science and Energy (CARBSE). It is recognized by the Indo-Swiss Building Energy Efficiency Project (BEEP), it utilizes passive design strategies like optimal orientation, landscaping, and daylighting, alongside active measures such as energy-efficient lighting and a chilled beam system. It has 50% roof coverage of PV panels, the panels generates 70 kWh/m2/yr, contributing to its energy self-sufficiency.

6. Malankara Tea Plantation

The Heritage Building Complex at Malankara Tea Plantation in Kottayam, Kerala, is the nation's first Net Zero Energy office complex, with 27 KW solar power plant. It is grid independent, reducing carbon emissions by up to 47 tons annually and diesel fuel usage by approximately 97%. With a payback period of less than five years, it has potentially became an energy-plus building by selling excess electricity back to the grid.

7. Sun carrier Omega Building

The Sun Carrier Omega Building in Bhopal, India, of 9888 square feet is a private office. It is LEED Platinum certified. It's recognized for its advanced renewable energy solutions, including the Sun Tracking Intelligent Solar PV System. Energy efficiency strategies involve meeting 100% of the building's energy needs through onsite renewable energy generation and storage, alongside initiatives such as high albedo paint and efficient lighting. The building promotes sustainability through features like onsite renewable energy generation, water efficiency measures, and resource management practices. Additionally, it prioritizes indoor air quality and occupant health with low-emitting materials.

8. PL-13 Annexe Building Godrej & Boyce Mfg. Co. Ltd

The PL-13 Annexe Building by Godrej & Boyce in Mumbai is of 24,443 square meters and is the India's first "Net Zero Energy Rated" project by the IGBC. It has passive design strategies like landscaping and daylighting, along active measures such as optimized HVAC systems and energy-efficient lighting. It include a 120 kWp rooftop solar PV system, contributing 8% to its energy needs, and has adopted an automated cleaning system to further enhance efficiency and water savings.

4.1. ENERGY PERFORMANCE OF VPKBIET NEW BUILDING

To achieve an energy efficient building in VPKBIET campus, software like Green Building Studio by AutoDesk, Revit and E- Quest were used.

4.1.1 AutoDesk Green Building Studio

Models for each floor of the building were made in the Revit for further analysis in the Green Building Studio. These models were close to accurate in dimensions to the actual building with respect to the 2D floor plans of the New Building in VPKBIET Campus. The exported .gbXML files were then imported into the GBS software for the analysis and with the already known input data we received the approximate results for the building floor-wise. The software can present a 15-20% of inaccuracy in the analysis according to the mentor for this method with respect to his findings for his own projects. The following data was achieved after the analysis (cost in rupees):

Table 1: Energy & Cost analysis of New Building.

Floor	Floor Area (m^2)	Annual Electric Cost
Lower Ground Floor	1,351.61	31,46,263
Ground Floor	2,468.19	55,03,489
First Floor	2,429.03	54,80,847
Second Floor	853.022	2069116

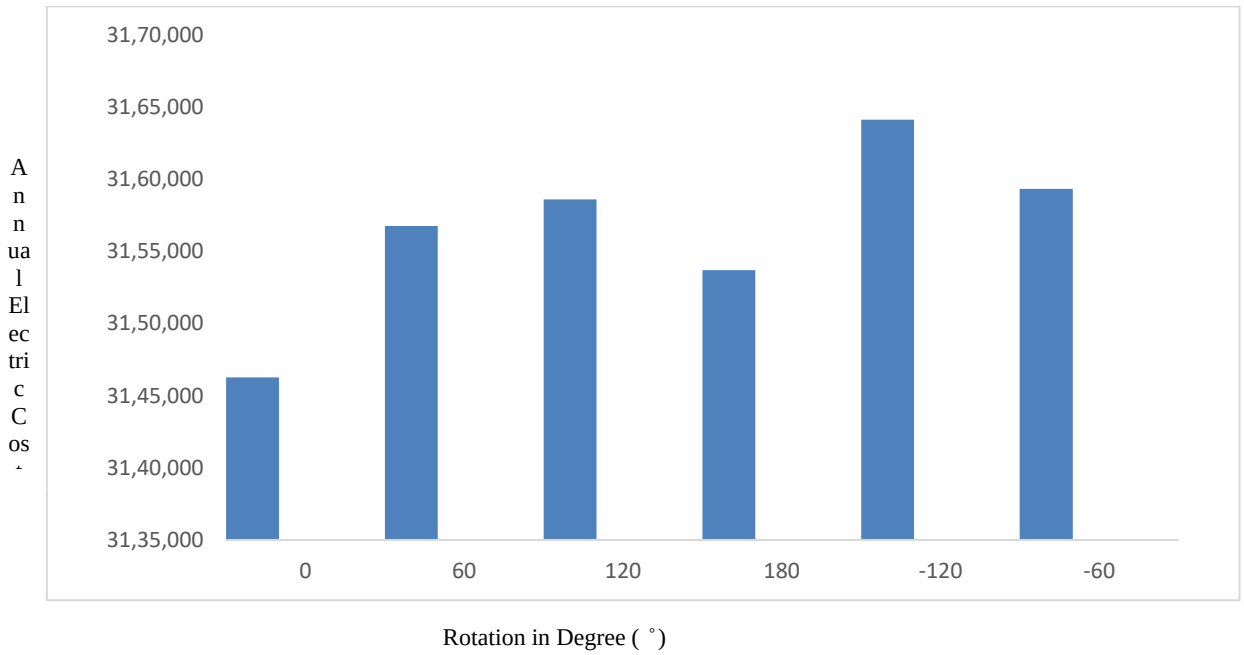

Fig. 2: Energy Consumption of Lower Ground Floor with respect to rotation from its original axis.

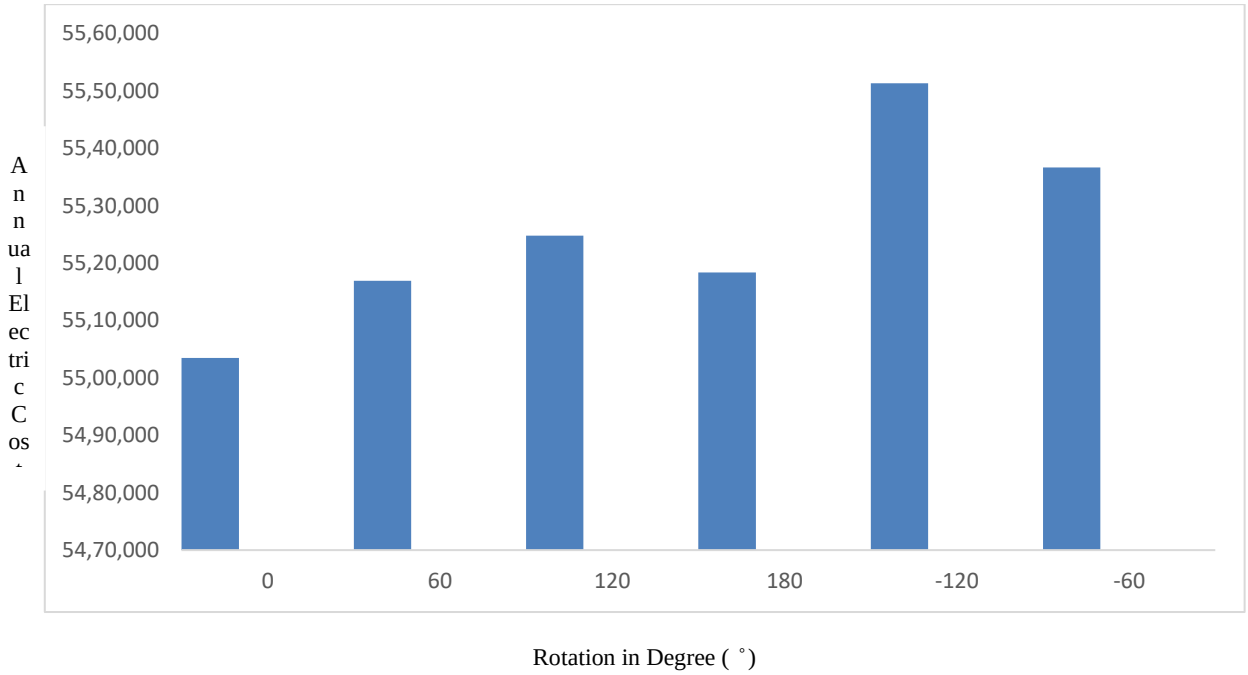

Fig. 3: Energy Consumption of Ground Floor with respect to rotation from its original axis.

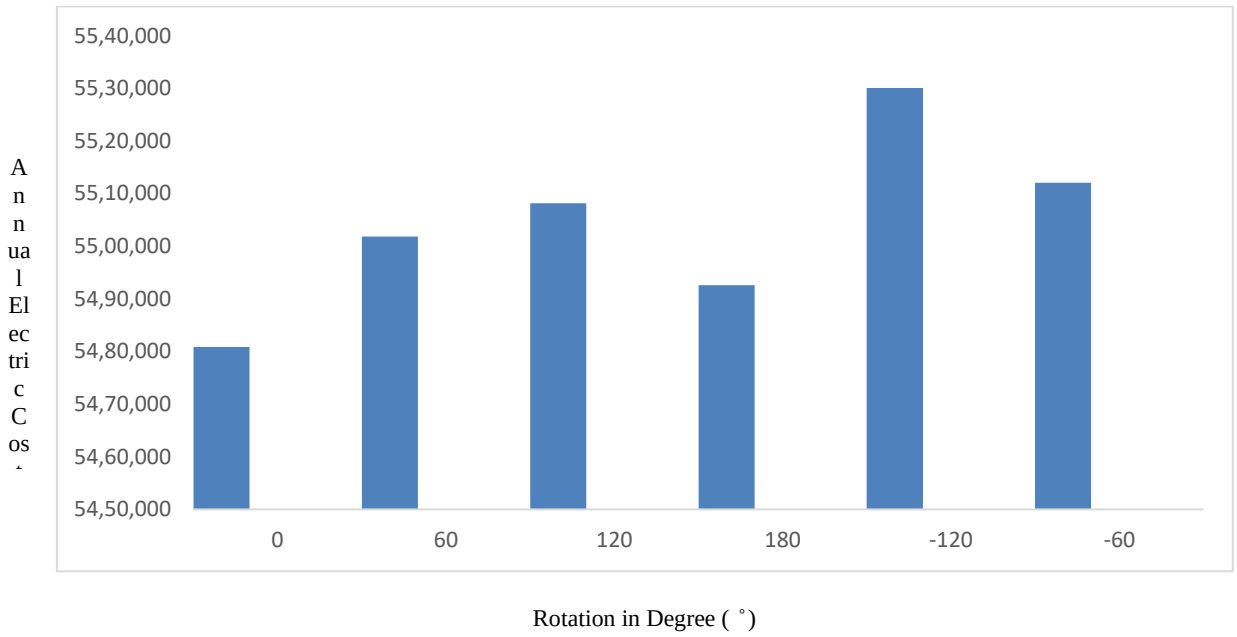

Fig. 4: Energy Consumption of First Floor with respect to rotation from its original axis.

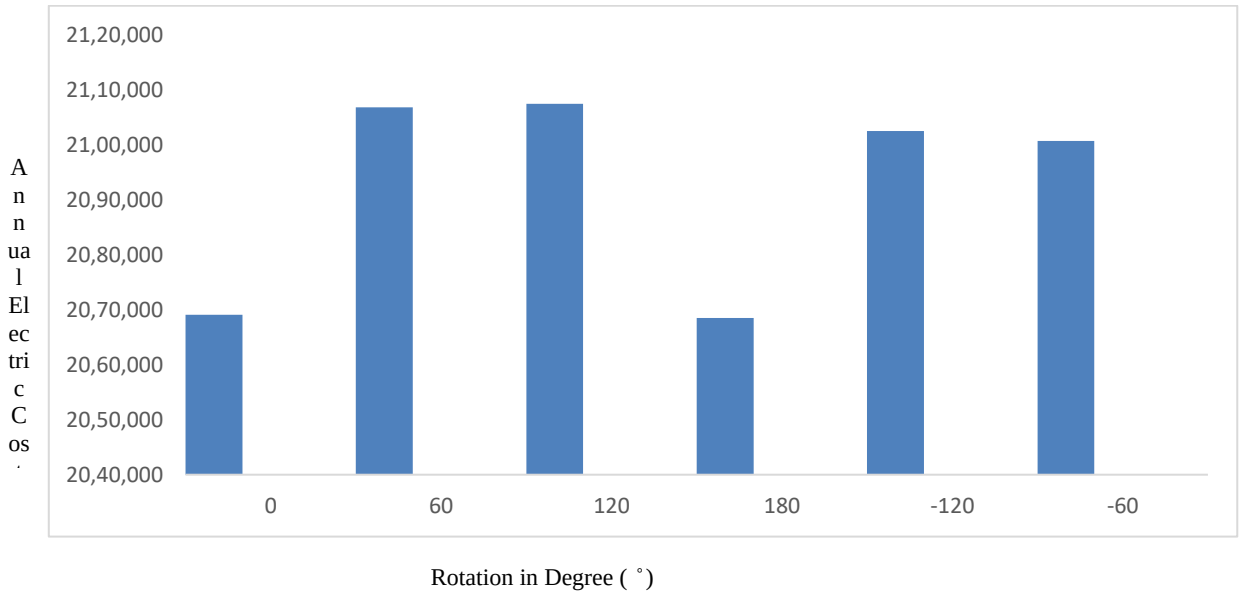

Fig. 5: Energy Consumption of Second Floor with respect to rotation from its original axis.

4.1.2 E-Quest

Various models of VPKBIET, New Building were made by importing the CAD file of the New Building. Model 1 shows the standard building made without adopting any Energy Efficiency measures. Model 2 to 12 shows the building after adopting the energy efficiency measures including changing the U values of walls, roofs, and windows, providing insulating materials and HVAC systems.

The CAD plan was imported in the software in .dxf format. The plan was zoned in different parts. The weathering file of the nearest city Pune was imported for considering the weather conditions. The building envelope details, standard window shading coefficient and according to the previous year audit and observation of the internal loads (lighting, equipment) were provided to the software. For Model 1 no energy efficiency

measures were adopted. For Model 2 to 12 energy efficiency measures including HVAC system and changing U values of the building envelope were adopted.

U value: The rate at which heat moves through a structure is called thermal transmittance, or U value. The U value of a structure decreases with increasing insulation. Lower the U value, the lower is the heat flow which results in greater energy savings and pleasant and constant room temperature.

Therefore, materials with lower U values should be adopted. Lower U values can be obtained by using the insulating materials such as

1. Polystyrene materials
2. Spray Foam Insulation
3. Cellulose Insulation
4. Fiberglass Insulation
5. Mineral Wool Insulation
6. Polyisocyanurate (Polyiso) Insulation

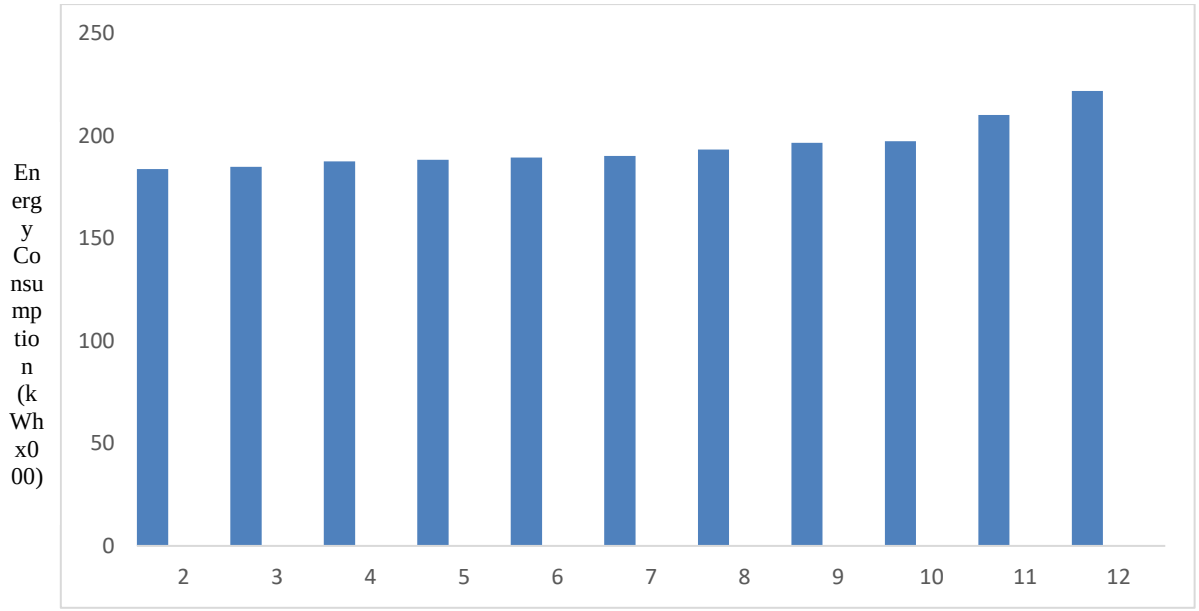

Fig. 6: Results of the models

According to the results, Total annual energy demand of the building if the lowest U values and HVAC system are adopted is 183830 kwh in which miscellaneous equipment consumes 55.27%, area lights consume 22.28%, Pumps and Aux consumes 19.6% and Vent Pipes consumes 2.81% of the total energy demand.

And if highest U values and HVAC system are adopted, the total annual energy demand is 221910 kwh in which miscellaneous equipment consumes 45.79 %, area lights consume 18.45 %, Pumps and Aux consumes 31.12 % and Vent Pipes consumes 4.64 % of total energy demand.

4.2. CALCULATION OF COOLING LOADS FOR HVAC SYSTEMS

For a HVAC system to design is a lengthy task. Cooling loads for a building must be known for the further design process of an HVAC system in a building. In this project, the approximate cooling loads are calculated for any future references. These cooling loads are calculated using the E-20 Excel Sheet for calculations of heating and cooling loads.

The total Tons of Refrigeration required for the whole building is **379.86 TR**. The total cooling load for the building are said to be **1336 kW/hr** approximately.

The following table shows the data floor-wise, and the detailed data is presented further:

Table 2: Cooling loads for Main Building

Floor Description (Total Room Area)	Tons of Refrigeration (TR)	Cooling loads (kW/h)	Percentage (%)
Lower Ground Floor (1324.48 sq.m.)	69.37	243.98	18.262
Ground Floor (2081.73 sq.m.)	135.72	477.33	35.723
First Floor (2140.83 sq.m.)	124.86	439.15	32.873
Second Floor (733.25 sq.m.)	49.91	175.54	13.142

4.3. CALCULATIONS FOR SOLAR ENERGY REQUIREMENT

Number of solar panels required

Energy consumption per month = 24,165Kwh

Peak hours – 4

∴ 201.375 kw system is required.

No. of panels required to satisfy the complete energy need for the building = 201.375 / 0.32

=629.29 = 630.

Available panels = 211

Solar panels tilt angle = Latitude x 0.87 + 3.1 ≈ 18.153 x 0.87+3.1 =18.9 degree from horizontal facing true south.

Area of Solar panels =

Length (L) = 1.98 meters

Width (W) = 1.05 meters

Tilt angle = 18.9 degrees

Standard Ground Area = 2.079 m^2

Projected Area = 2.079 / cos (18.9) ≈ 2.19 m^2

So, the area of the ground required for one solar panel installed at tilt of 18.9 degrees is approximately 2.19 m^2.

The terrace area with no solar panels is shown in the fig. 53.

Terrace area of the VPKBIET Building according to the CAD plan = 631.92 m^2

Area of 50 solar panels = 50 x 2.19 = 109.5 m^2

According to the area calculated above, minimum 50 solar panels can be suggested to be installed at the terrace.

Total energy generated by the 211 solar panels-

No. of the solar panels installed = 211

No. of solar panels suggested = 50

Power of each solar panel = 320 Watt.

∴ 320 x 261 = 83520 Watt

= 83.52 Kw

1 kw of solar panels generate 4 kwh of electricity in a day.

∴ 1kw = 4 Kwh ∴ 83.52 x 4 = 334.08 Kwh

Solar panels of 83.52 Kw generate 334.08 kwh of electricity in a day.

Solar panels generate 10022.4 kwh of electricity in a month.

Solar energy generation is 120268.8 kwh units after installing 50 more solar panels.

V. COST ANALYSIS FOR INSTALLATION OF SOLAR SYSTEM

This thumb rule was derived from IIT Bombay Energy Literacy Training

1 : 1 : 10 : 1000

Where, following represents

1 – Electricity Consumption

1 – Rooftop Area, Battery Requirements

10 – Solar panel Requirements

1000 – Cost Requirements

Here, 1 unit/ month electricity consumption = 1 sq. feet area requirement

1 unit/ day electricity consumption = 1 kwh battery requirement

1 unit/ month electricity consumption = 1 x 10 = 10-Watt solar panel requirement

1 unit/month electricity consumption = 1 x 1000 = Rs. 1000 cost requirement

Using Thumb Rule,

Most efficient model identified by e-Quest software and its cost for additional solar system.

Electricity Consumption = 183830 kwh annually = 15320 kwh per month

= 510 kwh per day

If the monthly requirement is 15320 kwh,

∴ Rooftop space requirement = 15320 square feet

Battery requirement = 510 kwh

Solar panel requirement = 15320 x 10 = 153200 Watt

Money requirement = 15320 x 1000 = Rs. 1,53,20,000 /-

VI. RESULTS AND DISCUSSION

After adopting energy efficiency measures like HVAC systems, providing the insulating materials as well as addition of the solar panels, the building can be close to a Net Zero Energy Building. The initial investment, which is required for installing insulation, HVAC system, including ductwork, equipment and labour costs is expensive. With the age and condition of the New Building, retrofitting for HVAC compatibility could further increase the expenses. The building's existing infrastructure can pose challenges for installing HVAC system effectively including structural limitations. Retrofitting insulation requires alterations to the building's structure which may compromise the integrity of the new building if not executed carefully. Installing insulation may alter the appearance of the building's interior and exterior. Increasing the number of solar panels to 261 enhance the building's capacity to generate more renewable energy, reducing the reliance on grid supplied electricity. The additional 50 solar panels can lead to cost savings on electricity bills.

VII. CONCLUSION

The technologies and various measures applied by the case studies, while their planning, designing, and construction, it is suggested that relying on renewable energy sources alone will not make the building NZEB. Providing adequate lighting design, adopting various technologies such as HVAC systems, renewable sources and changing the buildings material properties can reduce the energy load and fulfil the demand of energy of

the building. After analysing the literatures and case studies, the results produced from software the various techniques and measures suggested are HVAC system, insulating materials to the building shell, changing the shading coefficient of the windows and renewable energy alternatives.

Therefore, addition of 50 Polycrystalline Solar panels is suggested along with other energy efficiency measures to make the VPKBIET, New Building close to the Net Zero Energy Building. Results obtained after considering the suggested measures, the reduction of energy consumption is almost 27.50%. The VPKBIET New building can be converted to NZEB with maximum 69.9% after adopting suggestive measures.

Providing wind turbines would not be a feasible option but by installation of vertical tower on the terrace at a design height, the advantage of wind energy can be taken for the generation of electricity.

The initial investment in providing energy efficiency measures may be challenges, the numerous benefits they provide in terms of energy savings, environmental impact, property value and long-term sustainability make it a rational decision.

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Effect of Brick Bond Pattern Under Plane Loading with Various Aspect Ratio

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ABSTRACT

Several types of brick bond patterns are used to construct masonry walls. A masonry wall's reaction to shear, compression and in-plane stresses may be significantly affected by the bond pattern of its bricks. This study's objective was to examine the performance of a brick masonry wall constructed using various brick bond patterns when in-plane loads are applied to the wall also, analysed the effect of different location of opening on overall brick masonry wall. In the present research, the simplified macro-modelling method was adopted. The simplified macro-modelling process combines an
extended finite element system with constitutive models based on plasticity. The Stretcher, Header, English, Flemish are only some of the many possible configurations for the brick wall. Here in the brick bond pattern of the stretcher bond was also employed to model a masonry wall and was
analytically investigated under an in-plane load. The finite element method (FEM) was used to conduct this research.

Keywords: Brick masonry; compressive strength; variability; probability distribution function; shear bond strength; in-plane loading; Simplified macro-model approaches.

I. INTRODUCTION

1.1. General

A brick wall undergoing an earthquake global acceleration field is subjected to both in-plane and out-of-plane loads. The former results from the story shear force under horizontal loading and the latter is either due to the out-of-plane inertia force caused by the considerable mass of the brick wall or the out-of-plane action of a flexible floor on the wall. The presence of one type of loading on a structural element affects the strength of that element against another type of loading. Considerable experimental, numerical and analytical studies have been carried out on the behavior of masonry buildings, particularly under earthquake loading and mostly on the behavior of brick walls.

Hossain et al. (1997) Investigated the in-situ deformation characteristics of bricks and mortar joints. Couplets with inclined bed joint were tested for shear bond strength by uniaxial loading. Failure for all the specimens was observed within the joint. Mean shear bond strength and nonlinear shear stress-strain behavior were evaluated. Sarangapani et al. (2005) Studied the effect of brick-mortar bond strength on the compressive strength of masonry. The compressive strength, flexural bond strength and shear bond strength of the masonry made with local bricks and mortar was determined experimentally. In order to improve the bond strength of mortar, use of some bond- enhancing techniques like cement slurry and epoxy resin coating for lean mortars was suggested. It was observed that with the increase in flexural and shear bond strength, the compressive strength of masonry increased. Poor bond strength was observed responsible for the failure of prism along the brick-mortar joint. Similarly, high bond strength resulted in diagonal failure of masonry under compression. Therefore, the study highlighted the relation between bond strength, compressive strength and mode of failure in brick masonry. Reddy and Gupta (2006) Investigated experimentally the tensile bond strength of masonry constructed using soil-cement blocks and cement-soil mortars. The studied was aimed to find the effect of different block properties (such as initial moisture content, cement content, strength and surface characteristics) and mortar properties (such as workability and composition of cement-soil mortars) on the direct tensile strength of masonry couplets. It was observed that bond strength is affected by initial moisture content of blocks as partially saturated blocks provided good strength in comparison to completely dry or fully saturated blocks. Thus, this paper provides the importance of initial moisture content for achieving bond strength. Similarly, the higher bond strength was achieved with the increase in cement content on the block. It was found that cement-soil mortar achieved 15-20% higher bond strength in comparison to conventionally used cement mortar. Reddy et al. (2007) Studied the influence of shear bond strength on compressive strength of soil-cement block masonry. The methods to improve the shear bond strength of soil-cement block masonry was also suggested. The methods developed to improve the shear bond strength included making the bed surfaces texture of blocks rough, surface coatings and altering the frog size and area. It was experimentally observed that rough textured blocks and cement slurry coated blocks obtained higher shear bond strength. Similarly, no significant changes were observed in stress-strain and compressive strength properties of masonry with the change in shear bond strength when the masonry block unit modulus is greater than that of mortar. But it was found that enhancing bond strength improves the compressive strength of soil- cement block masonry. Reddy and Vyas (2008) Presented the influence of bond strength on compressive strength and stress-strain characteristics of soil cement block masonry with cement lime mortar. It was found that the bond strength increased by three to four times with the application of surface coating and making the surface texture rough. In this study, three different cased of block masonry with different block to mortar elastic modulus ratio were considered. From the extensive experimental tests, it was found that bond strength and compressive strength of masonry depend considerably on the block to mortar elastic modulus ratio. Pavia and Hanley (2010) Investigated the bond strength of masonry with natural hydraulic lime mortar. The study aimed to correlate bond strength with mortar hydraulicity, water content, workability and water retention. The experimental programmed included the determination of flexural bond strength by bond wrench test for different hydraulic strength lime mortars. It was suggested that water retention property of natural hydraulic lime mortar enables higher bond strength. Kurdo F. Abdulla et al. (2017) Presented combination of constitutive models had employed together with the extended finite element method (XFEM) to simulate 3D masonry structures used a simplified Micro- modelling approached. In the new approached progressive cracked and non-linear post-failure behavior between the masonry joint interfaces was well-captured by used a cohesive, surface based

approached with a traction separation law. In addition, cracked propagation within masonry units identified by the novel used of XFEM without the pre-definition of cracked location. The compressive failure of masonry was also included via a Drucker-Prager material constitutive model. Thus, all key local and global behavior and failure modes of masonry captured. The capability of the proposed model demonstrated by validation studied of the response of masonry structures

under monotonic in-plane, out-of-plane and in- the seismic performance of the masonry room used macro modeling. Modeling techniques demonstrate high effective in representing the masonry wall in general and the nonlinear properties of materials in particular. The case studied for masonry wall analysis in two ways applied lateral loaded and applied controlled displacement. The results confirmed the reliability of the representation techniques used the ABAQUS software. Danna Darma yadi et al. (2019) Presented the three-dimensional Finite Element Model that has been constructed for Masonry Wall under lateral force by using Abaqus software. This research aimed to investigate the behavior of Masonry Walls under lateral force and developed load-displacement curve. From the result that the numerical model using the Abaqus Software can represent the load-displacement curve of Masonry Walls due to lateral forces.

1.2. Types of Bonds in Brick Masonry Wall Construction

The most commonly used types of bonds in brick masonry are:

1. Stretcher bond
2. Header bond
3. English bond and
4. Flemish bond

Other Types of bonds are:

plane cyclic loaded, which was able to reproduced experimentally observed behavior with accuracy and without numerical convergence difficulties. previously.

Ali Laftah et al. (2017) Presented numerical representation used the finite element method of the programmed based on the representation techniques (micro, Simplified, macro modeling) of the masonry wall and evaluate the seismic performance of the masonry room.

1. **Facing bond**
2. **Dutch bond**
3. **English cross bond**
4. **Brick on edge bond**
5. **Raking bond**
6. **Zigzag bond**
7. **Garden wall bond**

1. Stretcher bond

Longer narrow face of the brick is called as stretcher as shown in the elevation of (figure below 1 Stretcher bond) also called as running bond, is created when bricks are laid with only their stretchers showing, overlapping midway with the courses of bricks below and above. Stretcher bond in the brick is the simplest repeating pattern. But the limitation of stretcher bond is that it cannot make effective bonding with adjacent

bricks in full width thick brick walls. They are suitably used only for one-half brick thick walls such as for the construction half brick thick partition wall. Walls constructed with stretcher bonds are not stable enough to stand alone in case of longer span and height. Thus, they Then need supporting structure such as brick masonry columns at regular intervals. Stretcher bonds are commonly used in the steel or reinforced concrete framed structures as the outer facing. These are also used as the outer facing of cavity walls. Other common applications of such walls are the boundary walls, gardens etc. (figure below 1 Stretcher bond)

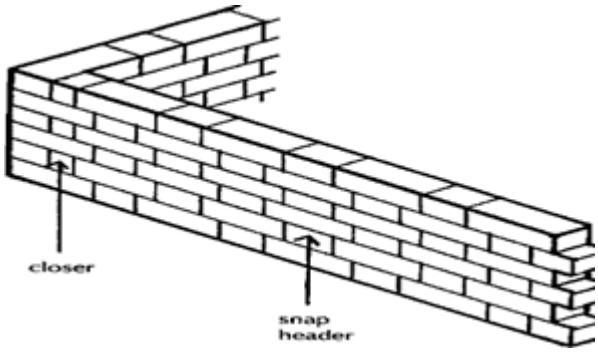

Fig.1

2. Header bond

Header is the shorter square face of the brick which measures 9cm x 9cm. Header bond is also known as heading bond. In header bonds, all bricks in each course are placed as headers on the faces of the walls. While Stretcher bond is used for the construction of walls of half brick thickness whereas header bond is used for the construction of walls with full brick thickness which measures 18cm. In header bonds, the overlap is kept equal to half width of the brick. To achieve this, three quarter brick bats are used in alternate courses as quoins. (figure below 2 Header bond)

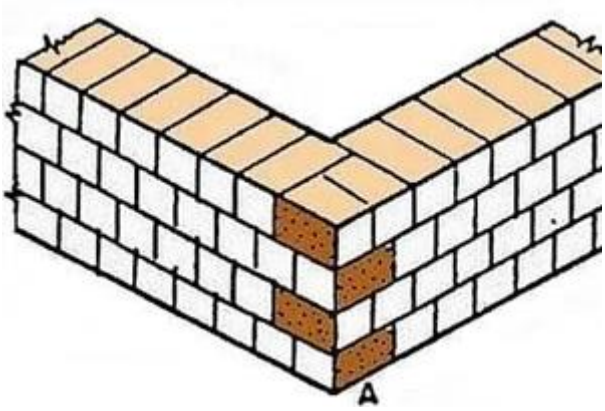

Fig .2

3. English Bond

English bond in brick masonry has one course of stretcher only and a course of header above it, i.e., it has two alternating courses of stretchers and headers. Headers are laid centered on the stretchers in course below and each alternate row is vertically aligned. To break the continuity of vertical joints, quoin closer is used in the beginning and end of a wall after first header. A quoin close is a brick cut lengthwise into two halves and used at corners in brick walls. (figure below 3 English bond)

4. Flemish Bond

For the breaking of vertical joints in the successive courses, closers are inserted in alternate courses next to the quoin header. In walls having their thickness equal to odd number of half bricks, bats are essentially used to

achieve the bond. Flemish bond, also known as Dutch bond, is created by laying alternate headers and stretchers in a single course. The next course of brick is laid such that header lies in the middle of the stretcher in the course below, i.e., the alternate headers of each course are centered on the stretcher of course below. Every alternate course of Flemish bond starts with header at the corner. The thickness of Flemish bond is minimum one full brick. The disadvantage of using Flemish bond is that construction of Flemish bond is difficult requires greater skill to lay it properly as all vertical mortar joints need to be aligned vertically for best effects. Thus, if the pointing has to be done for brick masonry walls, then Flemish bond may be used for better aesthetic view. If the walls have to be plastered, then it is better to use English bond. (figure below 4 Flemish bond)

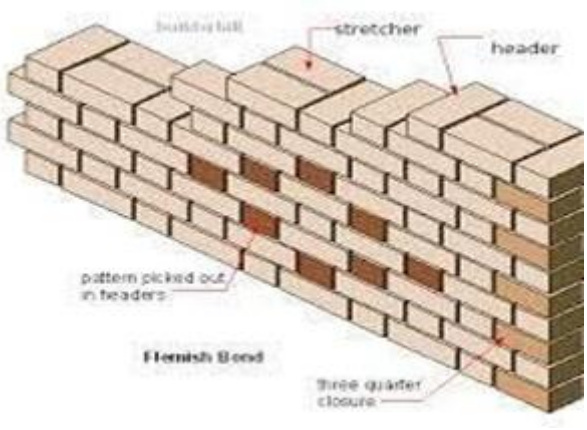

Fig.3

Masonry material

Masonry is a composite material consisting of units and mortar. These components display greatly different behavior, such as the large differences between stiffnesses and deformabilities. Hence massify is markedly non-homogeneous and anisotropic, displaying distinct directional properties due to the planes of weakness created by the mortar joints. The representation of masonry can greatly vary between the analysis methods attempting to model its behaviour. Clearly, the more realistically the behavior is treated, the more complex the analysis.

Random variability of masonry

Masonry properties such as flexural tensile strength exhibit a high degree of random variability. The main factors affecting variability include inherent variation in materials, variation in manufacturing processes, unit and mortar properties (surface conditions, porosity, moisture content and suction rate), shrinkage and workmanship Masonry quality is especially susceptible to variations due to workmanship because of the labor-intensive nature of its construction and as a result, experimental results generally display a relatively large amount of scatter. While every care was taken to minimize the variability in the experimental study, it was not possible to eliminate it. Hence sufficient number of replicates was required to quantify the variability that existed between test specimens.

Causes of in-plane loading

The foundation of an URM structure transmits seismic motion from the ground to the stiffest elements, the in-plane structural walls. The structural walls excite the floor diaphragms that in turn excite the in-plane walls for in-plane action of URM buildings, the walls constitute the majority of the total mass. Hence for seismic loading, out-of-plane bending arises as a result of the inertia forces caused by the transverse horizontal component of

the ground motion (Farris, 1995). The magnitude of these forces is affected by the mass, stiffness, fundamental period and damping of the structure, as well as the magnitude of the earthquake (Potter, 1994). For multi-storey buildings, the inertial forces are higher for upper storey, therefore the in plane loading experienced for these storeys is also greater than for lower storeys. Consistent with this is the identification of one of the groveling weak links in the seismic load path of URM being the inadequate out-of-plane bending strength of walls near the tops of buildings (Klopp, 1996). This is due to a combination of higher out-of- plane loading and a lower level of axial loading, which produces stabilizing moments and acts to strengthen the walls.

Problem Description

The effect of brick bond patterns under plane loading with various aspect ratios is a critical aspect of structural engineering and construction. Understanding how different bricklaying techniques and the shape of the structure can impact its stability and load- bearing capacity is essential in designing resilient and efficient buildings. In this discussion, we will delve into the significance of brick bond patterns and aspect ratios in structural design and explore their implications on the structural integrity and performance of masonry constructions. The numerical simulation of a reinforced concrete structure requires an accurate model of the structural elements and its constituent members acting as a composite made up of concrete and steel. A sketch of each section is created separately with ABAQUS, which can then be extruded in any direction; this is why a 3D solid element in “modeling space” using deformable type for beam was created. In order to develop concrete beam, 8- node continuum solid element was utilized. The solid element has eight nodes with three degrees of freedom at each node – translations in the nodal x, y, and z directions. The element is capable of plastic deformation, cracking in three orthogonal directions, and crushing.

Modelling approach

Introduction to Abaqus 2017 ABAQUS is a finite element analysis (FEA) software developed by Dassault Systems' SIMULIA brand. While my knowledge is based on information up to 2022, I can provide a general introduction to ABAQUS 2017. ABAQUS 2017 is a specific version of the ABAQUS software suite, and it was released in 2017. ABAQUS is widely used for simulating and analyzing mechanical, structural, and Multiphysics engineering problems. It's particularly popular in industries like aerospace, automotive, civil engineering, and biomechanics. Key features of ABAQUS include its ability to perform complex finite element analysis, simulate various materials and behaviors, model nonlinearities, and study dynamic or static behavior of structures. ABAQUS uses a scripting language for customization and automation, making it a powerful tool for researchers and engineers to solve a wide range of simulation challenges.

Modelling Steps in Abaqus Software

1) **Created the parts of the masonry wall:**
   a) Full Brick: the full brick part of Masonry wall 1m x1m Brick is used. The
   b) Half Brick: that the 1 m x1 m Half Brick and Depth about 10m is taken.
   c) RC Beam: the RC Beam of lentgh 12mx 12m is taken.The depth of the RC Beam is 1000m
2) **Assigned the material properties to the parts of the masonry wall:**
   A) For the Brick of the Masonry wall:
      a) Mass Density: the Mass density is put in the General option in the property.i.e.,2400 Kg/m.

b) Drucker Prager: In the Mechanical option, under the Elasticity properties the Drucker Prager properties are of Brick are assigned. i.e., Angle of friction 360, Flow stress ratio1 and dilation angle 11.30 .

c) Drucker Prager Hardening the Drucker Prager Hardening property is used for the definition of the Yield stress and the Plastic Strain of the Brick material of the masonry wall.

d) Elastic property of the Brick: the material step, under the mechanical option the elastic properties of the Brick i.e., Youngs modulus 2888 MPa and Poisson's ratio 0.15 is used.

B) For the concrete of the masonry wall:

a) Mass Density of the RC Beam of the masonry wall: Fig. h) shows that the Mass Density of the RC Beam of the masonry wall is 2400kg/m is used. The value of the density is put in General option in the property.

b) Elastic property of the RC Beam of the masonry wall the Elastic properties the Youngs modulus and the Poisson's ratio are used.

3) **Definition of the Assembly for the masonry wall:** the Assembly step, the masonry wall is created from Full Brick, Half Brick and RC Beam using stretcher Brick bond

4) **Step of the masonry wall:** the Step, pressure loading-gravity load and cyclic loading is applied.

5) **Interaction of the masonry wall:** the Surface-to-surface contact interactions described a contact between the RC Beam and Bricks of the masonry wall.

6) **Applied load on the masonry wall:** the Load step, load and pressure is applied on masonry wall at top and the amount of load is 700KN. Boundary conditions are also created.

7) **Mesh part of the masonry wall:** the process of generating a two dimensional and three-dimensional, Mesh is created.

8) **Visualization of the Masonry wall:** the Finite Display of the models and results is obtained in the visualization step.

II. RESULTS AND DISCUSSION

Results

Fig. 4) and Fig. 5) shows that the vertical compressive stresses cause the stretcher bond to slide, crush the toe, and crack in a diagonal pattern.

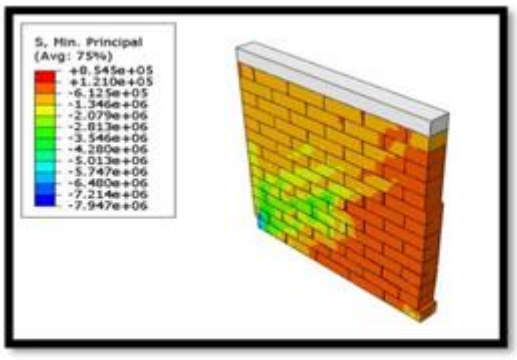

Fig. 4) Failure modes of masonry walls for stretcher bond

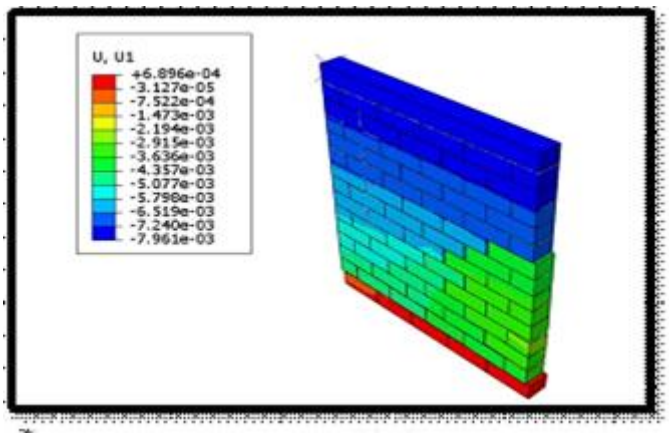

Fig. 5) Minimum principal stresses on masonry walls for stretcher bond.

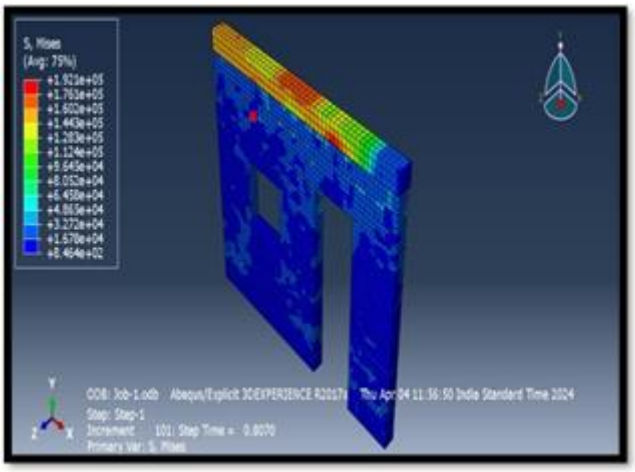

Fig. 6) Shows the load distribution of masonry wall.

Fig 6) shows the openings are provided for window and door with stretcher bond in masonry wall. After submission of job, get following results. This result for load of magnitude 10000N.

the lintel helps distribute the load across a wider area. This prevents stress concentrations directly above the opening, reducing the risk of cracks or structural failure.

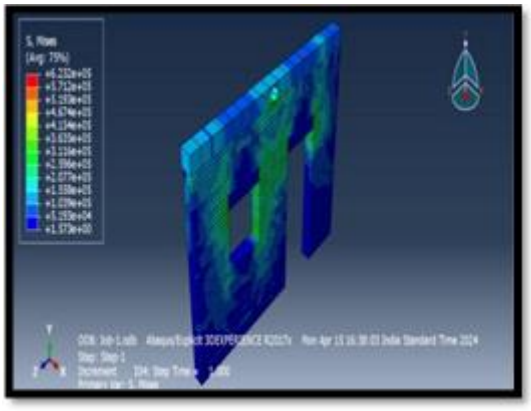

Fig. 7) opening in beam with varying load

Above fig the openings are provided for window and door with stretcher bond in masonry wall also opening is provided in beam. After submission of job, get following results. This result for load of magnitude 10000N.

the beam can safely transfer loads around the opening without excessive deflection or failure

Graph shows representation of varying displacement with increasing magnitude of force. Force applied on beam above masonry wall without lintel and contains opening. Application of force starts with force of 50000N and further continue up to 400000N. Displacement is taken in millimeters.

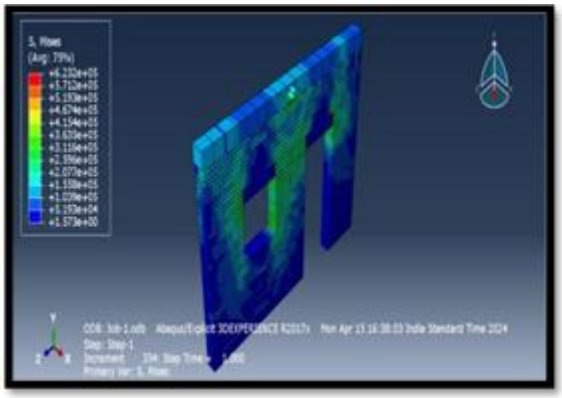

Fig. 8) opening in beam with varying load

Above fig the openings are provided for window and door with stretcher bond in masonry wall also opening is provided in beam. After submission of job, get following results. This result for load of magnitude 20000N

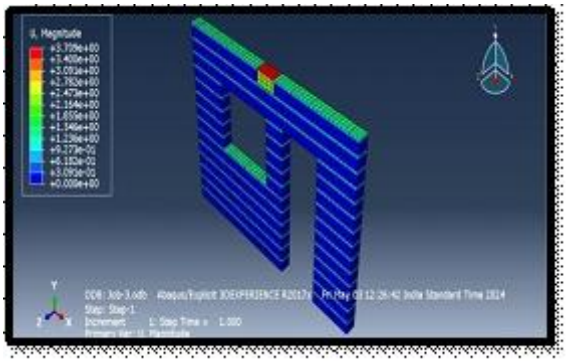

Fig. 9) Shows wall without opening and lintel

A masonry wall without openings and lintels is typically stronger and more stable than one with openings, as it provides uninterrupted structural integrity. This solid construction efficiently distributes loads throughout the wall, reducing stress concentrations and enhancing the overall durability of the structure.

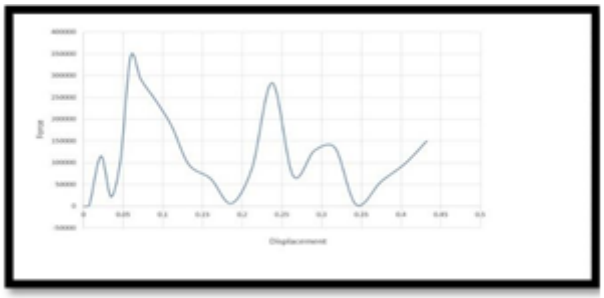

Fig. 10) Beam opening without lintel

Graph shows representation of varying displacement with increasing magnitude of force. Force applied on beam above masonry wall with lintel and contains opening. Application of force starts with force of 5000N and further continue up to 45000N. Displacement is taken in millimeters.

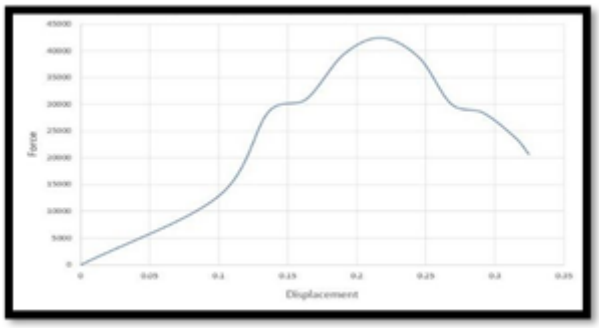

Fig. 11) Beam opening with lintel

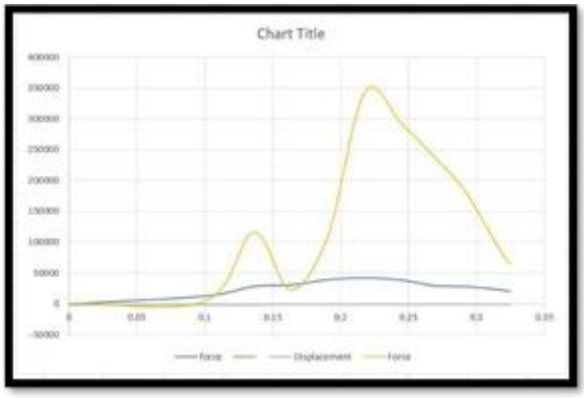

Fig. 12) Graphical representation of comparison between beam opening with and without lintel

Blue line represents graphical representation of beam opening without lintel and yellow line represents graph of beam opening with lintel. Values of displacements are constants for graph of beam opening with lintel. Graphical representation of beam opening without lintel is nearly parallel to X-Axis. Above figure shows the comparison between beam opening without lintel and with lintel simultaneously.

Discussion

In this micro modeling analysis, following outcomes and behavior of masonary wall are obtained. The red color in masonry wall shows that earlier failure in masonry wall and blue color shows that slow failure in masonry wall.

III.CONCLUSION

In the project stage-I, effect of stretcher brick bond is studied.

The analysis of masonry wall for the stretcher brick bond is obtained with the help of ABAQUS software.

- In this micro modeling analysis, following outcomes and behavior of masonary wall are obtained. From Fig.4.1. a) The red color in masonry wall shows that earlier failure in masonry wall and blue color shows that slow failure in masonry wall.
- Macro-model analysis of stretcher brick bond pattern is done by using finite element modelling. For the comparison of results other types of brick bonds are required. Other types of brick bond models will be prepared in further progress.
- From above analysis, we conclude that when load is applied of 10000N then maximum stress is at middle of the beam and minimum stress on total surface of masonry wall.

- By varying load about 20000N, one corner of beam shows maximum stress and one shows minimum. Amount of stress about some extent is transferred to the masonry wall.
- By varying load about 30000N, As compared to above result beam shows less stress and wall shows more stress.

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Analysis of Impact of EV Bus Charging On Distribution Grid: A Review

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ABSTRACT
Charging Electric Vehicles (EVs), particularly Electric Buses (BEBs), can significantly impact the distribution grid operation. Studies have shown that the integration of high-power charging systems for BEBs, reaching up to 600 kW, requires special consideration due to potential overloading effects on the grid [1] [2] [3]. The presence of EVs in the grid as a load can lead to increased grid losses, affecting parameters like deployment and cost; however, managing EV charging and discharging can help reduce grid losses and positively influence the load curve [4]. Implementing smart charging strategies, such as dynamic tariffs and bi-directional charging, can effectively mitigate grid congestion, voltage problems, and transformer overload risks associated with intensive EV charging, ensuring optimal system performance and stakeholder satisfaction [5].

I. INTRODUCTION

In [1] Study on EV charging effects on distribution system and Analyzes impact on bus voltage profile and power losses. In [2] Study assesses impact of EV charging on power distribution systems also Utilizes software tools to investigate potential overloading and degradation risks. In [3] Evaluates impact of dynamic tariffs on smart EV charging and Aims to minimize grid reinforcement with growing EV share. In paper [4] Impact of fast-charging BEBs on distribution grid analyzed. Study on power quality impact of BEB charging solutions. In [5] EV's in distribution grid impact grid losses and load curve studied with Transition to EV's aims to reduce environmental pollution and emissions. In [9] EVs impact residential distribution network, affecting power quality and reliability and Study analyzes EV penetration effects on distribution substation and transformers. Paper [11] proposes smart charging coordination strategy for electric vehicles in distribution network. Strategy considers price sensitivity of EV drivers and prioritizes charging based on state of charge level. [13] Evaluates impact of dynamic tariffs on smart EV charging also Focuses on reducing grid reinforcement with growing EVs. EVs have environmental benefits but impact distribution network mentioned in [14] Study analyzes performance of distribution substation and transformers

II. LITERATURE REVIEW

Effects of EV charging on bus voltage profile and power losses were studied and also Incorporates DG and capacitor banks in distribution system design [1]. [2] Analyzed impact of EV charging on power distribution systems in Kentucky also Used DRIVE and HotSpotter software tools for investigation. [3] Evaluates effectiveness of dynamic tariffs and network constraints for EV charging and Compares dynamic network tariff with flat tariffs for smart charging. [4] BEBs replacing diesel buses in cities for zero emissions. Super-fast-chargers needed on route lines to meet energy demand. Comparison of EV presence effects on grid losses and Simulation on 74-bus distribution grid with 1000 vehicles were discussed in [5].

III.METHODS USED

Ref No	Methodology used
1	Framework assimilates DG, PV, wind, biogas, capacitor banks. Implemented on IEEE 33-Bus test system using MATLAB.
2	DRIVE and HotSpotter software tools utilized for analysis Multi-physics reliability analysis conducted on distribution transformer
3	Development of a detailed optimisation model for public charging of EVs Evaluation of different levels of network constraints and dynamic tariffs
4	Use of fast-chargers up to 350 kW based on pantograph technology Use of slow-chargers up to 50 kW based on Combined Charging System Type 2 (CCS2)
5	Comparison of EV presence and absence on grid losses. Simulation in DIGSILENT software on a 74-bus distribution grid.
6	Analyzing effects on bus voltage profile and power losses Incorporating Distributed Generation (DG) and capacitor banks in simulations
7	Modeling of EV load on distribution system Impact analysis on power grid stability and charging station locations
8	Model for worst-case analysis of charging station impact Validation on a representative case study
9	Analysis of performance of distribution substation and transformers Examination of performance for various penetration levels of EVs
10	V2G Technology with bidirectional converter for EVs Modeling EV charging behavior to estimate grid load needs
11	Energy management approach considering price sensitivity of EV drivers Priority groups based on EV's state of charge (SoC) level
12	Lookup-table-based charging approach for EVs Comprehensive impact analysis of high-level EV penetration
13	Development of a detailed optimisation model for public charging of EVs Evaluation of different levels of network constraints and dynamic tariffs
14	Analysis of performance of distribution substation and transformers Examination of performance for various penetration levels of EVs

15	Modeling of an EV load and its impact on the distribution system Implementation on the IEEE 33 bus distribution system
16	Strategic planning and control methods to integrate EVs into distribution systems Advanced operations strategies to reduce or eliminate costly grid upgrades
17	SOC-based coordinated charging method with real data-driven profiles Integration of PV generation and BES system for peak load reduction
18	Study existing electric vehicle charging modes Analyze positive and negative effects on urban distribution network

IV. CHALLENGES AND LIMITATIONS

While critically reviewing referenced papers some of the studies have limitations with respect their studied system.

Ref No	Limitations
2	• Overloading in distribution systems • Under voltage violations
3	• Capacity limitations due to growing EVs • Congestion and voltage problems in LV distribution network
4	• Voltage variations due to fast-chargers remain below the EN50160 standard limit values. • Total Harmonic Voltage Distortion (THDv) and individual harmonic currents are within acceptable limits.
5	• Grid losses increase with EV presence. • Managing EV charging reduces grid losses.
6	• Limited to steady state system analysis • Focus on IEEE 33-Bus test system for case studies
8	• Grid reinforcement investments needed due to increased loading. • Worst-case charging station impact analysis model presented and validated.
12	• Maintaining power balance during on-peak charging hours • Increase in residential grid voltage sag during high-level charging
13	• Capacity limitations due to growing EVs • Congestion and voltage problems in LV distribution network
14	• Stress on residential electricity distribution infrastructure • Poor power quality, low voltage levels, increased power loss, overloading of feeders, cables, and distribution transformers
16	• Limited load hosting capacity, transformer and line overloads, voltage and power quality degradation • Smaller-scale studies limit ability to capture impacts and opportunities introduced by managed EV charging, regional-scale movement of EVs, and more widespread EV deployment.
18	• Impact on power quality • Economic impact on distribution network

Impact of EV Bus Charging On Distribution Grid

Ref No	Conclusive findings
1	• EV charging affects bus voltage profile and power losses.
2	• Identifies distribution system overload risks and mitigation solutions. • Investigates overload impact on distribution transformers through reliability analysis.
3	• Dynamic network tariff outperforms other flat tariffs by increasing valley-filling. • V2G ensures joint optimum for stakeholders with decreased CPO costs.
4	• Voltage variations due to fast-chargers remain below the EN50160 standard limit values. • Total Harmonic Voltage Distortion (THDv) and individual harmonic currents are within acceptable limits.
5	• EV charging and discharging affect grid losses significantly. • Managing EVs can reduce grid losses in distribution grids.
6	• EV charging affects bus voltage profile and power losses. • Framework integrates DG and capacitor banks for realistic distribution system.
7	• Modeling of EV load and its impact on distribution system • Identification of suitable locations for charging stations
8	• Model for worst-case analysis of charging station impact • Validated on a representative case study
9	• EV penetration in residential distribution networks negatively impacts power quality and reliability. • The performance of distribution substations and transformers is affected by EVs.
10	• The usage of Electric Vehicles (EVs) increases load and losses in the power grid system. • Vehicle-to-Grid (V2G) technology reduces losses in the distribution system.
11	• The proposed smart charging coordination strategy effectively manages EV charging in a LV distribution network. • The algorithm successfully shifts loads while meeting network and EV constraints.
12	• Large-scale EV integration affects bus voltage and line current. • Lookup-table-based charging approach can minimize impacts.
13	• Dynamic network tariff outperforms other flat tariffs by increasing valley-filling. • V2G ensures joint optimum for stakeholders, decreasing CPO costs and grid violations.
14	• EV penetration in residential distribution networks negatively impacts power quality and reliability. • The performance of distribution substations and transformers is affected by EV penetration.
15	• EV load impacts distribution system parameters. • Model helps find suitable locations for charging stations.
16	• EV charging can impact electricity distribution systems • Strategic planning and control methods can minimize grid upgrades
17	• SOC-based coordinated charging method reduces peak load and line loading. • Integration of PV and BES improves energy efficiency in grid.
18	• Electric vehicles have positive and negative effects on the urban distribution network.

- Example simulation with East China Power Grid verifies some functions of electric vehicles connected to the grid.

V. CONCLUSION

In conclusion, the analysis of the impact of Electric Vehicle (EV) bus charging on the distribution grid underscores the critical need for strategic planning and innovative solutions to address the challenges posed by the integration of high-power charging systems. As evidenced by various studies, the rapid adoption of EVs, particularly Electric Buses (BEBs), has the potential to strain the distribution grid, leading to increased grid losses and operational complexities. However, proactive measures such as implementing smart charging strategies can significantly mitigate these challenges and pave the way for a more sustainable and resilient grid infrastructure. By embracing dynamic tariffs and bi-directional charging technologies, stakeholders can not only alleviate grid congestion and voltage issues but also optimize system performance and enhance stakeholder satisfaction. Moving forward, continued research and collaboration between industry stakeholders, policymakers, and academia will be essential in ensuring the seamless integration of EVs into the distribution grid while maximizing their benefits and minimizing their potential drawbacks.

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Soil Structure Interaction Effect Accounted for Seismic Design of RC Structure

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ABSTRACT

Seismic design of reinforced concrete (RC) structures is a critical aspect of ensuring structural safety and resilience in earthquake-prone regions. Soil-structure interaction (SSI) may have significant effects on free vibration characteristics and seismic response of some structures. These effects result from the soil inability to fully restrain the movements of structure foundation in addition to soil's large energy dissipation capacities. The seismic response of structure is greatly influenced by soil structure interaction. This work aims to address the importance of considering soil- structure interaction (SSI) effects in the seismic design process for RC structures Taking a multistory reinforced concrete frame structure as an example the modal analysis of whole structure carried out by using SAP 2000 software. The 8, 10, 12 story structure is modeled. The current research on 8, 10, 12 storey structure is analyzed in SAP 2000 with and without soil structure interaction. The result shows that as number of storey increases the joint displacement also increases and as the story height increases the base reaction is decreases. The study shows that by introducing soil structure interaction the joint displacement and base reaction are increases as compared to structure without soil interaction.

KEY WORDS: Soil structure interaction, SAP 2000, Seismic analysis, Joint Displacement, Joint Reaction

I. INTRODUCTION

Soil-structure interaction (SSI) is a critical factor in the seismic design of reinforced concrete (RC) structures. This phenomenon refers to the interplay between the structural system and the underlying soil or foundation during seismic events, and it can have a substantial impact on the structural response to earthquakes. Soil-structure interaction (SSI) is a critical consideration in the seismic design of reinforced concrete (RC) structures. In seismic design practices, SSI is addressed through various means, often guided by specific design codes and standards such as the International Building Code or Eurocode. These codes typically require structural engineers to account for SSI effects during the analysis and design phase. The properties of the foundation, particularly soil stiffness and damping, play a crucial role in SSI, as they affect how the structure responds to ground motion.

To consider SSI effects, engineers employ advanced analytical methods like finite element analysis to model the interaction between the structure and the underlying soil. The results of these analyses help in assessing the

structure's response to seismic loads. Additionally, engineers may incorporate SSI mitigation measures into their designs, such as base isolators or deep foundations, to reduce the impact of SSI on the structure's performance during an earthquake.

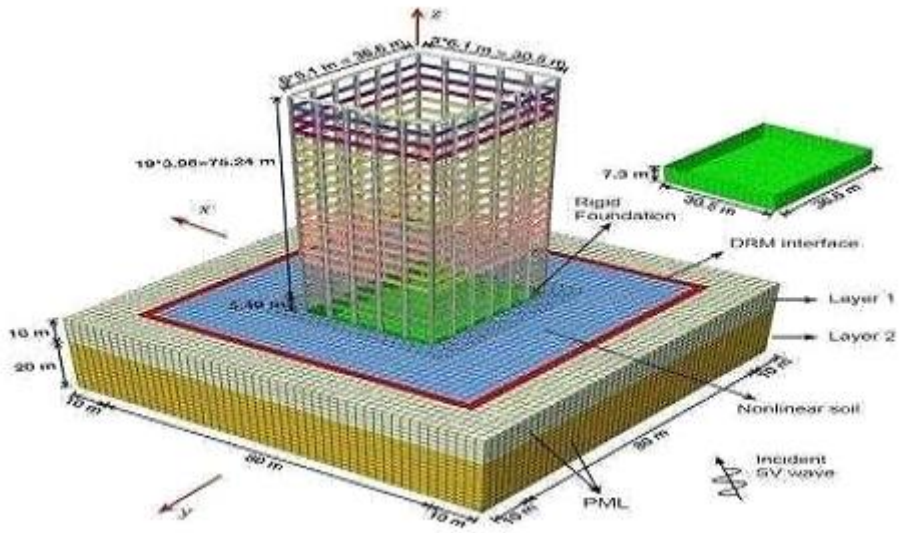

Fig1: Dynamic soil structure interaction

The fig 1. shows that Dynamic Soil-Structure Interaction (DSSI) is a complex field of study in structural engineering and geotechnics. It examines how the interaction between a building or structure and the underlying soil affects the structure's response to dynamic loads, such as earthquakes or vibrations. In DSSI, the behavior of both the structure and the soil is considered simultaneously, as opposed to traditional static analysis. During dynamic events, the stiffness and damping properties of the soil can change, impacting the structure's natural frequencies, displacements, and stresses. Engineers use advanced computational methods, including finite element analysis, to model this interaction accurately. Understanding DSSI is crucial for designing resilient structures, ensuring they can withstand seismic forces or other dynamic loads.

Needs of Soil structure Interaction:

Studying soil-structure interaction (SSI) is essential for:

- Dynamic Response:

During an earthquake, the ground motion induces dynamic forces on structures. SSI affects how these forces are transmitted from the ground to the structure, impacting its dynamic response. Neglecting SSI can lead to inaccurate predictions of a structure's behavior

- Amplification and Damping:

SSI can lead to amplification or reduction of ground motion at the foundation level. Understanding these effects helps engineers design foundations and structural systems to withstand the seismic loads effectively.

- Deformation Compatibility:

SSI accounts for the relative deformations between the soil and the structure. Ignoring this interaction can result in excessive stress concentrations, leading to structural damage or failure.

- Lateral Soil Resistance:

The lateral resistance provided by the surrounding soil affects the lateral stability of a structure during an earthquake. SSI analysis helps ensure that the structure remains stable under seismic loads.

Techniques for soil structure interaction:

- Dynamic Analysis:

Dynamic analysis methods such as time history analysis and response spectrum analysis are frequently used to analyze response patterns in seismic scenarios. SSI can be integrated into these analyzes by taking into account the different stiffness and damping properties of the soil

- Equivalent Static Analysis:

This simple approach involves converting the power supply into a static equation that includes SSI effects. The concept of dynamic time is used to represent the dynamic behavior of the system. This method is used when dealing with earthquake or wind energy. Instead of considering the time history of dynamic loads, engineers calculate a series of static loads that will create something like maximum response.

- Site-Specific Response Spectra:

Determining site-specific response spectra that consider local soil conditions is essential. These spectra can be used to account for amplification or de amplification of ground motion due to the soil's characteristics. These spectra are custom-generated for specific locations based on the local geological and geotechnical conditions. Site-specific response spectra provide a graphical representation of ground motion, showing the acceleration response of a site to different frequencies and amplitudes of seismic waves.

- Nonlinear Analysis:

Nonlinear analysis methods can capture more complex SSI effects, such as soil yielding or foundation rocking. This is particularly important for structures on soft soils. This analysis considers the nonlinear response of materials under various loading conditions, allowing for a more accurate representation of real-world structural behavior. Nonlinear analysis is crucial when dealing with complex problems, such as large deformations, material yielding, and post- elastic behavior, which cannot be adequately addressed through linear analysis methods.

- Pushover Analysis:

Pushover analysis helps assess the seismic performance of a structure by applying lateral forces incrementally. This approach can incorporate SSI effects by considering soil behavior and foundation flexibility. This method involves applying a gradually increasing lateral load to a structure and studying its response in a nonlinear manner.

Problem Description:

Soil-structure interaction (SSI) is a crucial consideration in the assessment of the dynamic behavior and seismic response of reinforced concrete structures. It represents the complex interplay between the building's foundation, the underlying soil, and the structure itself. In seismic-prone regions, understanding and accounting for SSI is paramount for designing resilient and safe buildings.

During an earthquake, the ground motion can cause the foundation to move relative to the soil, leading to dynamic forces that impact the structure's stability. Neglecting SSI can result in inaccurate predictions of a building's behavior during a seismic event. By considering SSI, engineers can optimize the design and reinforcement of structures to withstand the forces generated by an earthquake.

Effective SSI analysis involves modeling the interaction between the building and the soil, considering factors such as soil stiffness, damping, and the building's mass and flexibility. This comprehensive approach ensures that the structure can dissipate seismic energy and remain structurally sound, protecting occupants and preserving property.

II. LITERATURE REVIEW

- **Tomeoa, et al. (2017),** investigated how soil-structure interaction (SSI) affects the seismic performance of reinforced concrete buildings. Researchers varied soil properties, SSI modeling techniques, and seismic design levels. Results showed that the modeling approached significantly impacts seismic demanded estimates. A detailed finite element model (fem) could reduce seismic demands by up to 50%, while a simplified beamed on nonlinear Winkler foundation (BNWF) model had smaller effects, primarily in 8-story buildings on soft soils. The key difference lied in damping characteristics, with the BNWF model underestimating energy dissipation due to SSI.
- **Shehata, et al. (2014),** studied analyzed impact of soil-structure interaction (SSI) on multi-story buildings with raft foundations. They used three analysis methods and found that the fundamental period of vibration was influenced by SSI and may been underestimated by empirical expressions. SSI, especially with soft soil, increased story displacement and shear responses. The studied showed that SSI significantly affects base forces and roof displacement. For mid-rise moment- resisting buildings on soft soil, considering SSI in seismic design was crucial for structural safety during earthquakes. neglecting SSI may lead to unreliable safety assessments.
- **Ibrahim, et al. (2020),** investigated the impact of soil-structure interaction on 40 existing buildings constructed before and after the implementation of turkey's modern seismic design code in 1998. They used non-linear time history analyses with four different soil conditions. The findings revealed that soil-structure interaction doesn't increase displacement capacity but could shifted it. Weak soil conditions increased rotations at the base, affecting elastic drift ratios. Soft soil conditions had the most significant impact, particularly on low-story buildings. The first stories were most affected, and the number of collapsed buildings increased under soft soil conditions, with old and low-story buildings being more vulnerable.
- **M. Requena Cruz, et al. (2022),** focused on assessing the effects of Soil- Structure Interaction (SSI) in seismic vulnerability analyses of reinforced concrete buildings in Lisbon. It presents a methodology for including and quantifying SSI effects. The key conclusions include:Soil Characterization: A method is proposed to define soil parameters based on laboratory and in situ tests, with a focus on clayey soil common in Lisbon. Superstructure Modeling: The chosen mid- rise building is susceptible to p-Δ effects and is affected by SSI according to EC8. Foundation Analysis: Properly modeling footings is crucial for accurate results, and the study highlights the importance of considering the ultimate soil capacities3D Soil Modeling: Coarse mesh and linear soil models result in rigid behavior and unreliable outcomes. Improved modeling considers flexible soil properties and interactions with footings, leading to more accurate results.
- **P. N. Thakur, et.al (2022),** the researched paper concludes that "Soil Structures Interaction of Multi-Storey Buildings on Raft Foundations under Dynamic Loads" highlights the importance of dynamic soil-structure interaction in mitigating the impact of seismic events on high-rose buildings. The studied emphasizes the used of shear walls supported by piled mats to reduced damaged caused by seismic impacts. Through a 3D numerical approached, the researched assesses the effects of soil-structure interaction on the seismic performance and earthquake- induced losses in tall buildings. The studied also investigates the influenced of size and load- bearing mechanisms of piles on the seismic performance of buildings considered soil-pile- structure interaction. Overall, the research underscores

the significance of understood and optimizing soil-structure interaction to enhance the resilience of multi-storey buildings under dynamic loaded.

III.METHODOLOGY

- **General**

The methodology entails outlining a step by step procedure to be followed for the completion of project.

- **Introduction to SAP 2000:**

SAP2000 is the most powerful Windows version of the SAP series. It is the most integrated and effective 3D static and structural analysis software. SAP 2000 integrates all calculations and analysis of load calculation, dynamic seismic analysis, linear and non-linear analysis, steady-state and functional spectral density analysis and static pushover analysis, and provides fast, reasonable and reliable as true linear, non- linear, static and dynamic analysis. SAP has been widely used in the field of structural engineering analysis since its birth.

The general steps of structure analysis and design with SAP2000 are as follows:

Create and modify models to define the material, geometry, load, and analysis parameters of the structure; Model analysis

View analysis results

View and optimize structural design

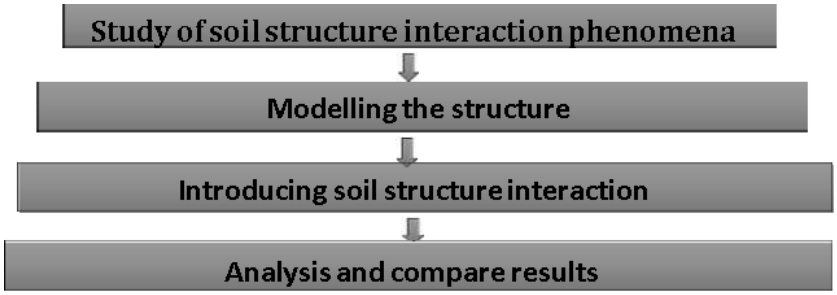

Fig 2. Methodology Flow chart

- **Study of soil structure interaction phenomena:**

To understand the phenomenon of soil structure interaction the research papers are incorporated.

- **Modelling the structure:**

The structural model was created in SAP 2000 software. The 8, 10, 12 stories RC building is currently being created. Cross-sectional properties are being assigned to each element such as beam, column, slab. It includes the step of applying loads to structure such as dead load, other load, live load, seismic load using Indian standards and also checking the structural model is safe or not. For the seismic zone the zone 5 is considered as per IS1893:2016

Here are the data we considered for modelling of each structure as follows:

Table 1. Data for structure modelling

Story height	3m
No of bays in 'X'	5
Bay width in 'X'	3m
No of bays in 'Y'	7
Bay width in 'Y'	3m

Beam size	400X500 mm
Column size	500X500 mm
Grade of concrete	M25
Slab thickness	125 mm
Seismic zone	5
Importance factor	1
Response spectrum	5

- **Introducing soil structure interaction:**

It includes introducing Soil structure interaction. Firstly, it is assuming mat foundation in all models then it including the soil properties.

- **Analysis and comparing results:**

First of all, the extracting the results between models with soil structure interaction and without soil structure interaction and then comparing the results.

Following factors are being considered for comparison.

a. Joint Displacement

b. Base Reaction

IV. RESULTS

- **General**

In this project for the first objective the structural model was created in SAP2000 software. For that8,10,12 story structure was created. For that modeling firstly input the section properties like beam and column to each element. The loads like dead load, live load, other loads. EQx, EQy are applied. For seismic design zone 5 is considered as per IS 1893:2016. For the zone 5 the importance factor as 1 and response spectrum is 5 considered.

- **Modelling 8 story structure in SAP 2000:**

The fig 3 is representing model of 8 story structure modelled in SAP 2000 software. In which the sectional properties are inserted like beam, column, slab. This model is 3D viewed.

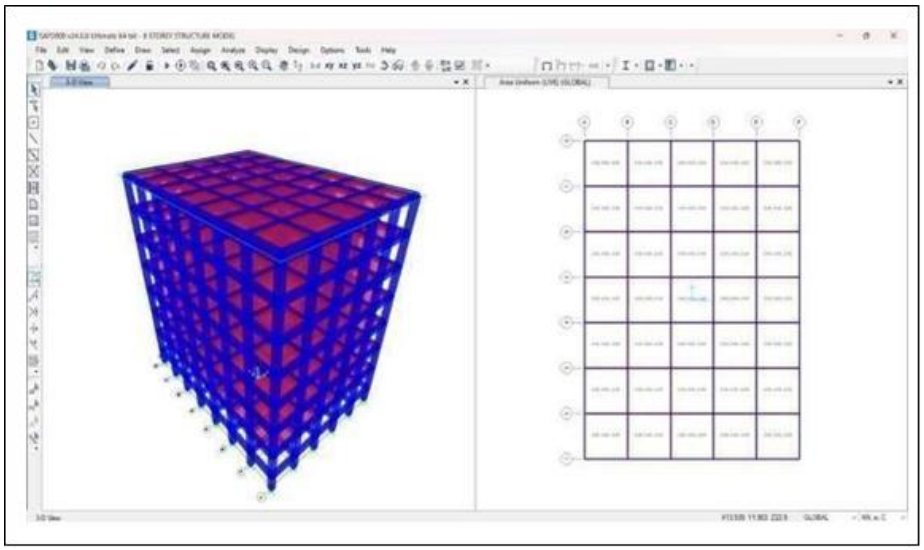

Fig 3. Modelling of 8 story

- **Modeling of 10 story structure in SAP 2000**

The fig 4 represents the structure of 10 story structure modelling. In which the sectional properties are inserted like beam, column, slab. This model is 3D viewed.

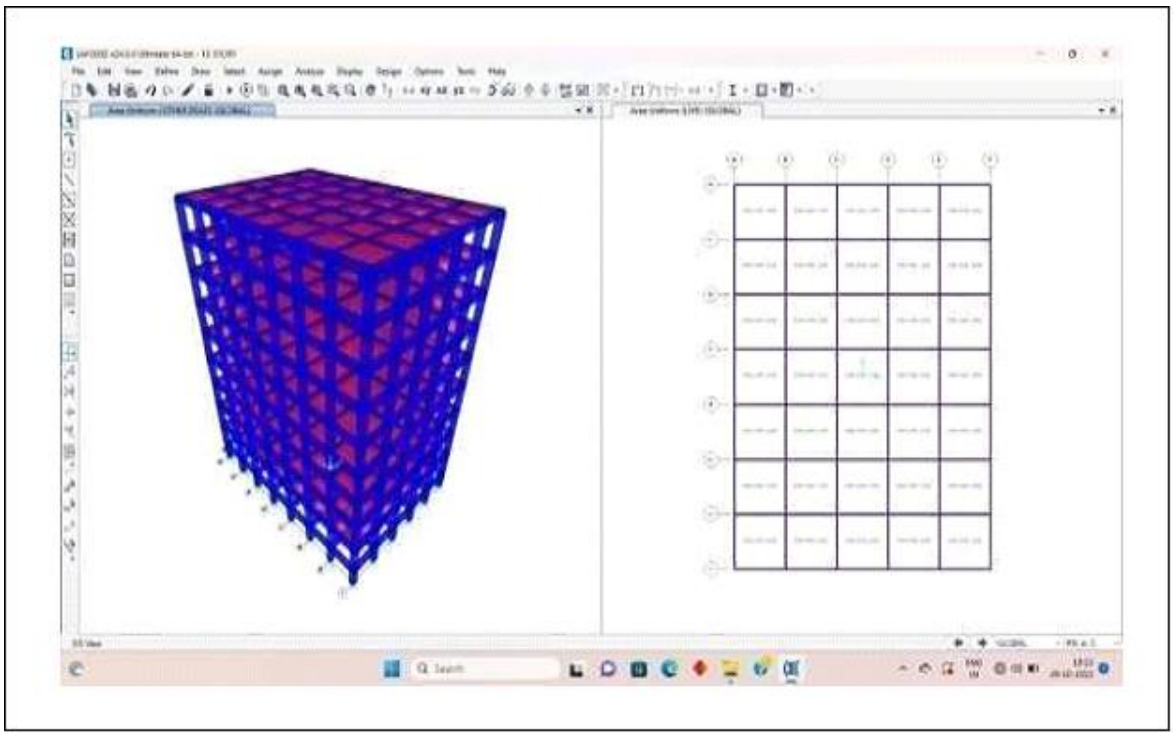

Fig 4. Modeling of 10 story structure

➢ **Modeling of 12 story structure in SAP 2000 software:**

The fig 5. shows about 3D model of 12 story structure

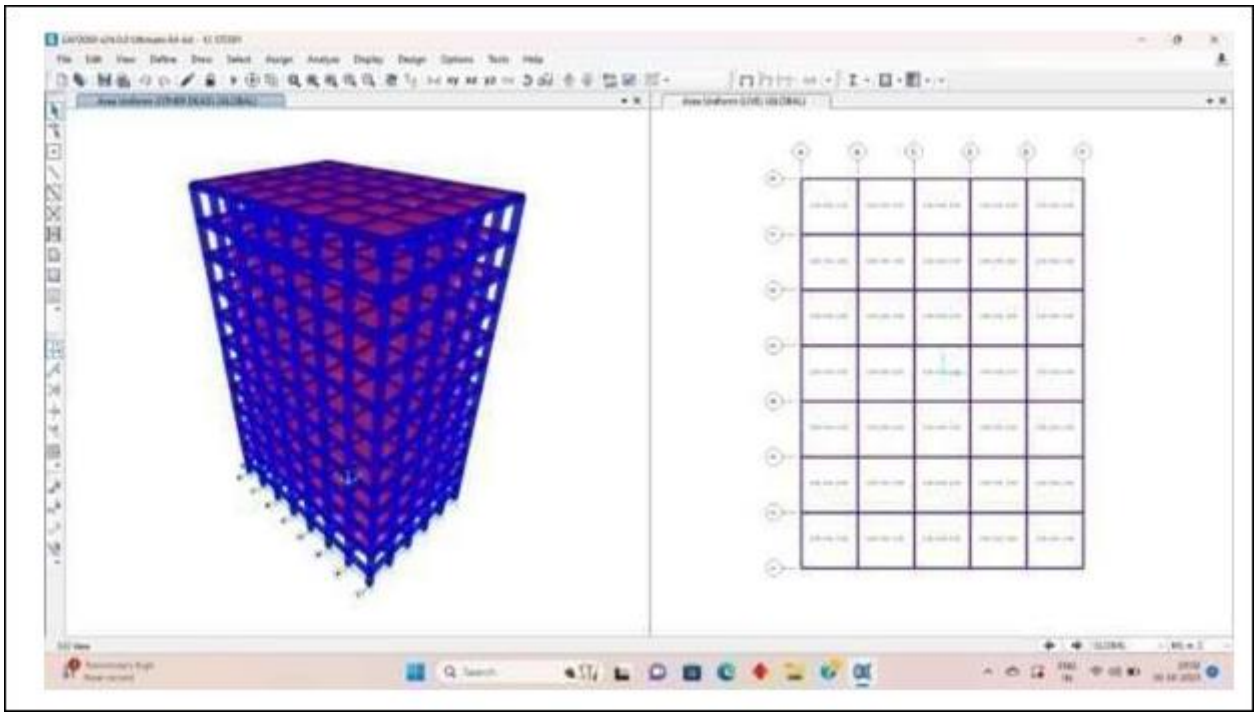

Fig 5. Modelling of 12 story structure

Here are the results of joint displacement and base reaction of 8,10,12 storey structure without considering soil interaction:

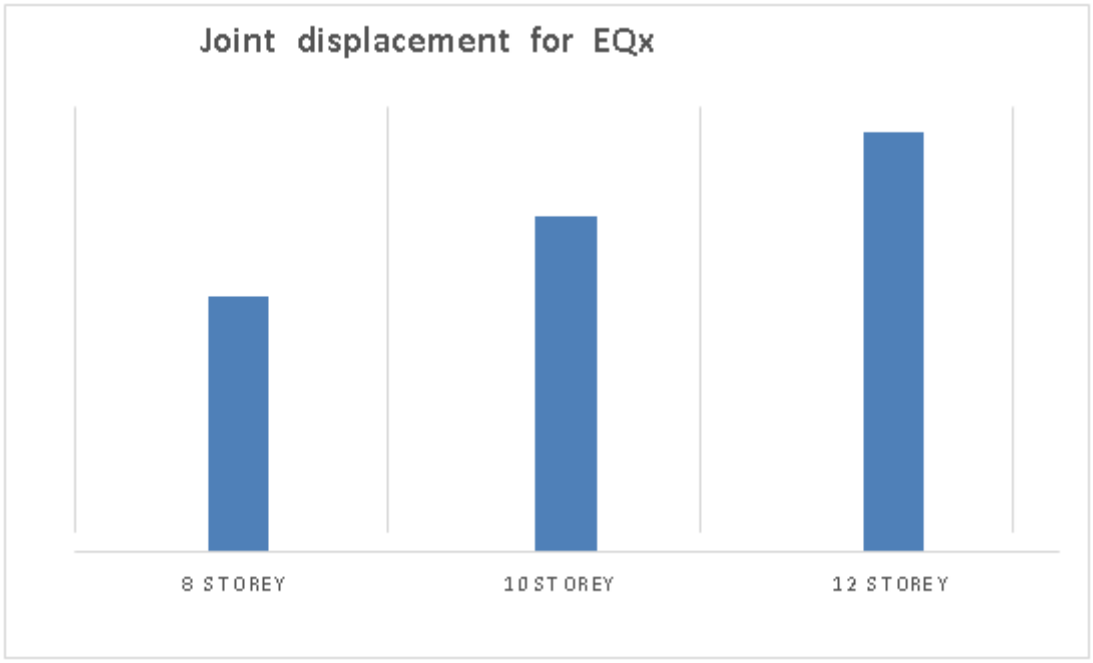

Fig 6 Results of Joint Displacement in EQx

Above fig 6. shows about the joint displacement in EQx. The joint displacement of 8, 10, 12 story are 17.21 mm, 22.60 mm, 28.32 mm respectively. It seems that as the story height increases the joint displacement increases.

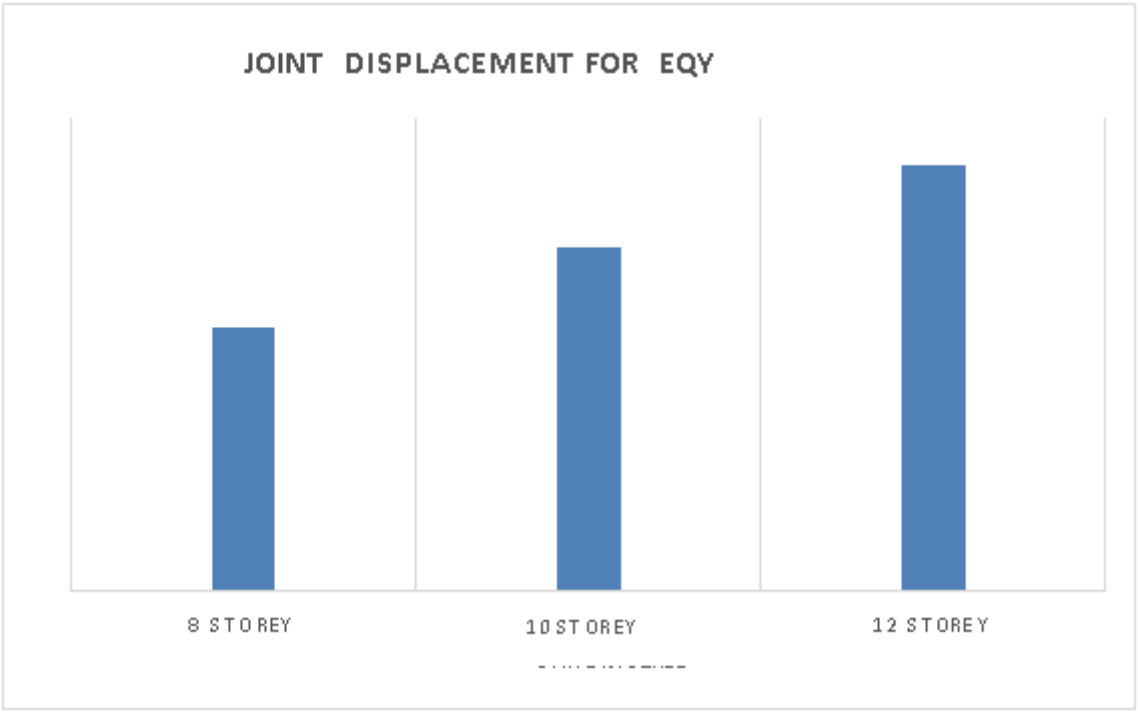

Fig 7. Results of Joint Displacement of EQy

Above fig 4.5 shows about the joint displacement in EQy. The joint displacement of 8, 10, 12 story are

16.67 mm, 21.71 mm, 26.95mm respectively. It seems that as the story height increases the joint displacement increases.

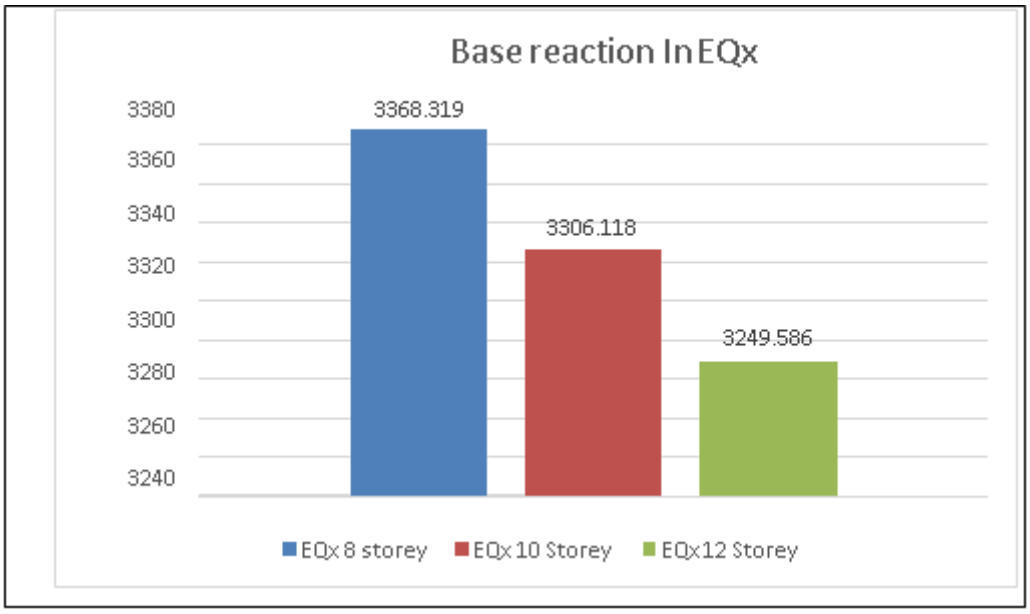

Fig.8 Base Reaction in EQx

The base reaction is addition of lateral force. Above fig 4.6 shows about the base reaction in EQx. The base reaction of 8, 10, 12 story are 3368.319KN, 3306.118KN,3249.586 respectively. It seems that as the story height increases the base reaction decreases.

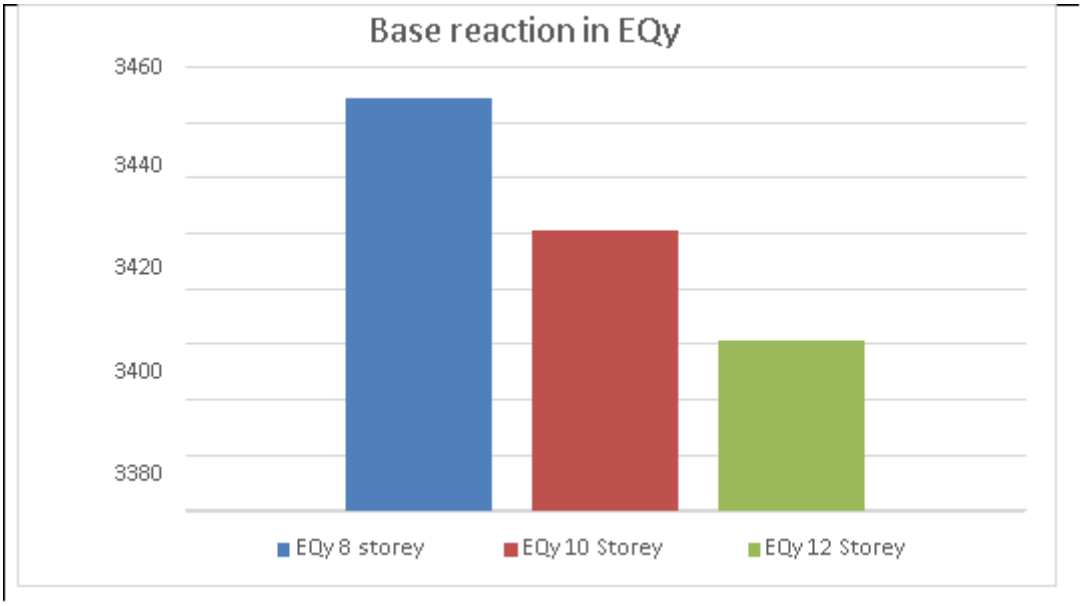

Fig.9 Base Reaction EQy

Above fig 9 shows about the base reaction in EQy. The base reaction of 8, 10, 12 story are 3448.706 KN, 3401.303KN 3361.564 KN respectively. It seems that as the story height increases the base reaction decreases.
By the results it concludes that the joint displacement increases with story height. It seems that here is 31% increase in joint due to increasing 2 stories. There is no large difference between joint displacement in EQx and EQy because the structures are regular.

Also, the base reaction is decreases as the story height increase.

Here are the structures considering soil structure interaction:

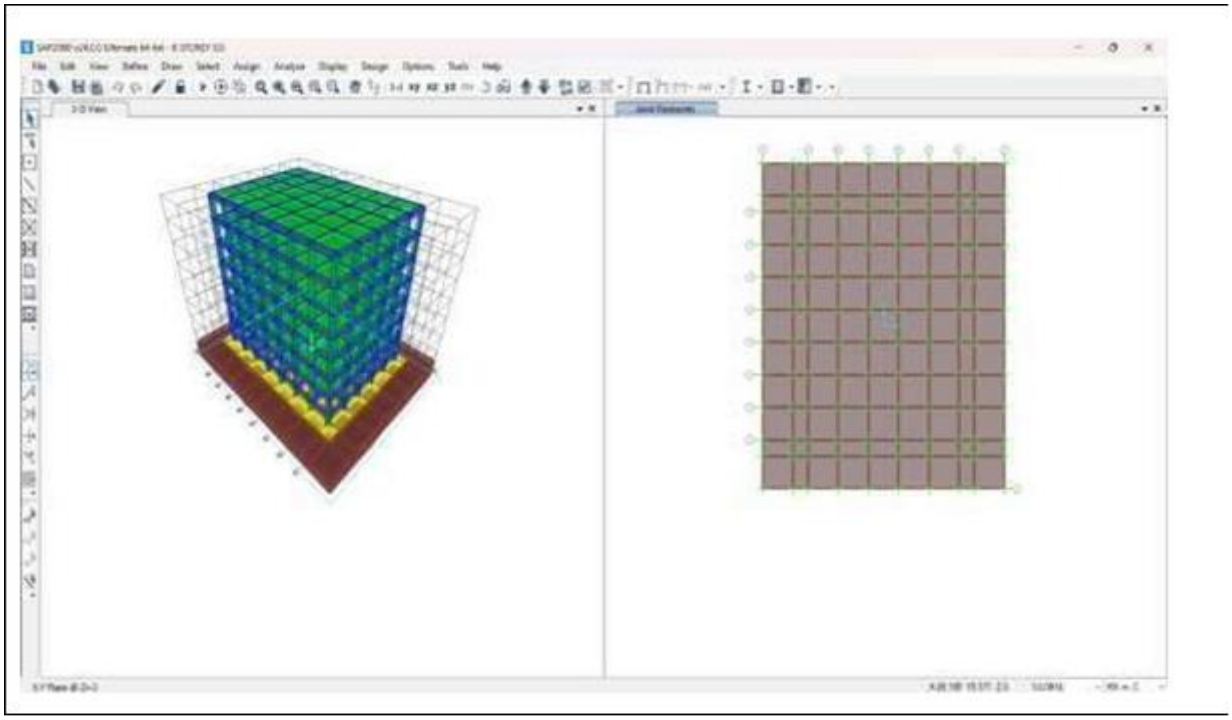

Fig 10 : 8 storey structure considering soil structure interaction

The above fig 10 shows that the soil structure interaction is introduced in 8 strorey structure using SAP2000 software. Similarly, 10 and 12 storey structure is created by introducing soil interaction. The structure are given below in fig 11 and 12

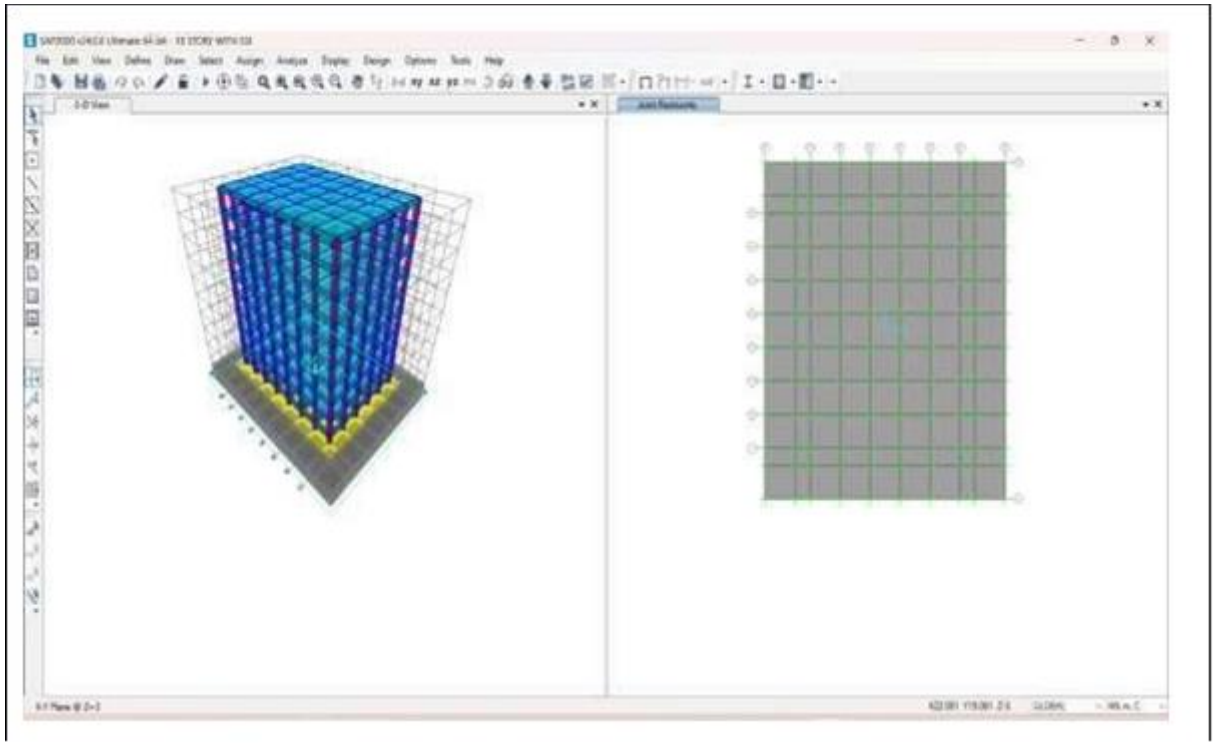

Fig 11: 10 storey structure considering soil interaction

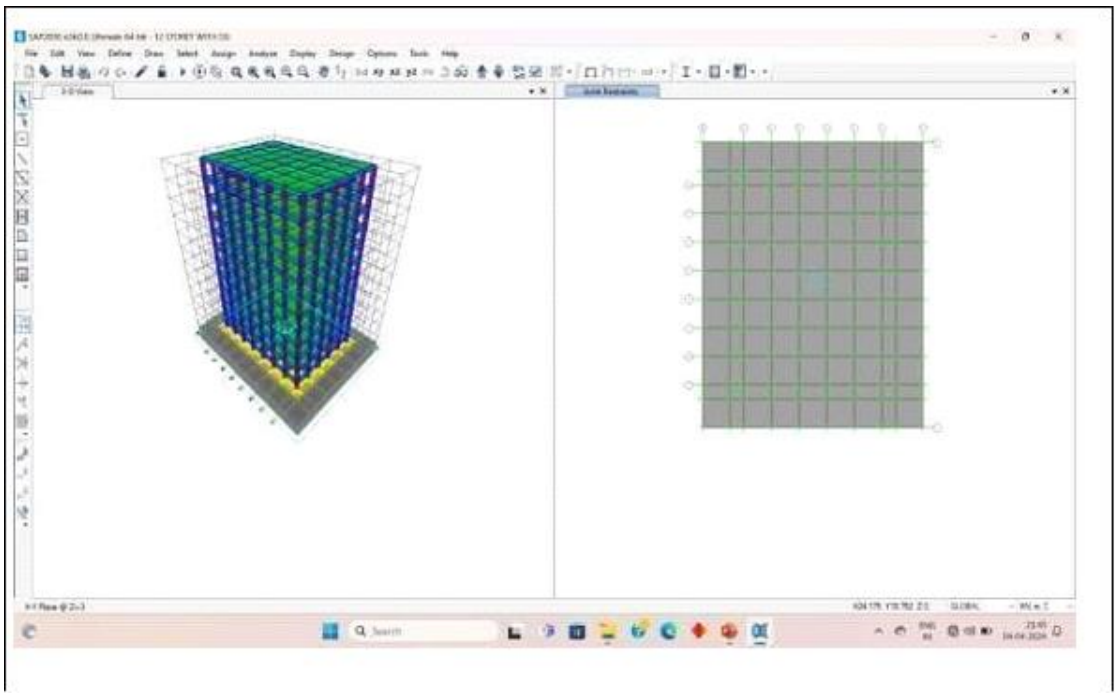

Fig 12: 12 storey structure considering soil interaction

Here are the results of joint displacement of 8,10,12 storey structure considering soil interaction in EQx and EQy:

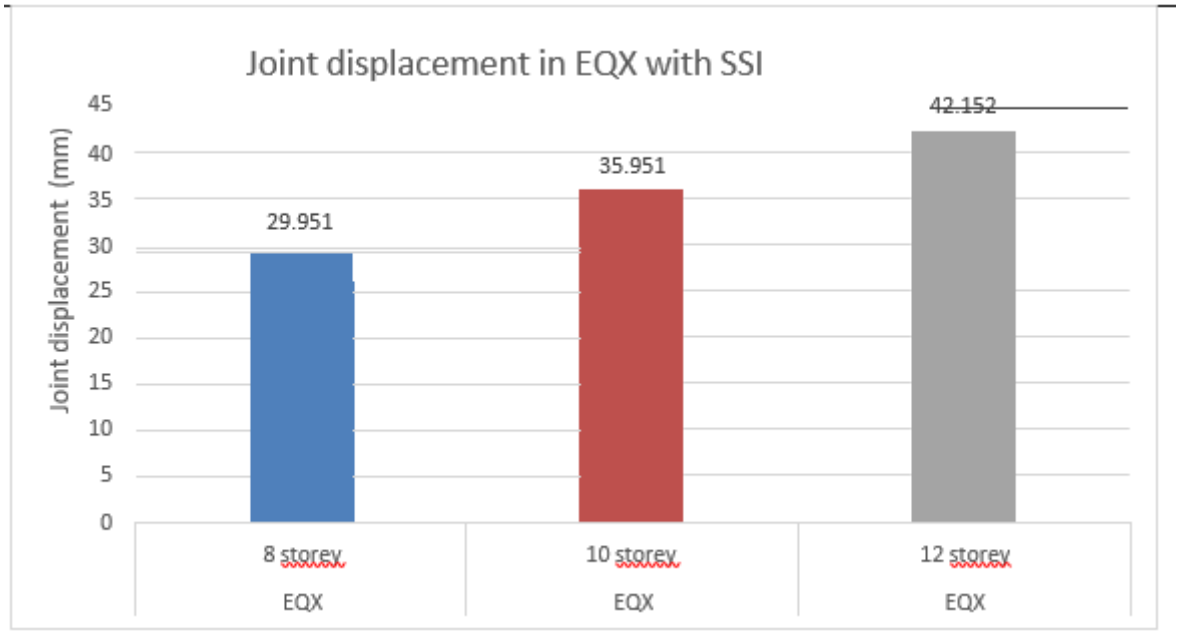

Fig 13 Joint displacement of 8,10,12 storey in EQx considering soil structure interaction

The above fig 13 shows the result of joint displacement of 8,10,12 storey considering soil structure interaction in EQx. The joint displacements are 29.951mm, 35.951mm, 42.152mm of 8,10,12 storey respectively.

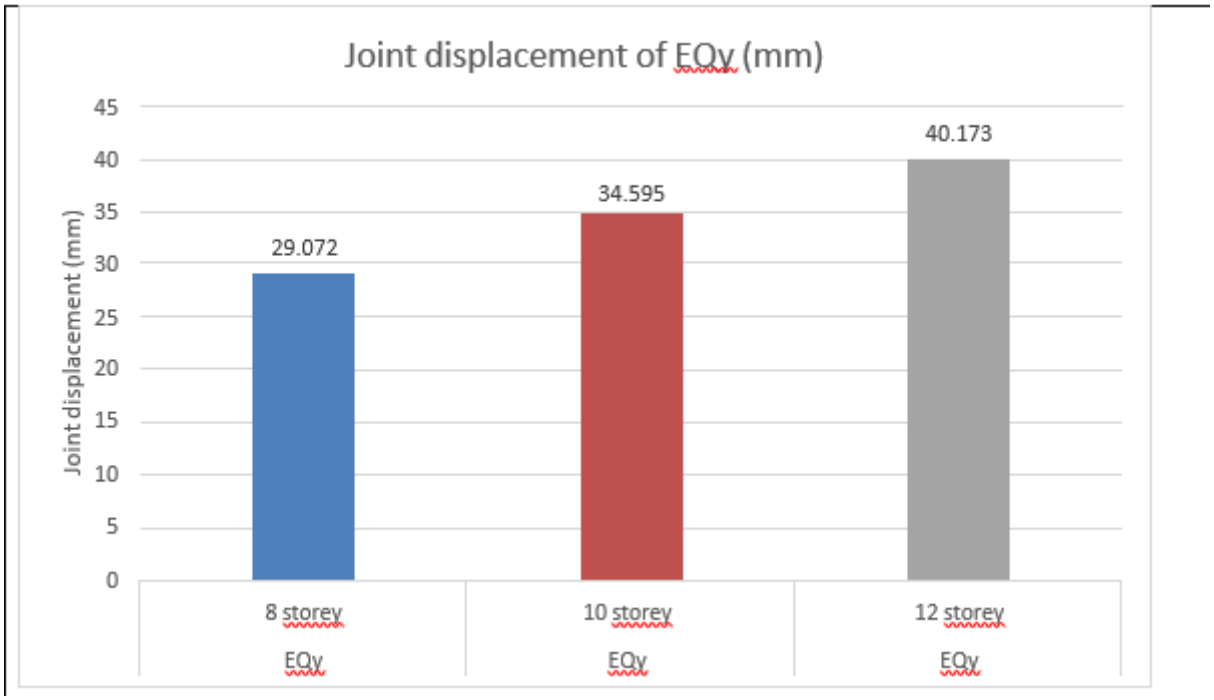

Fig 14 Joint displacement of 8,10,12 storey in EQy considering soil structure interaction

The above fig 14 shows the result of joint displacement of 8,10,12 storey considering soil structure interaction in EQy. The joint displacements are 29.072mm, 34.595mm, 40.173mm of 8,10,12 storey respectively.

Here are the results of base reaction of 8,10,12 storey structure considering soil interaction in EQx and EQy:

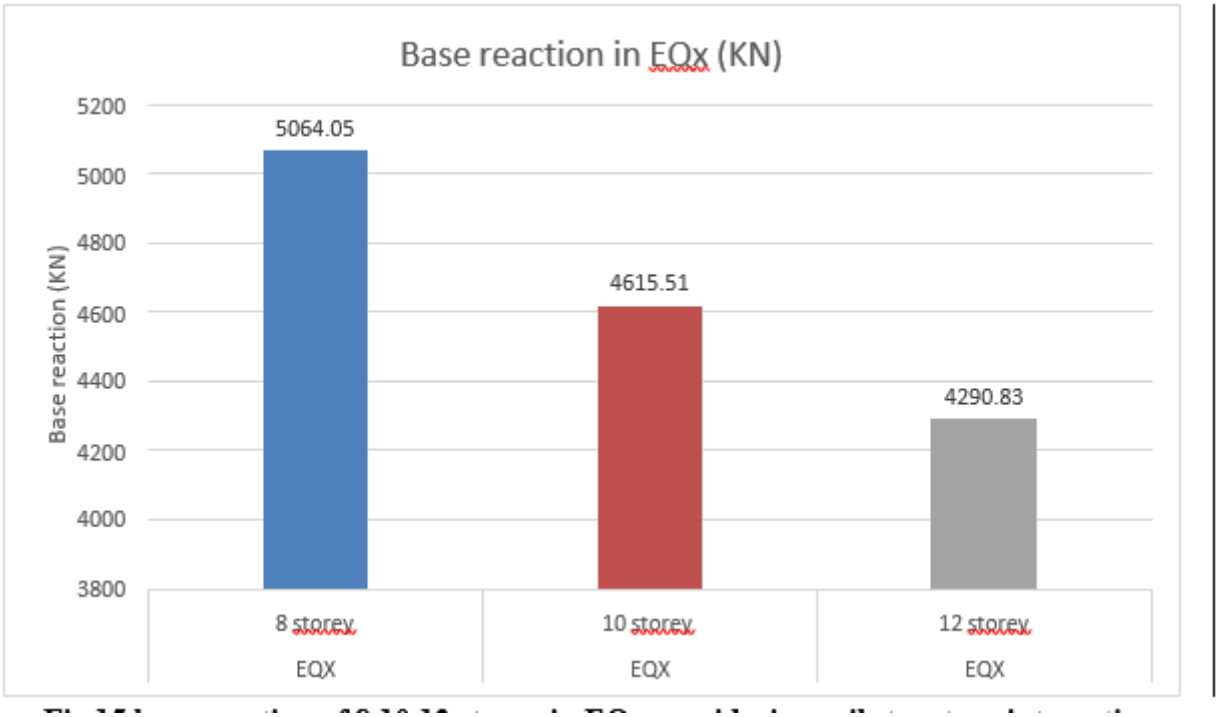

Fig 15 base reaction of 8,10,12 storey in EQx considering soil structure interaction

The above 15 shows the result of base reaction of 8,10,12 storey considering soil structure interaction in EQx. The base reactions are, 5064.05KN, 4615.51KN, 4290.83KN of 8, 10, 12 storey respectively.

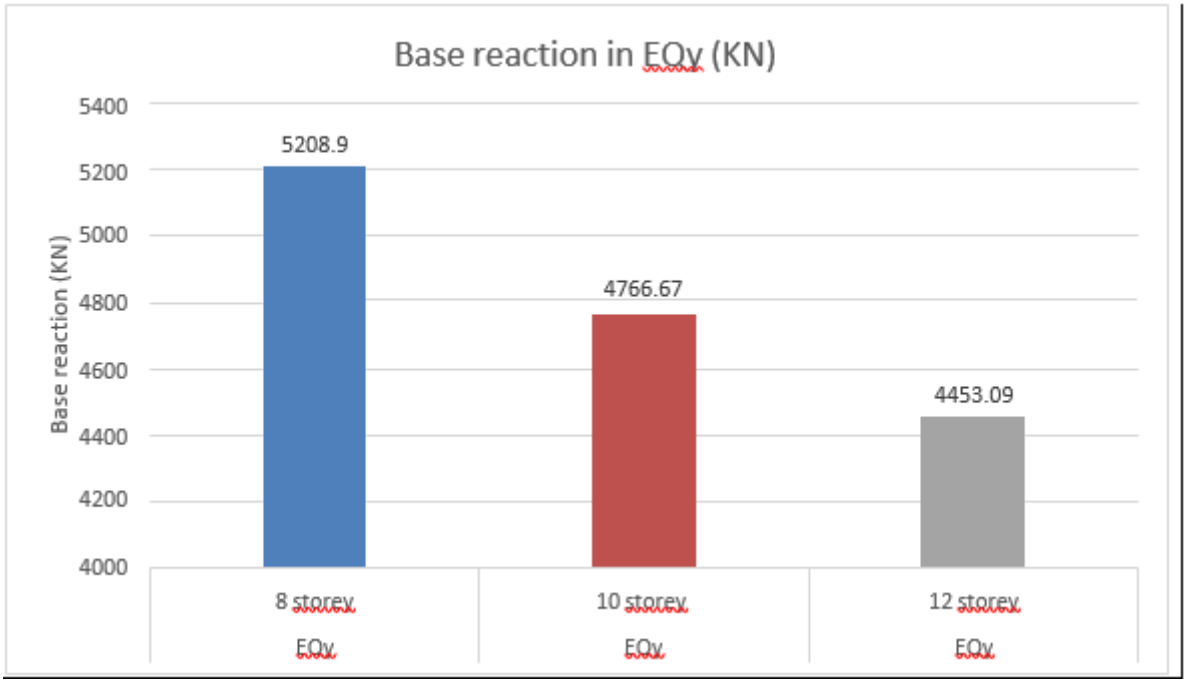

Fig 16 base reaction of 8,10,12 storey in EQy considering soil structure interaction

The above fig 16 shows the result of base reaction of 8, 10, 12 storey considering soil structure interaction in EQy. The base reaction are, 5208.9KN, 4766.67KN, 4453.09KN of 8,10,12 storey respectively.

Here are the combine graph of joint displacement of 8 storey structure with soil structure interaction and without soil structure interaction:

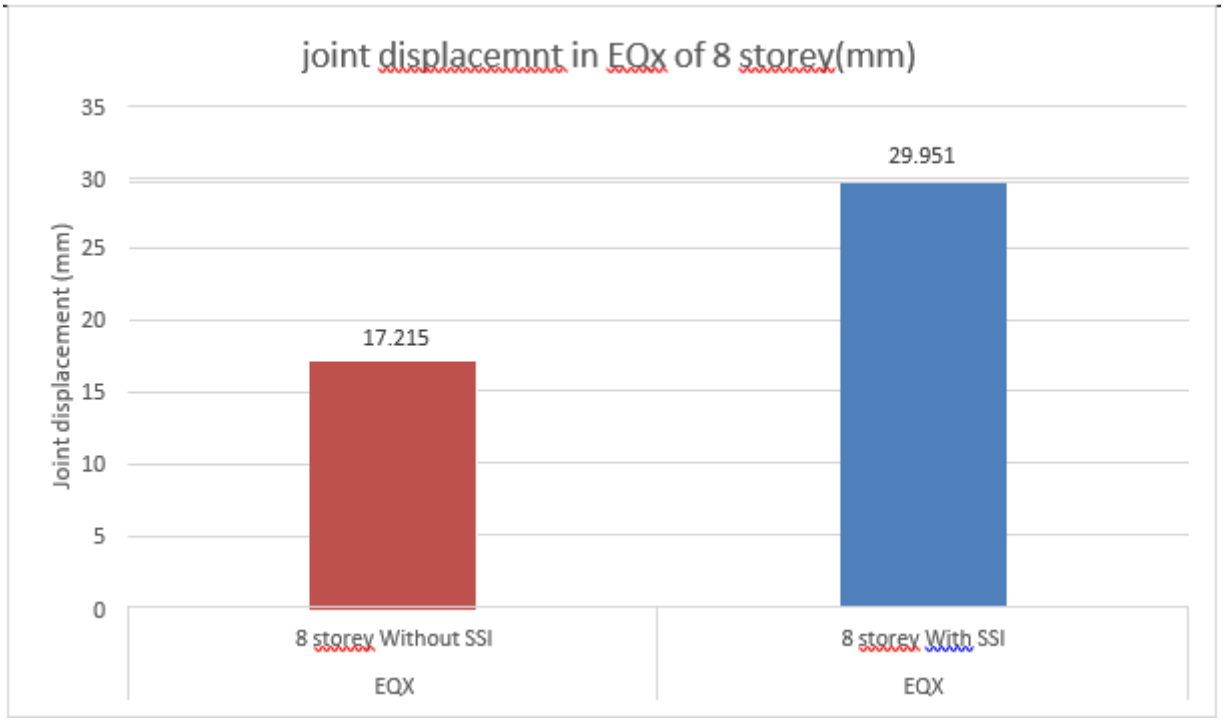

Fig 17: Joint displacement result of 8 storey structure with soil structure interaction and without soil structure interaction in EQx

The above fig 17 shows the combine result of joint displacement of 8 storey structure with soil interaction and without soil interaction in EQx. The joint displacement of 8 storey without soil structure interaction is

17.215mm and with soil structure interaction is 29.951mm. It seems that the joint displacement is increases by introducing soil structure interaction. This because it considers the foundation flexibility, soil amplification and dynamic effects which can lead in higher deformation.

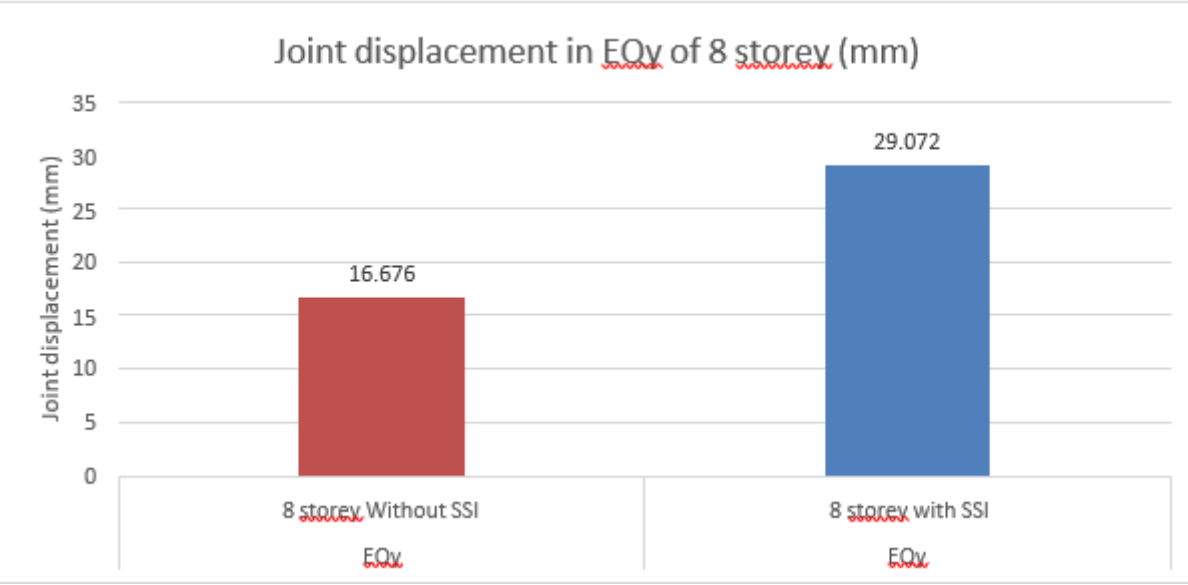

Fig 18: Joint displacement result of 8 storey structure with soil structure interaction and without soil structure interaction in EQy

The above fig 18 shows the combine result of joint displacement of 8 storey structure with soil interaction and without soil interaction in EQy. The joint displacement of 8 storey without soil structure interaction is 16.676mm and with soil structure interaction is 29.072mm.

Here is the combine graph of joint displacement of 10 storey structure with soil structure interaction and without soil structure interaction:

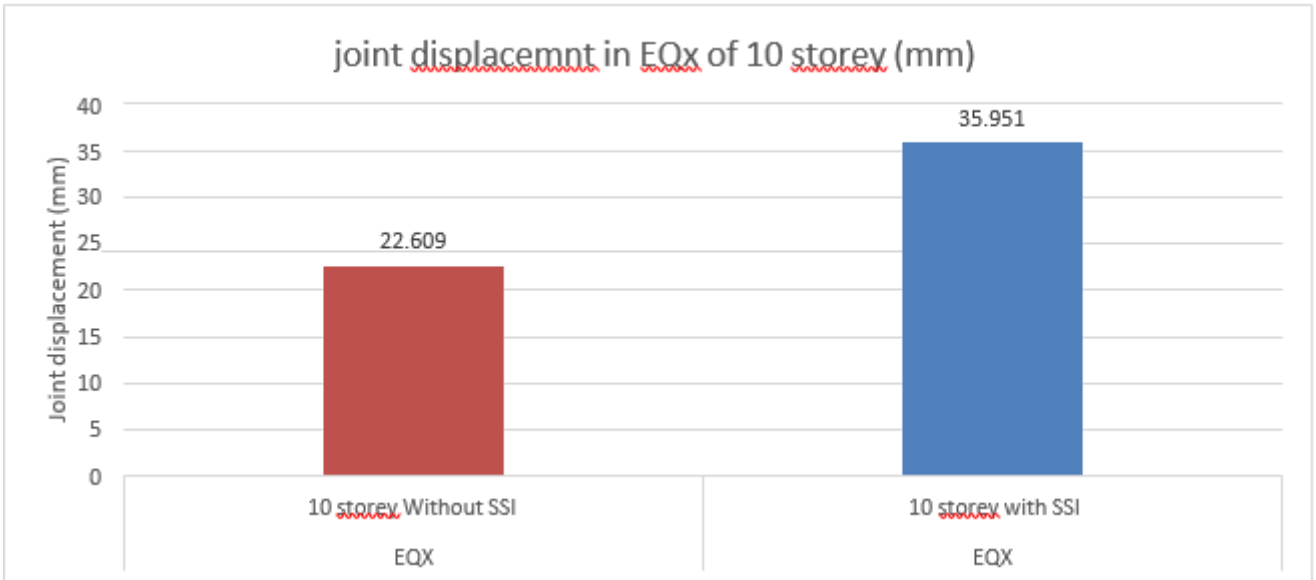

Fig 19: Joint displacement result of 10 storey structure with soil structure interaction and without soil structure interaction in EQx

The above fig 19 shows the combine result of joint displacement of 10 storey structure with soil interaction and without soil interaction in EQx. The joint displacement of 10 storey without soil structure interaction is 22.609mm and with soil structure interaction is35951mm. It seems that the joint displacement is increases by introducing soil structure interaction.

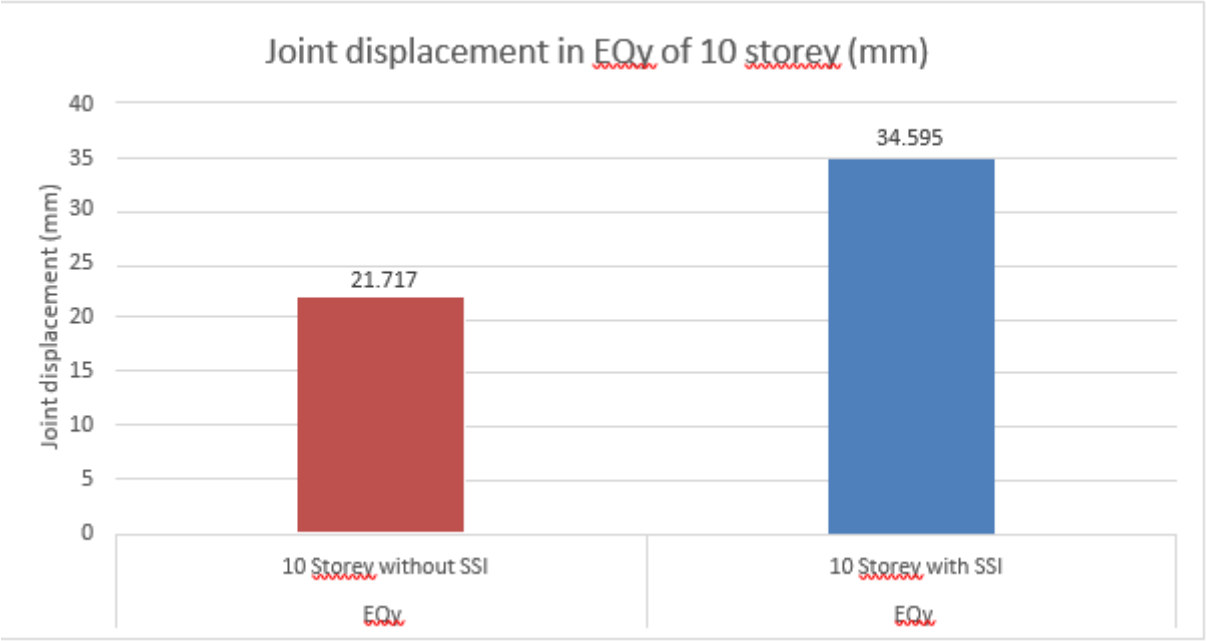

Fig 20: Joint displacement result of 10 storey structure with soil structure interaction and without soil structure interaction in EQy

The above fig 20 shows the combine result of joint displacement of 10 storey structure with soil interaction and without soil interaction in EQy. The joint displacement of 10 storey without soil structure interaction is 21.717mm and with soil structure interaction is 34.595mm.

Here is the combine graph of joint displacement of 12 storey structure with soil structure interaction and without soil structure interaction:

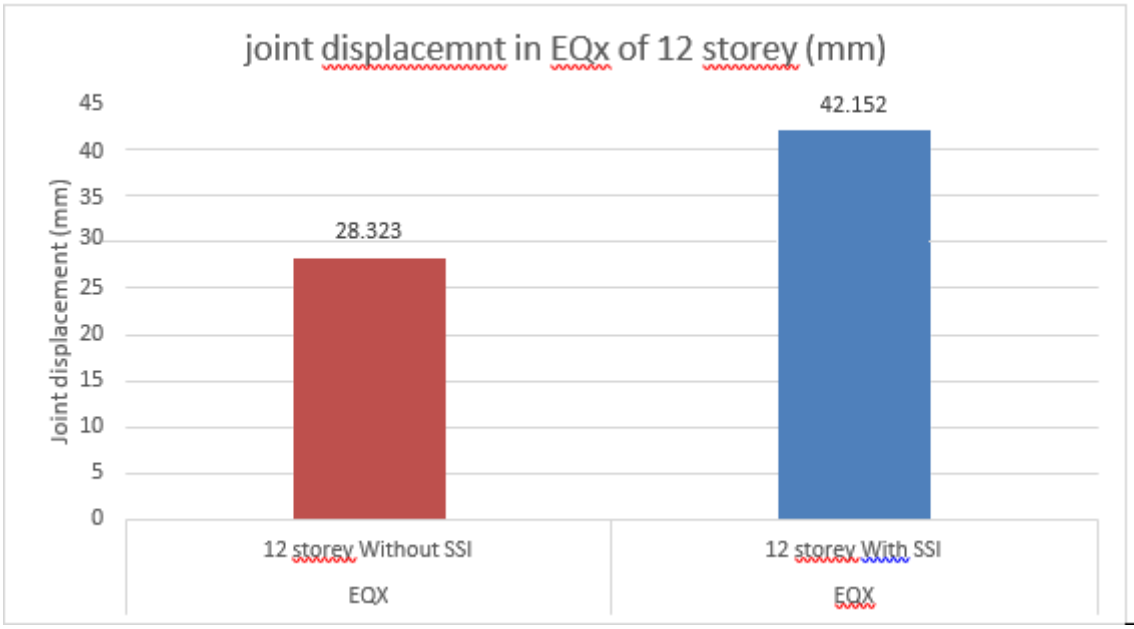

Fig 21: Joint displacement result of 12 storey structure with soil structure interaction and without soil structure interaction in EQx

The above fig 21 shows the combine result of joint displacement of12 storey structure with soil interaction and without soil interaction in EQx. The joint displacement of 12 storey without soil structure interaction is 28.323mm and with soil structure interaction is 42.152mm. It seems that the joint displacement is increases by introducing soil structure interaction.

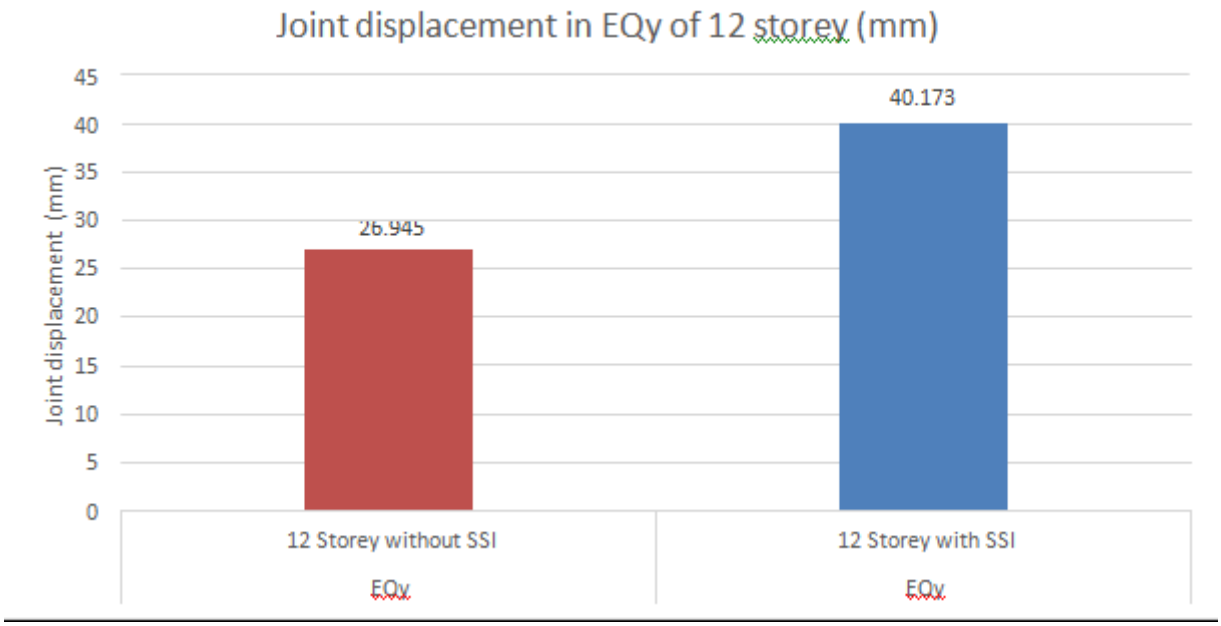

Fig 22: Joint displacement result of 12 storey structure with soil structure interaction and without soil structure interaction in EQy

The above fig 22 shows the combine result of joint displacement of 12 storey structure with soil interaction and without soil interaction in EQy. The joint displacement of 12 storey without soil structure interaction is 26.945mm and with soil structure interaction is 40.173mm.

Here is the combine graph of base reaction of 8 storey structure with soil structure interaction and without soil structure interaction:

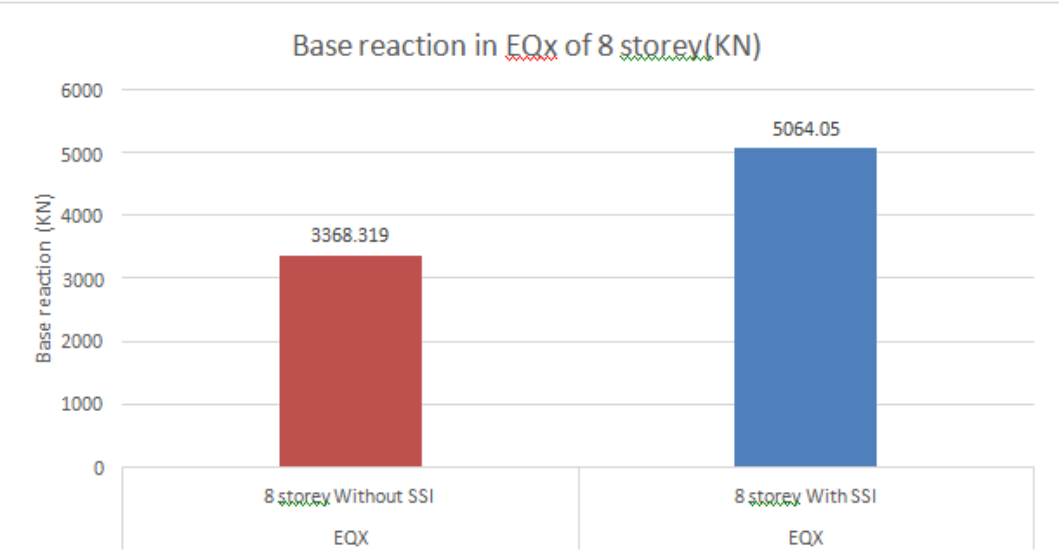

Fig 23: Base reaction result of 8 storey structure with soil structure interaction and without soil structure interaction in EQx

The above fig 23 shows the combine result of base reaction of 8 storey structure with soil interaction and without soil interaction in EQx. The base reaction of 8 storey without soil structure interaction is 3368.31KN and with soil structure interaction is 5064.05KN. It seems that the base reaction is increases by introducing soil structure interaction. This because by introducing soil structure interaction it can lead higher load transmission to foundation as compared to analysis without soul structure interaction.

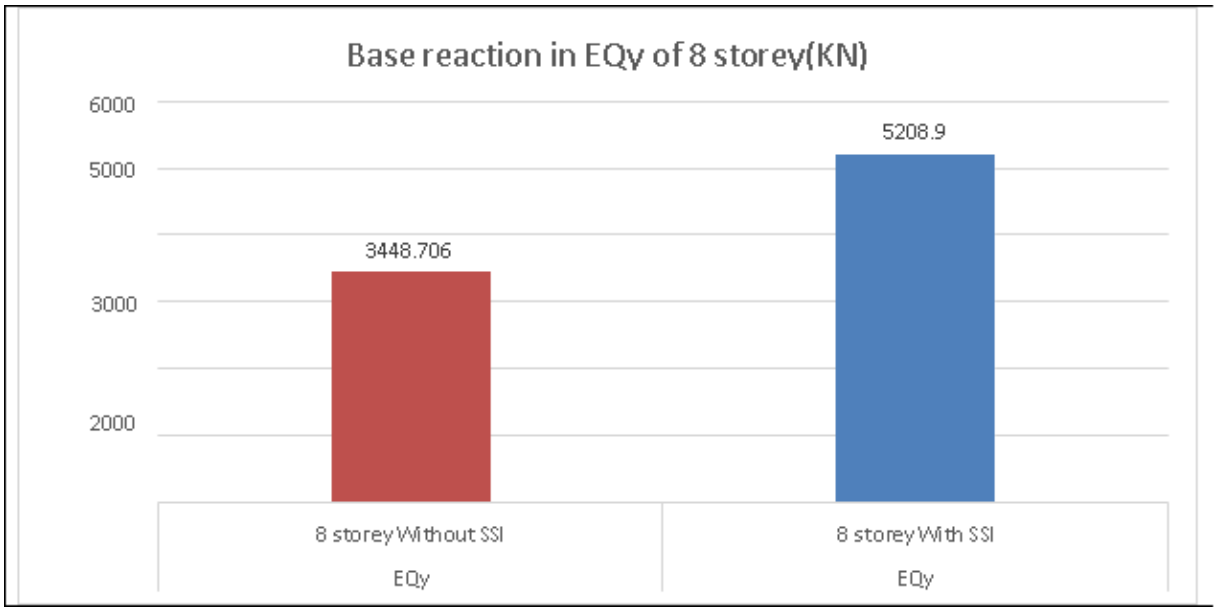

Fig 24: Base reaction result of 8 storey structure with soil structure interaction and without soil structure interaction in EQy

The above fig 24 shows the combine result of base reaction of 8 storey structure with soil interaction and without soil interaction in EQy. The base reaction of 8 storey without soil structure interaction is 3448.70KN and with soil structure interaction is 5208.9KN.

Here is the combine graph of base reaction of 10 storey structure with soil structure interaction and without soil structure interaction:

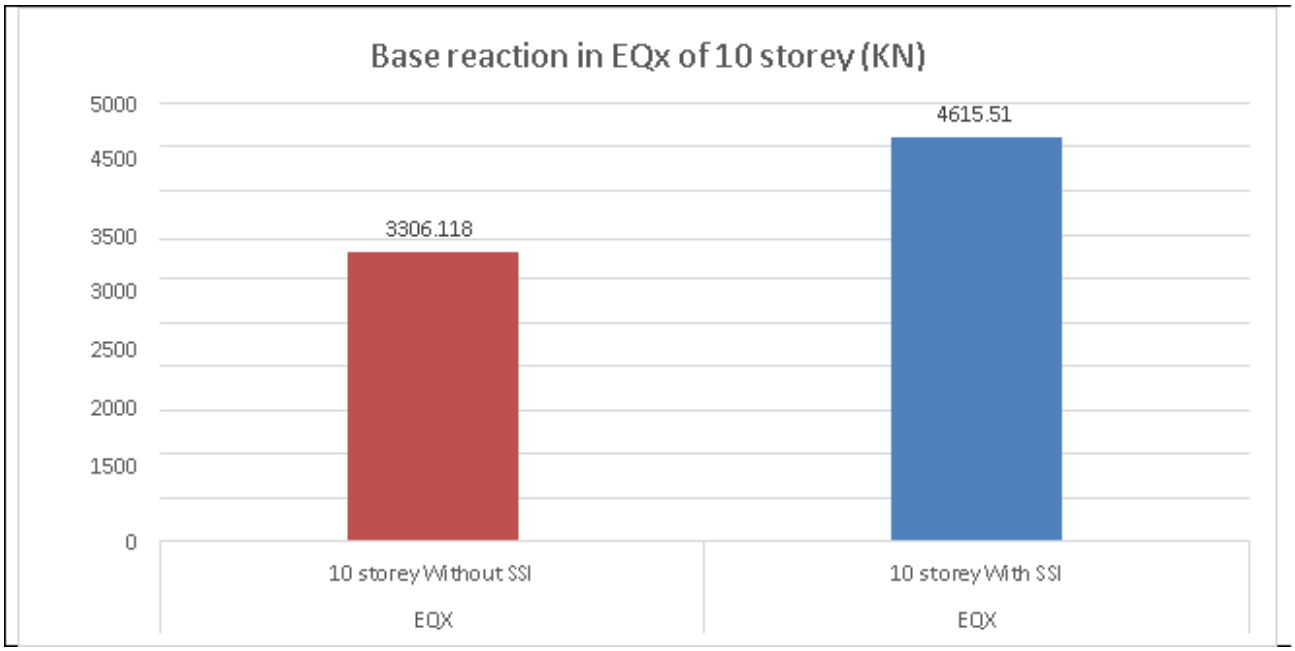

Fig 25: Base reaction result of 10 storey structure with soil structure interaction and without soil structure interaction in EQx

The above fig 25 shows the combine result of base reaction of 10 storey structure with soil interaction and without soil interaction in EQx. The base reaction of 10 storey without soil structure interaction is 3306.118KN and with soil structure interaction is 4615.51KN.

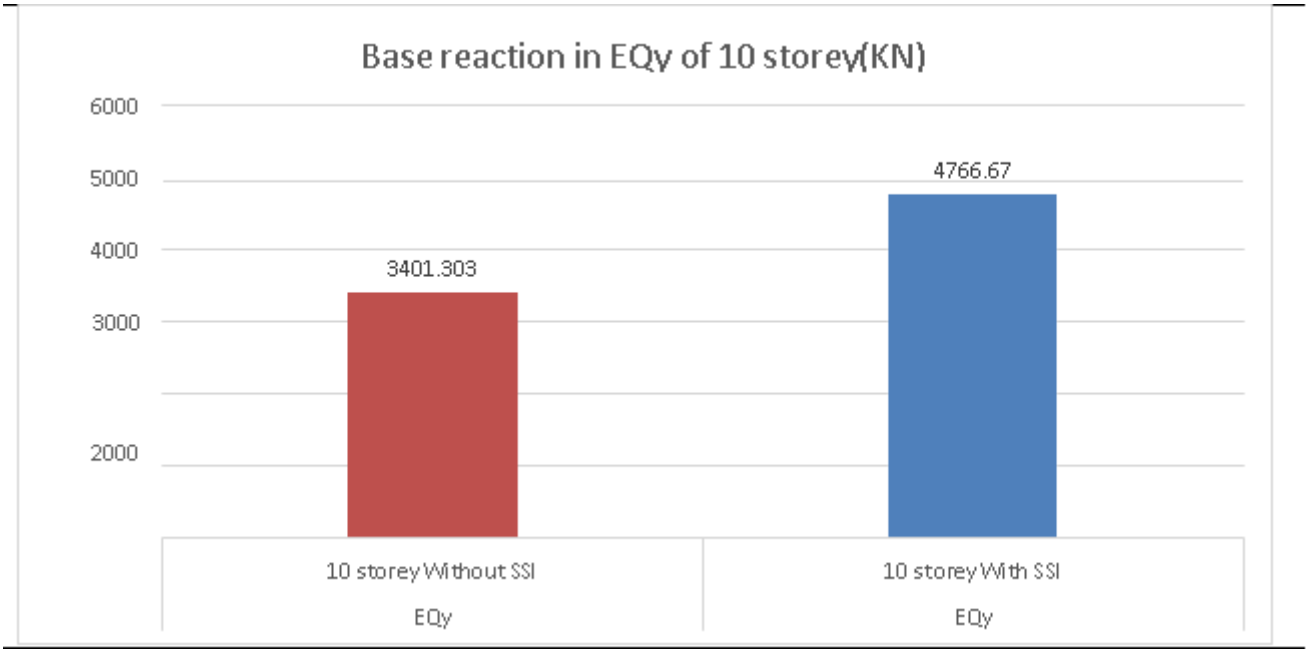

Fig 26: Base reaction result of 10 storey structure with soil structure interaction and without soil structure interaction in EQy

The above fig 26 shows the combine result of base reaction of 10 storey structure with soil interaction and without soil interaction in EQy. The base reaction of 10 storey without soil structure interaction is 3401.3KN and with soil structure interaction is 4766.67KN.

Here is the combine graph of base reaction of 12 storey structure with soil structure interaction and without soil structure interaction:

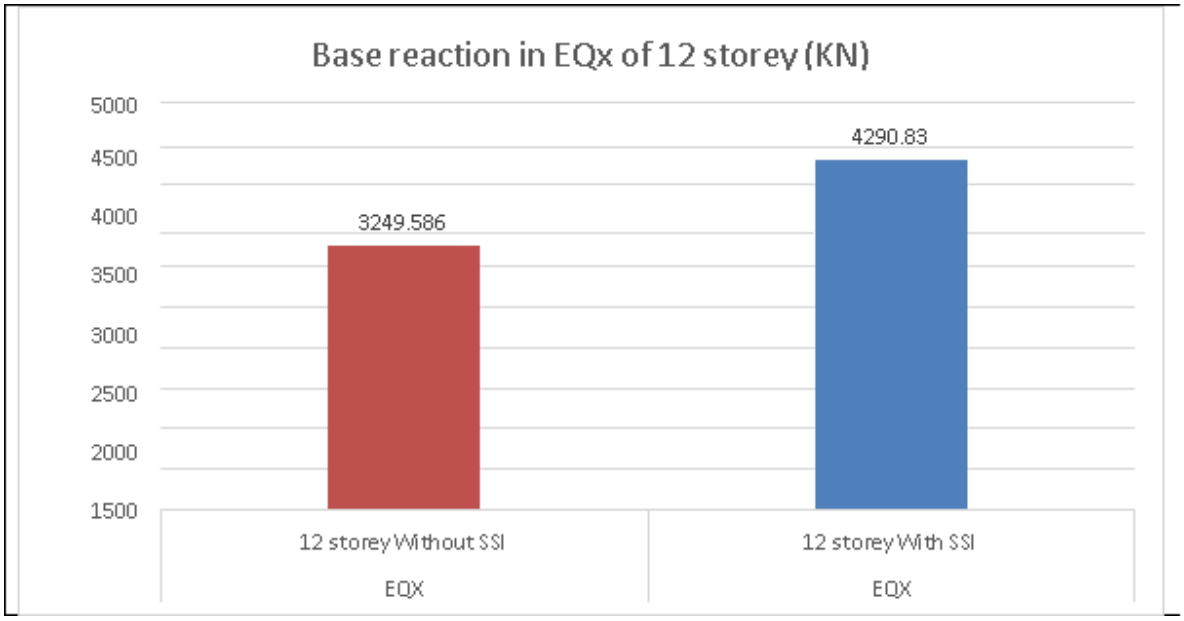

Fig 27: Base reaction result of 12 storey structure with soil structure interaction and without soil structure interaction in EQx

The above fig 27 shows the combine result of base reaction of 12 storey structure with soil interaction and without soil interaction in EQx. The base reaction of 12 storey without soil structure interaction is 3249.58KN and with soil structure interaction is 4290.83KN.

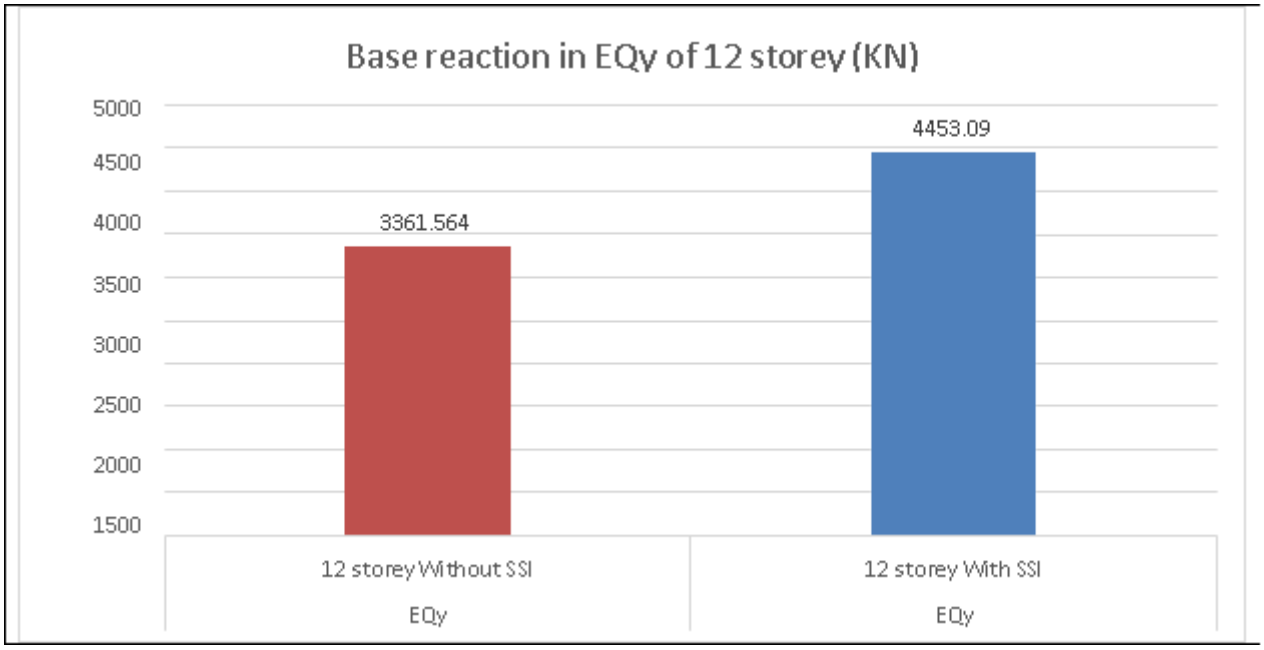

Fig 28: Base reaction result of 12 storey structure with soil structure interaction and without soil structure interaction in EQy

The above fig 28 shows the combine result of base reaction of 12 storey structure with soil interaction and without soil interaction in EQy. The base reaction of 12 storey without soil structure interaction is 3361.56KN and with soil structure interaction is 4453.09KN.

The combine graph of joint displacement of 8, 10, 12 storey shows that the joint displacement is increases by introducing soil structure interaction. Joint displacement and base reaction can be significantly influenced by soil structure interaction effect. For building with soil structure interaction, joint displacement is higher due to the flexible base and it is lower for buildings without soil structure interaction.

The combine graph of base reaction of 8, 10, 12 storey shows that the joint displacement is increases by introducing soil structure interaction. This is because by introducing soil structure interaction the load transmission to foundation is higher as compared to analysis without soil structure interaction.

V. CONCLUSION

It observed that as story height increases the joint displacement also increases. It seems that increasing story height by 2 storey there will be 31%increase in joint displacement. Also, by increasing 4 storey there will be 64%increase in joint displacement. The study represents that as the story height increases the base reaction is decreases. This is due to in a tall structure, the load is distributed over a larger area as you move up the building. This means that the lower levels of the structure bear a greater portion of the load, resulting in higher base reactions. Joint displacement and base reaction can be significantly influenced by soil structure interaction effect. For building with soil structure interaction, joint displacement is higher due to the flexible base and it is lower for buildings without soil structure interaction. The base reaction is increase by introducing soil structure

interaction because it can lead higher load transmission to foundation as compared to analysis without soil structure interaction. Soil-structure interaction (SSI) significantly influences seismic design for reinforced concrete (RC) structures. Proper consideration and mitigation strategies are essential to ensure the safety and performance of RC structures in earthquake-prone areas.

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Analysis on Big Data Indexing

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ABSTRACT
Social media is becoming the primary means of communication for practically all activities, including business, information, and personal updates. As a result, a significant amount of data about various activities is generated. As a result, social media has integrated itself into our daily lives. But sorting through all of this data for analysis is a difficult and time-consuming operation. There are numerous ways to solve this issue. Sorting, indexing, and data reduction may be the answers. Additionally, which will be applied to recommendation, visualization, etc. Indexing strategies for extremely repetitive data sets are now a topic of discussion. Queries with value and dimension subsetting conditions can be expedited with these strategies. With regard to the compatibility of data type, size, dimension, representation, storage, etc., there are several indexing techniques. Because the majority of electronic text collections are huge and diverse, indexing is absolutely necessary. Because text search is used to locate files on computers right out of the help services incorporated into operating systems, the motto is to find an improved way to text search. Various indexing techniques, such as tree-based indexing, multidimensional indexing, hashing, and others, are employed based on the data structures and big data analysis (BDA). It is necessary for indexing to address search speed. To avoid a delay in the outcome, the index's size must be a percentage of the original data and must be constructed at the rate at which the data is generated. Here, a few search structures and indexing strategies are covered in relation to data structures, frameworks, space requirements, applications, and simpler implementations.

Keywords: Large-scale Data; Indexation; Search; Retrieving Information

I. INTRODUCTION

Information retrieval now faces challenges due to the proliferation of sophisticated data collections and data expansion [1]. Creating indexes on data sets is one way to solve this. Indexes are typically lists of tags, names, subjects, and other information about a set of things that indicate the locations of the items. In light of this, a list of tags, names, subjects, and other information from a dataset that indicates where data can be located can be considered a big data index. The creation of an index, or an access mechanism to a searched object, is known as an indexing technique. Additionally, it explains the arrangement of data in a storage system to aid in the retrieval of information. Partitioning datasets based on criteria that will be often utilized in queries is the concept behind big data indexing[2]. Each fragment in the index has a value that satisfies a set of query predicates. The goal of this is to store the data more systematically so that it may be retrieved more easily.

Metadata that describes the contents of complex data are collected alongside them. These datasets can be queried by utilizing the contents metadata. scanning the relevant group(s) related to the query is a more efficient method than scanning the entire database, which might take a lot of time. Since the search procedure only takes into account the content of a particular group(s), this reduces the amount of time it takes to retrieve information. To make knowledge retrieval easier, an appropriate aid in the retrieval of information. Partitioning datasets based on criteria that will be often utilized in queries is the concept behind big data indexing[4]. Each fragment in the index has a value that satisfies a set of query predicates. The goal of this is to store the data more systematically so that it may be retrieved more easily. Metadata that describes the contents of complex data are collected alongside them. These datasets can be queried by utilizing the contents metadata. scanning the relevant group(s) related to the query is a more efficient method than scanning the entire database, which might take a lot of time. Since the search procedure only takes into account the content of a particular group(s), this reduces the amount of time it takes to retrieve information. To make knowledge retrieval easier, an appropriate The datasets must be processed using an indexing approach. The benefit of having an orderly storage system to facilitate information retrieval and search is also included in this. A system that makes use of a massively parallel computer or machine that connects numerous RAM, CPUs, and disk units is necessary for big data indexing. High data processing capacity, shorter query response times, data replication for improved availability and dependability, and structural scalability are the advantages of this. The kind of queries that will be run on the dataset, such as range queries, point queries, similarity searches (nearest neighbor search), and so on, will determine the design of an access technique or the kind of indexing strategy to be utilized in processing a particular dataset.query, ad hoc query, and keyword query. As a result, the kind of data to be indexed (such as emails, logs, audio, video, photos, etc.) and the kind of query that will be run on the indexes must be known to the designer. Indexing strategies fall into two categories, according to non-artificial intelligence (NAI) approach and artificial intelligence (AI) approach.

II. LITERATURE REVIEW

Information system engineers' implementation of "Privacy by Design" is the main topic of Fei Bua's paper. It probably goes over methods and approaches for incorporating privacy concerns into information system development and design. Techniques like encryption, access control, and data anonymization may fall under this category. It appears to be a useful addition to the information management area, especially in view of growing worries about data privacy[1].

An "ad hoc" crawler is introduced by Baldassarre et al. in their article on the MIoT (Massive Internet of Things) paradigm. This research presumably examines the features and difficulties of overseeing large-scale Internet of Things systems and suggests a remedy in the shape of a customized crawler. The MIoT paradigm most likely alludes to the particular difficulties presented by the vastness and diversity of IoT data and devices. The creation of a customized crawler offers a workable solution to these problems[2].

Mukherjee and colleagues explore the subject of security and privacy in fog computing, emphasizing the difficulties that come with this dispersed computing model. By bringing cloud computing to the network's edge, fog computing raises additional security and privacy issues. This document probably gives a summary of these issues and talks about possible fixes or tactics for mitigating them. Fog computing is becoming more and more popular in a variety of applications[3],

An effective indexing method for edge computing environments' unstructured data sharing systems is presented by Xie et al. Edge computing refers to the processing of data nearer its source. cutting down on bandwidth and delay. Most likely, the approach put out in this research will help edge computing systems optimize performance and scalability by providing an effective means of arranging and gaining access to unstructured data. To fully utilize edge computing in a variety of applications, these kinds of procedures must be developed[4].

A survey is conducted by Sunhare et al. regarding data mining applications within the Internet of Things (IoT). Data mining techniques can extract significant insights from the massive amounts of data generated by the Internet of Things. The various applications of data mining to IoT data, including anomaly detection, predictive maintenance, and customized services, are probably covered in this survey. Comprehending these uses can direct upcoming IoT research and development initiatives and direct upcoming IoT and data mining research and development initiatives[5].

Interval-based queries over lossyIoT event streams are the main focus of Busany et al. Real-time decision-making requires effectively searching and interpreting the constant streams of events generated by IoT devices. In order to ensure the correctness and dependability of query results, it is likely that this study suggests methods for managing interval-based queries in the event of data loss or network disruptions. By addressing a real-world problem in IoT data management, our work helps to increase the resilience and usability of IoTsystems[6].These articles address significant issues and offer creative answers on a variety of subjects pertaining to data mining, edge computing, information management, and the Internet of Things.

III.ALGORITHM

1) The B Tree : Similar to a Binary tree search, but more complicated, is how the B-tree operates. Nodes in the B-tree have more branches than nodes in the Binary tree, which results in a more complex structure . B-tree indexes use comparison operators (\, \=, =, >, >=) to provide range and similarity queries, such as Nearest Neighbor Search (NNS). Keys and records normally live on leaves of a B-tree, while duplicate keys are kept in internal nodes, Pointers to next nodes may be present in leaves, which facilitates item retrieval. Studies suggest that this approach could not always produce fast results for Big Data queries and could waste store capacity because of partial node occupancy . Although B-trees scale linearly, they can only be accessed in one dimension, in contrast to other tree-based Among the B-tree's variations are the B+tree , B*tree, and KDB-tree [1][2][3].
2) R-tree : An indexing technique for spatial or range queries is the R-tree. With each item having X and Y coordinates with minimum and maximum values, it is mostly used in geospatial systems . An R-tree has the advantage over a B-tree in that the former can satisfy range or multi-dimensional queries, while the latter cannot. Using the R-tree, one can quickly retrieve responses to questions given a query range. Finding every hostel on a particular campus or every hotel within a specific distance from a given place are two examples. Assigning minimum and maximum boundaries to data elements based on their distance from one another is the idea. At the leaf node, every record specifies a single item (with values at the minimum and maximum).
3) Inverted Indexing Design : The Strategy of Inverted Indexing Designing inverted indexes that are utilized for full-text searches, such as those found on Google and other search engines, is made possible by the inverted indexing method. A list of every unique term that appears in a document plus a list of the

documents that contain each word make up an inverted index. Multiple documents may share the same key as the index when the index is inverted. Additionally, a document can be indexed using more than one key. A blog post, for instance, may have several tags (as key), and each tag may have references to several blog posts. It is important to remember that not all inverted indexing techniques use B-trees or can have rows filled in them.B-trees form the basis of inverted indexes. A B-tree differs from an inverted index in that it makes use of row-structured data, while inverted indexes do not. The process of implementing inverse indexing involves indexing or storing a set of keypost list pairs, where the post list is a group of documents containing the key and the key is the searched index. Two or more words (keys) may be distinct terms, but they will appear to the user as one term when using inverted indexes, which is an issue. Furthermore, during query search, synonyms (of the keys) might not be identified or retrieved .Reviewing the potentials of the various indexing systems and how they are applied to Big Data management problems is the goal. The Big Data indexing problem has been addressed by addressing a number of indexing methodologies. The paper's conclusion can be used as a basis for developing more effective indexing systems or as a guide for selecting the method most appropriate for resolving a particular issue.

IV. CONCLUSION

This document compiles widely used data indexing strategies for handling and analyzing large amounts of data. Reviewing the potentials of the various indexing systems and how they are applied to Big Data management problems is the goal. The Big Data indexing problem has been addressed by addressing a number of indexing methodologies. The paper's conclusion can be used as a basis for developing more effective indexing systems or as a guide for selecting the method most appropriate for resolving a particular issue.

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Emergency Breaking System with Wireless EV Charging

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ABSTRACT

An emergency braking system is a critical safety feature that automatically applies the brakes of a vehicle in case of an emergency. This system can help prevent accidents or reduce the severity of collisions by slowing down or stopping the vehicle when a driver is unable to do so in time. There are various types of emergency braking systems, such as automatic emergency braking (AEB) and electronic stability control (ESC), which use sensors to detect potential collisions and help prevent skidding and loss of control in slippery road conditions. The use of emergency braking systems has become increasingly common in modern vehicles, and they have been shown to greatly improve safety on the road. However, it is important to remember that these systems are not infallible, and drivers should always remain alert and ready to take action in case of an emergency. Overall, emergency braking systems play a crucial role in ensuring the safety of drivers, passengers, and other road users, and their continued development and implementation are essential for further reducing the number of traffic accidents and fatalities.

I. INTRODUCTION

The rise of vehicle technology has been rapid in recent years. This is especially true in relation to sensing and braking systemsThe prevalent introduction of anti-lock braking systems (ABS) has provided the erection blocks for a wide-ranging variety of braking control systems. Additional hardware that allows brakepressuretobeincreasedabovehandledemandaswellastobeabridged,mutualwithadditional software control processes and sensors allow traction control (TC), electronic brake forcedistribution (EBD), brake assist (BAS) and electronic stability control (ESC) utilities to be added. In parallel to the expansion of braking technologies, sensors have been established that are capable of detecting physical obstacles, other vehicles or foot-travelers around the vehicle. Many luxury, mid- size and small cars in Europe, and in Japan even verysmall cars, are now built-in with an adaptive cruise control (ACC) system that is capable of calculating and maintaining a driver-preset movement to the vehicle ahead by automatic modulation of the engine control, and if required, automatically applying brakes up to a maximum deceleration of 0.3g (as per ISO standard).If not any vehicle is forward, the vehicle upholds the preferred “set-speed”. ACC can be well-ordered as an option for new vehicles. At least three heavy truck companies offer this feature on their vehicles. Ideally, a vehicle armed with new

braking technology and adaptive cruise control is prepared with all of the essential hardware to allow a simple crashpreventionsystem that would be capable of identifying when a crash is likely to happen and applying emergency braking to avoid it. Crash alleviation systems are already on the market, providing limited braking ability.

II. LITERATURE SURVEY

McCarthy et al (2004) carried out research that magnificently established a proof of concept sensor system that was capable of detecting foot-travelers in front of a vehicle. This project found that such a system could potentially be used to brake the vehicle and/or to implement active secondary safety features such as a pop-up bonnet and that this could offer substantial benefits in pedestrian accidents. The prototype system was developed by fusing a high resolution 24 GHz short range radar with a passive infra-red sensor. The basic functions were that the radar was used to identify distance and relative velocity accurately and the infra-red sensor was used to decide whether or not the object detected by the radar was a pedestrian or not.

Kalhammer et al (2006) also identified the possibility of developing systems capable of detecting pedestrians using a long-wave infra red camera. It was listed that this would be capable of making part of an better brake assist function and/or as part of an independently braking system. The authors concluded that it was feasible to develop such a system in time to meet the proposed requirements for complementary measures included in the second phase of the pedestrian protection Directive.

Walchshausl et al (2006) describe the development of a multi-sensor recognition system capable of detecting vehicles, objects and pedestrians. The system consisted of a far-infrared imaging device, a laser scanner and several radar sensors, integrated into a BMW passenger car. They state that the reason for developing a multi-sensor approach was that robust collision mitigation requires a perception performance of unprecedented reliability and that “current off-the-shelf single sensor approaches can hardly fulfil the challenging demands”.

Elliott *et al* (2003) showed that a large proportion of killed and seriously injured motorcyclistsresulted from a collision with a car. Some of the AEBS currently in production are claimed to be capable of detecting a large motorcycle in the centre of the lane (Nitsche and Schulz, 2004).

III.DESIGN AND IMPROVEMENT

The Design and improvement is distributed into three fields. The hardware implementation, System Architecture, and Circuit development.

A. Objectives

The objective of emergency braking systems is to enhance road safety and prevent or reduce the severity of accidents by automatically applying the brakes in emergency situations. These systems are designed to assist drivers and help them avoid collisions when they are unable to react in time, such as when they are distracted, fatigued, or faced with unexpected obstacles on the road.

The main goal of emergency braking systems is to reduce the number of traffic accidents and fatalities, which is a major public health concern worldwide. These systems are part of a broader effort to improve road safety through technological innovations and driver education.

In addition to preventing accidents, emergency braking systems can also reduce the severity of crashes and injuries when accidents do occur. By slowing down or stopping the vehicle before impact, these systems can help reduce the force of the collision and the resulting damage to the vehicle and its occupants.

Overall, the objective of emergency braking systems is to make driving safer and reduce the human and economic costs associated with traffic accidents. These systems have the potential to save lives and improve the quality of life for individuals and communities around the world.

B. Hardware Implementation

The Block diagram is shown below in the figure.1 depicts the entire robot system which illustrates the operation of the entire system.

Ultrasonic Sensor

Like radar, lidar and active infrared systems, ultrasound can be used in detection and ranging applications using the time of flight principle to estimate the distance to an object. Ultrasonic radiations are effectually sounds waves with frequencies higher than that audible to the human ear, proper for short to medium range applications at low speed. A scanning sonar sensor based on a phased array of ultrasonic sensors facilitates gathering information on the distance, angular position, velocity and nature of surrounding obstacles. Ultrasonic sensors provide a good signal of vehicle toobstacledistances,arelessinclinedtobeingaffectedby abuildupofremains,havegoodresponse times and are low cost. However their performance is only suitable for short and medium range applications, fluctuations in operating voltage reduces performance and the accuracy of object detection is sometimes affected by reflected signals.

ESP8266 Controller

ESP8266 is a very low cost & user-friendly WiFi module, which improves a simple TCP/IP connection and can simply be interfaced with microcontrollers via Serial Port. The first chip in this series was ESP-01 that gained a sheer attention in the market.

Motor Driver-L298D

L-298 is an Integrated Circuit (IC) existing in dual type of setscurrently a days which will be given later. L 298 is a double full bridge driver that has a ability to tolerate high voltage as well as high current. It obtains basic TTL (Transistor Transistor Logic) logic levels and is capable to operate the different loads such as DC motors, stepper motors, relays etc.L-298 has dual enable input to handle any device by enabling or disabling it. L 298 IC is most frequently used to create motor drivers or motor controllers. These motor controllers can be handled by any micro controller e.g Arduino, PIC, Raspberry Pi etc.They obtains input from micro controllers and control the load dedicated to their output terminals respectively. L-298 motor driver (H-Bridge) is able to control two different DC motors instantaneously.

Battery-Lithium Iron 3S

The 3S 40A Lithium Ion BMS is a high current Battery Management System for Lithium Ion Battery Packet. The BMS offers Overcharge, Over Discharge, and Short Circuit Protection. This BMS is for a 3 Series Battery Pack i.e 11.1V Lithium Iron Battery Pack.This 3S 40A Lithium Ion BMS should not be used with Drill Motor, as this does not offer Stability charging of the Battery Pack, and might damage the battery as well the BMS.

Wires/Jumpers

Jumper wires, also known as jumper leads or simply jumpers, are electrical cables used to make temporary connections between two points in an electronic circuit. They are typically made of insulated wire with alligator clips or other types of connectors on each end Jumper wires are commonly used in a variety of

electronics applications, such as prototyping and testing circuits, repairing or modifying electronic devices, and troubleshooting electrical problems. They allow for quick and easy connections between components without the need for soldering or other permanent connections.

Wireless Charging Module-5V/1A

The Wireless Charging Module can be useful in electronic equipment in common use for close wireless charging or power supply. Contained of a transmitter and isolation coil, it could serve as a spare for the Wireless Power Supply with stable 5V output voltage and maximum 1.2A output current. Its small size and isolation coil is more appropriate for using in wireless project.

Power Bank Module with Display

The 5V 2.4A Twin USB + Type-C + Micro + Lightning/Apple USB Power Bank module With LED Display is suitable for a DIY moveable backup power supply with a charging input that matches the 5.0V adapter. the system will deliver an exact battery indication. However charging, the LED digital screen displays the current battery charge status.

C. Methodology

Sensors detect a potential collision and take action to avoid it entirely, takingcontrolaway fromthedriver.Inthecontextofbrakingthisislikely toincludeapplying emergency braking sufficiently early that the vehicle can be brought to a stand still before a collision occurs. Formerly the sensing system has detected that the impact has become certain irrespective of braking or steering actions then emergency braking is automatically applied (independent of driver action) to reduce the collision speed, and hence injury brutality, of the collision. This type of system has lower potential benefits but is lower risk because it will not take control away from the driver until a point very close to a collision where the sensing system is likely to be more dependable. We can operating our car with remote control using ESP8266 WIFI Robot Car application on smartphone.

1. Block Diagram

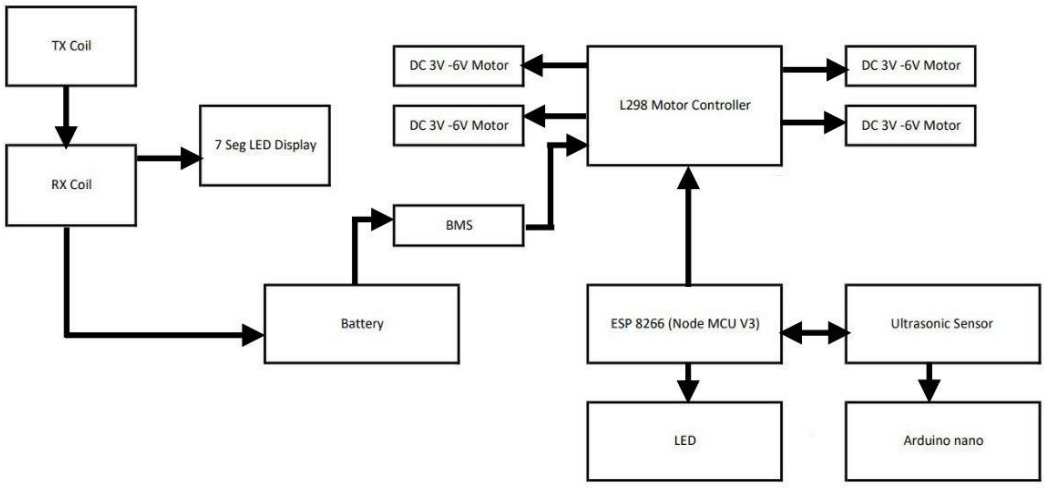

Figure 1 Block diagram of the proposed system

2. Flow Chart:

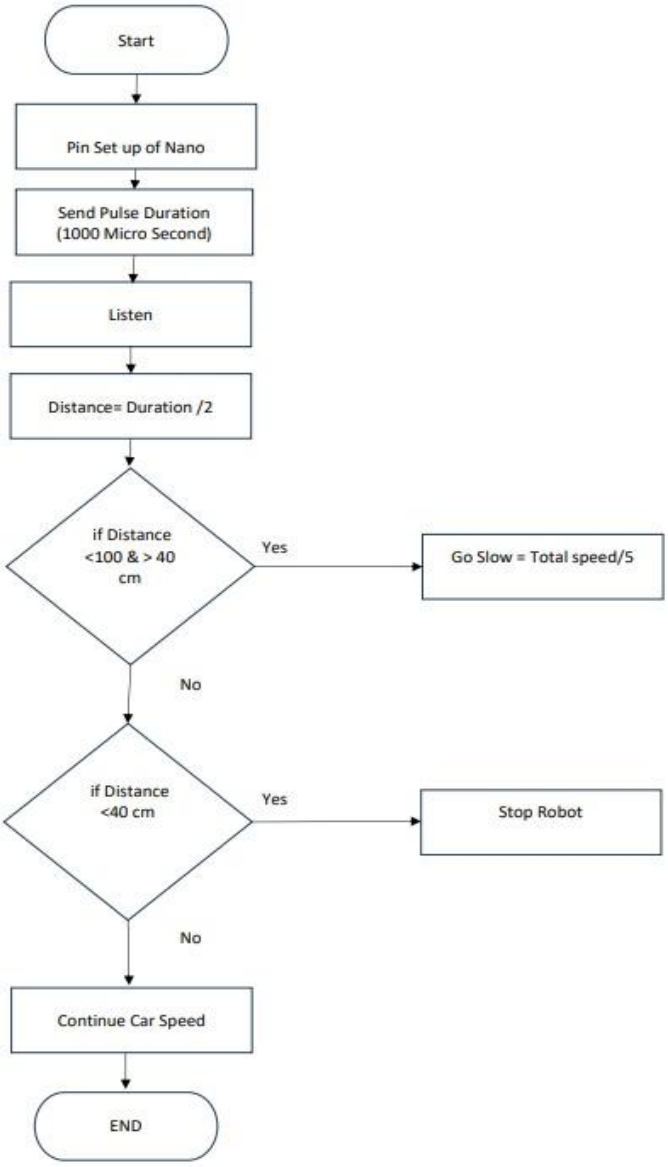

Figure.2 Design flow of the Arduino Nano working

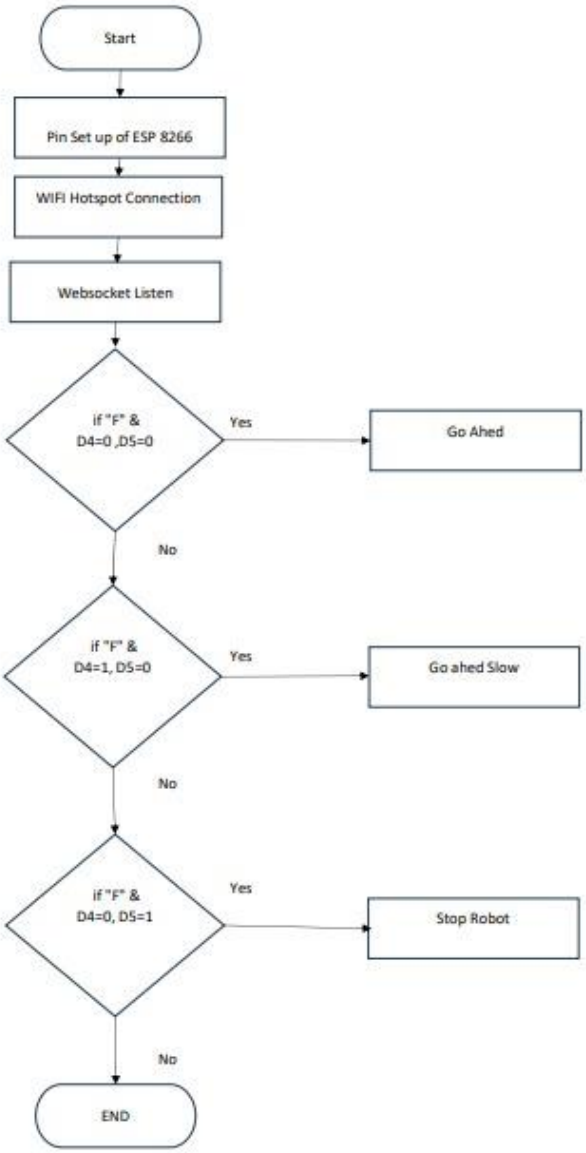

Figure.3 Design flow of the ESP8266 working

IV. RESULTS

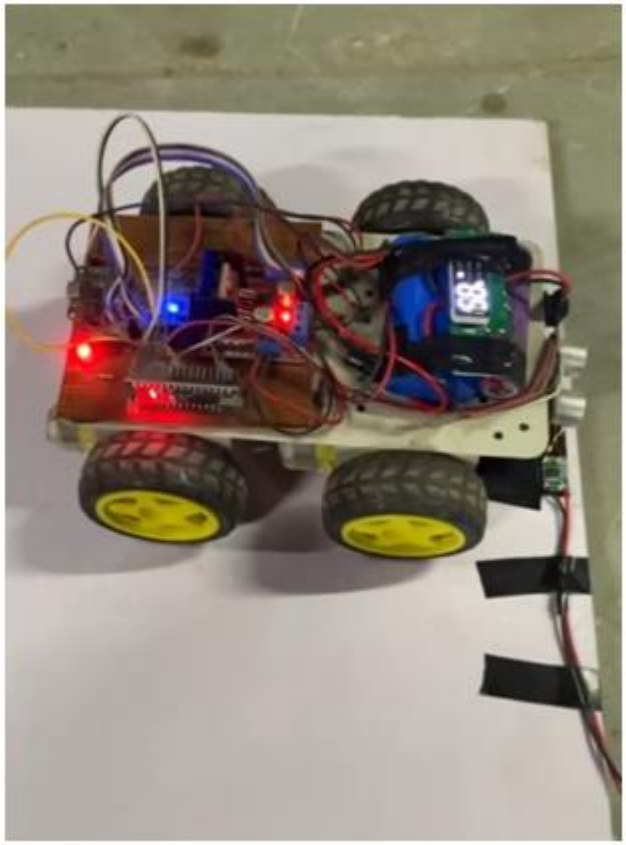

Figure.4 Hardware

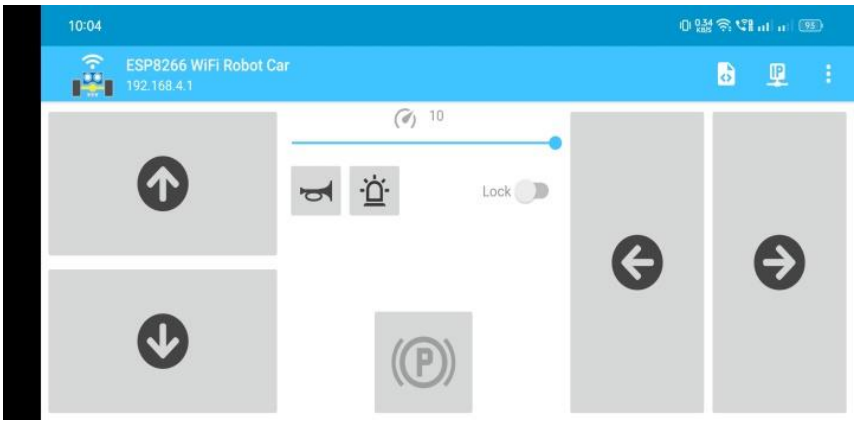

Figure.5 Remote Control Application

This section provides details on the evaluation results of this project. The purpose of our article is clear. As far as we know, our robot model does not create any interference, the movement of the robot depends on the information we give to the remote control. Control of the circuit Customers can better use it directly, he main conclusion we get is that Arduino cannot work at the same time, but in our system we used ESP8266 module and Arduino Nano so that everything performs many functions. Android app installed on your phone. These features make our robots simple and easy to use in our daily lives.

Result Calculations:

Parameters	Calculations
Charge	Battery Charging 10% in one hour.
Speed Of Car	Assign Speed/5
Yellow LED	If obstacle away from 100cm then blink yellow LED. (Distance<=100)
Red LED	If obstacle away from 40cm then blink Red LED.
Reduced Speed when blink yellow led	Current Speed of car/2.
Emergency Breaking when blink red led	If obstacle away from 40cm then automatically stop the car.(distance> =40)

V. CONCLUSION

Automatic emergency braking systems (AEBS) were in manufacture on a number of current vehicles at the top end of the market in the initial stages of this work and are capable of autonomously mitigating two-vehicle front to rear shunt accidents as well as some collisions with fixed objects and motorcycles. Such systems were fitted together with ACC and forward collision warning systems that mutual the same hardware.

Systems are presently in various stages of development that will also act in pedestrian collisions and towards the end of the project at least one system offering some pedestrian functionality was released on a assembly vehicle. There is also a strong study base that aims to develop systems skilful of acting in other vehicle to vehicle impact configurations.

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A Review on Banking System Utilizing Blockchain Technology

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ABSTRACT

The emergence of blockchain technology has revolutionized the traditional banking system by providing a decentralized, secure, and transparent platform for financial transactions. This research paper explores the feasibility and benefits of implementing a blockchain-based banking system. By examining current challenges within the traditional banking sector, such as lengthy transaction times, high fees, and lack of transparency, this paper argues that blockchain technology can offer a viable solution. The paper also evaluates the potential risks and regulatory concerns associated with blockchain-based banking systems, and proposes strategies to mitigate these challenges. This research paper aims to highlight the transformative potential of blockchain technology in revolutionizing the banking sector and improving financial services for both consumers and institutions.

Keywords— Blockchain, Banking System, Finance, Machine Learning

I. INTRODUCTION

In the rapidly evolving realm of financial technology, the emergence of blockchain technology stands as a catalyst for profound transformations in traditional banking structures. This paper endeavors to embark on a meticulous and comprehensive exploration of the revolutionary landscape presented by blockchain-based banking systems. As the financial sector undergoes a paradigm shift towards decentralization, transparency, and heightened efficiency, the integration of blockchain technology becomes a linchpin in redefining the fundamental principles of banking services. Our inquiry delves deep into the core components that constitute the bedrock of these innovative systems, unraveling the intricate tapestry of consensus mechanisms that underpin blockchain networks. Whether through the robust security measures of Proof of Work or the energy-efficient alternatives like Proof of Stake, the chosen consensus mechanism shapes the system's resilience against adversarial attacks. Simultaneously, the examination of smart contract security unveils the critical need for secure coding practices and regular audits to fortify the reliability and safety of these self-executing contracts.

The paper does not merely scrutinize the technical intricacies but extends its gaze to the critical realm of data security. We navigate through the nuances of encrypting sensitive data and safeguarding the privacy and confidentiality of user information both during storage and transmission. Furthermore, the exploration encompasses identity management systems and multi-factor authentication protocols, which form the bulwark against unauthorized access and protect the sanctity of user accounts. In addition to these technical aspects, the paper explores the regulatory landscape, addressing the imperative of compliance with financial and data protection regulations. The incorporation of Know Your Customer (KYC) and Anti-Money Laundering (AML) procedures becomes essential to meet regulatory requirements, ensuring that these innovative systems operate within the bounds of legal frameworks. Network security assumes paramount importance in this landscape.

The paper scrutinizes the implementation of firewalls, intrusion detection systems, and other measures to fortify the network infrastructure against external threats, particularly Distributed Denial of Service (DDoS) attacks that could disrupt services. Moving beyond technical considerations, the exploration extends into user-centric elements. The paper emphasizes the importance of secure wallet solutions, advocating for the adoption of hardware wallets to provide users with a fortified environment for storing their digital assets. An incident response plan is discussed as a critical component, addressing the swift and strategic management of security breaches to minimize potential damages and restore confidence in the system. Furthermore, the paper underscores the significance of user education, as informed users contribute significantly to the overall security framework. By raising awareness about potential risks associated with blockchain technology and promoting secure practices, we aim to empower users to navigate this dynamic financial landscape with vigilance and understanding.

This paper aspires to provide a holistic and nuanced understanding of the challenges and opportunities embedded in the development and implementation of blockchain-based banking systems. By navigating through the technical, regulatory, and user-centric dimensions, we seek to equip architects and stakeholders with the insights needed to build resilient, secure, and user-centric financial ecosystems in the age of blockchain innovation.

II. TRADITIONAL BANKING VS BLOCKCHAIN

The contemporary financial sector is undergoing a profound transformation, primarily due to Blockchain technology. In contrast to the conventional structures of traditional banking, Blockchain introduces a decentralized framework promising high security, transparency, and efficiency. In this comprehensive analysis, we go into the distinct characteristics of traditional and Blockchain-based banking systems, explaining the transformative potential of Blockchain across various dimensions.

Security and Transparency:

Traditional banks have always faced security challenges because they rely on centralized databases. Blockchain, as a technology built on cryptographic techniques and decentralized ledgers, strengthens its security architecture. The decentralized nature of the Blockchain ensures that transactions are securely recorded in a tamper-proof manner across a distributed network. This not only enhances security but also introduces a level of transparency rarely seen in traditional banking. Blockchain's cryptographic and decentralized features fundamentally redefine the concept of trust within financial transactions. Unlike traditional banking, where security is dependent on centralized entities, Blockchain disperses trust across the entire network. This

approach mitigates the risk of unauthorized access and fraudulent activities, creating a new era of secure and transparent financial transactions.

Furthermore, the utilization of Blockchain in banking can address the challenges highlighted in research [3], which emphasizes the need for standards integration. Blockchain inherently brings a standardized approach to data recording and sharing, contributing to a cohesive and secure international banking ecosystem. Reference: [1] - Blockchain Technology, an Alternative to the Traditional Banking System Decentralization and Elimination of Intermediaries:

A basis of traditional banking lies in its dependence on multiple intermediaries, contributing to delays and increased costs in transactions. Blockchain disrupts this conventional model by facilitating direct peer-to-peer transactions through smart contracts. These contracts, executed automatically based on predefined conditions, eliminate the need for intermediaries, streamlining the entire process. The decentralized nature of Blockchain not only accelerates transaction settlements but also significantly reduces associated fees, making financial transactions more cost-effective. The elimination of intermediaries is not merely a procedural change; it is a fundamental shift that transforms the dynamics of banking. Blockchain's decentralized approach empowers users, promoting inclusivity and efficiency within the financial ecosystem. This revolutionary change challenges the traditional banking structure, paving the way for a more streamlined, user-centric, and cost-effective experience.

Additionally, the research [4] introduces the concept of "RBaaS" or Robust Blockchain as a Service, emphasizing the importance of decentralized blockchain nodes. This model ensures a high level of availability, addressing concerns related to network connections and data center reliability, further highlighting the advantages of decentralization. Reference: [2] - Blockchain Application in Banking System, [4] - RBaaS: A Robust Blockchain as a Service Paradigm in Cloud-Edge Collaborative Environment.

Efficiency in Transactions:

Efficiency in transactions is a key differentiator between traditional and Blockchain-based banking systems. The absence of intermediaries in Blockchain leads to faster transaction processing times, enabling near-instantaneous settlements. Smart contracts, integral to the Blockchain framework, automate and execute predefined conditions, minimizing the need for manual intervention. This not only enhances the speed of individual transactions but also contributes to the overall fluidity and efficiency of the banking ecosystem. Blockchain's efficiency gains have far-reaching implications for the global financial landscape. Blockchain's power to make fast and secure transactions challenges the slow and less responsive nature of traditional banking. The efficiency of Blockchain isn't just a tech perk; it's a game-changer in how fast financial transactions can happen.

Furthermore, the research [7] emphasizes the role of Blockchain in addressing challenges related to Anti Money Laundering (AML) activities. The immutability and transparency of Blockchain can enhance the traceability of transactions, making it a valuable tool in the fight against financial crimes. Reference: [2] - Blockchain Application in Banking System, [7] - Blockchain Technology in The Banking Sector.

Innovation and Flexibility:

Innovation and flexibility are intrinsic features of Blockchain technology, setting it apart from the often rigid structures of traditional banking systems. Traditional banks encounter challenges when adapting to new technologies, hampered by their established frameworks. In contrast, Blockchain's decentralized and adaptable infrastructure provides fertile ground for innovation. Blockchain's flexibility is evident in its ability to

seamlessly integrate new features and services, fostering continuous improvement in financial products. It acts as a catalyst for innovation, responding dynamically to the evolving needs of the financial sector. The adaptability of Blockchain positions it as a driving force for positive change, challenging traditional banking to keep pace with the rapidly changing landscape. Blockchain's impact on innovation goes beyond merely improving existing processes; it extends to reimagining financial products and services. The technology is fostering a culture of continuous improvement and dynamism, propelling the financial sector into uncharted territories.

The research [5] on the application of Blockchain for central banks introduces the concept of Central Bank Issued Digital Currency (CBDC) as a potential use case. The study highlights that CBDC, among other use cases, is a research-intensive area, indicating the potential for innovation in the core functions of central banks. Reference: [7] - Blockchain Technology in The Banking Sector, [5] - Blockchain Application for Central Banks: A Systematic Mapping Study. The regulatory landscape and scalability are critical aspects that differentiate traditional and Blockchain-based banking systems. The lack of regulation, as highlighted in [7], poses a significant challenge for Blockchain adoption in the banking sector. Regulators need to gain a deeper understanding of Blockchain's features and characteristics to create a conducive environment for its implementation. The scalability challenge, discussed in the same research [7], focuses on the limitations of permissionless solutions in competing with existing systems in terms of speed and transaction volume. However, permission solutions offer a balance between scalability and technical architecture. In summary, while Blockchain offers unparalleled innovation and flexibility, addressing regulatory concerns and ensuring scalability is pivotal for its widespread adoption in the banking sector.

III.UI AND SYSTEM WE ARE LOOKING FORWARD TOO

The rapid growth of cryptocurrencies has brought about concerns, particularly regarding the scalability issue inherent in blockchain-based cryptocurrencies. The limitations in transaction processing speed, even for leading cryptocurrencies, hinder their practical applications. [4] Decentralized Identity Integration Module (DIIM), enhances privacy-preserving properties, surpassing user-centric identity management systems used in mainstream platforms like Facebook or Google. Provides a more secure and novel approach to identity integration within the OB ecosystem.Offers a decentralized solution for self-sovereign identities, ensuring user control over personal information.[1]

Cryptocurrencies, exemplified by Bitcoin and Ethereum, offer secure transactions through blockchains but face scalability challenges due to the need for network-wide consensus. Current transaction throughput is significantly lower than traditional systems like Visa, hindering widespread adoption. To address scalability issues, payment channels enable micropayments off-chain. However, utilizing multiple channels incurs overheads such as time costs and charges. The need for a more efficient solution prompts the proposal of a novel off-chain system called a "channel hub."[2]Serves as an interoperable backend for collaboration between national regulatory authorities (RAs) and banks. Facilitates decision-making processes and authenticates participants in the OB ecosystem. Enables effective data co-governance and monitoring of Third-Party Service Providers (TSPs) access behaviour.[1]

The performance and security of blockchains are crucial, with consensus algorithms playing a key role. Proof of work (PoW) is explained as an energy-intensive but secure algorithm used in permissionless blockchains. The environmental impact of PoW is acknowledged, and the potential issue of wealth concentration in proof of

stake is mentioned. Permissioned blockchains, relying on consensus algorithms like proof of authority (PoA), practical Byzantine fault tolerance (PBFT), Istanbul BFT (IBFT), and Raft, are presented as more energy-efficient alternatives.[3]

The differences in fault tolerance and computational complexity among these consensus algorithms are discussed. While PBFT and IBFT offer higher fault tolerance with increased complexity, Raft and PoA provide lower complexity but with some trade-offs. The importance of data integrity assurance in platforms like Raft is noted. Overall, the need for balancing security, efficiency, and environmental impact in blockchain technologies is highlighted.[3] The limitations in transaction processing speed, even for leading cryptocurrencies, hinder their practical applications. To address this challenge, the paper introduces a promising solution called the payment channel network (PCN). PCN enables off-chain settlement of transactions, reducing reliance on resource-intensive blockchain operations. However, potential transaction failures due to external attacks or uncooperative users pose challenges.[4]

The channel hub acts as a shortcut device within the payment network, allowing direct coin transfers between channels. Unlike existing payment hubs connecting participant nodes, the channel hub efficiently leverages channels already established in the payment network.[2]a hybrid blockchain system tailored for Central Bank Digital Currency (CBDC) is proposed, acknowledging the need for controllable decentralization and enhanced supervision in comparison to existing cryptocurrencies. The focus is on designing a network architecture that conserves computing resources, a technical scheme aligned with economic ecology, and efficient consensus algorithms.[5]

The proposed system is validated through three simulation experiments focusing on the scheme, network, and consensus. The results demonstrate the comprehensive improvement in transaction processing and consensus speed, highlighting the potential effectiveness of this hybrid blockchain system for CBDC. In terms of user interface, the emphasis is on presenting a modular, efficient, and supervised blockchain solution tailored to the specific requirements of a national digital currency.[5] In terms of user interface (UI), the model emphasizes a seamless and secure banking experience for users. The use of blockchain technology ensures transparency and security, and the incorporation of a consortium approach enhances the scalability and efficiency of the banking system. The UI should reflect the user-friendly aspects of the model, highlighting the secure registration process, transparent transactions, and the overall robustness of the proposed blockchain-based banking system.[6]

The proposed theoretical model for the banking sector aims to address various issues in the traditional banking system, such as data storage, privacy, scalability, and transparency, by leveraging blockchain technology. The model emphasizes the adoption of consortium blockchain, combining on-chain and off-chain transactions, and utilizing a Peer-to-Peer (P2P) protocol for enhanced data privacy.[6]

The analysis revealed categorizations for target user groups, data collection approaches, and data visualization methods across 14 blockchain-based and 10 non-blockchain-based agri-food traceability applications. However, the paper identified a lack of detailed discussions on user interfaces and design decisions, hindering thorough usability assessments. Furthermore, it highlighted a notable discrepancy in user involvement for evaluation between blockchain and non-blockchain-based research.[7]The potential consequence of overlooking user interface considerations is emphasized, as usability problems may arise, leading to the underutilization of blockchain technology. The paper concludes by discussing research gaps and proposing future directions to enhance user interface design in blockchain-based agri-food supply chain applications, emphasizing the importance of addressing these issues for broader blockchain adoption.[7]

IV. PRIVACY AND SECURITY

Creating a blockchain-based banking system necessitates a comprehensive approach to security and privacy to ensure the integrity of the financial infrastructure. Firstly, the consensus mechanism employed, whether Proof of Work or Proof of Stake, must be resilient against attacks, with a particular emphasis on preventing 51% of attacks. Smart contracts, the backbone of many blockchain applications, require secure coding practices and routine audits to identify and rectify potential vulnerabilities that could be exploited. The protection of sensitive information is paramount. Employing strong encryption algorithms guarantees the confidentiality of user data both in storage and during transmission. Implementing end-to-end encryption across communication channels adds an extra layer of security. Identity management systems must be robust, ensuring that users are reliably authenticated, and the integration of multi-factor authentication enhances the overall security posture.

Privacy considerations extend to the transaction level. Features like confidential transactions and zero-knowledge proofs enable users to engage in financial transactions without revealing specific details, striking a balance between transparency and confidentiality. Network security measures, including firewalls and intrusion detection systems, guard against external threats, particularly Distributed Denial of Service (DDoS) attacks that could disrupt services.

Compliance with regulatory standards is imperative. This includes adherence to financial and data protection regulations specific to the blockchain-based banking system's jurisdictions. Implementing Know Your Customer (KYC) and Anti-Money Laundering (AML) procedures ensures compliance with legal requirements and enhances the security of the financial ecosystem.

Access control mechanisms play a pivotal role in mitigating insider threats. Strict user access controls based on roles and responsibilities, regularly reviewed and updated, limit the risk of unauthorized access. The implementation of auditability mechanisms ensures that all transactions can be traced, contributing to compliance efforts and facilitating the identification of any suspicious activities. Secure wallet solutions are crucial components of the system, providing users with a safe environment to store their digital assets. Hardware wallets, in particular, offer an added layer of security. An incident response plan must be in place to handle security breaches promptly, minimising potential damages and restoring trust in the system. Regular security audits and vulnerability assessments are essential to a proactive security strategy.

User education is integral to the overall security framework. Informing users about potential risks associated with blockchain technology, promoting secure wallet practices, and raising awareness about phishing attacks and social engineering threats contribute to building a community of informed and vigilant users. In summary, addressing these multifaceted security and privacy concerns is essential for establishing a robust, trustworthy, and compliant blockchain-based banking system.

V. CASE STUDIES

Blockchain technology is a core, underlying technology with promising application prospects in the banking industry. With the increasing need for modernization in our day-to-day lives, people are open to accepting new technologies. From using a remote for controlling devices to using voice notes for giving commands, modern technology has made space in our regular lives [3]. The research reveals that blockchain can enhance the efficiency of various segments within the banking industry. Notably, it demonstrates positive impacts on cross-border fund transfers, financial reporting, compliance procedures, trade finance, and capital markets.

Additionally, blockchain streamlines the Know Your Customer (KYC) process. Despite these advantages, regulatory and technological obstacles pose significant challenges that must be addressed for the effective implementation of blockchain in the financial system.[4]

The key purpose of the proposed program is the creation of a new technology to provide more security for banking transactions. The Blockchain, a platform for the exchange of leader schemes, can be used in a wide number of programmes[1]. The 21st century is all about technology with the increasing need for modernization in our day-to-day lives, people are open to accepting new technologies. From using a remote for controlling devices[2]. Confidence is improved when performing banking transactions between parties using Blockchain as it decreases the risk of fraud and creates records of operations automatically. This provides an automatic context tracking of all device users.[1]

Nowadays, we can see that banks have started implementing Blockchain technologies through forming consortiums such as the R3 consortium which is one of the most leading and significant in the world (Guo & Liang, 2016)[1]. A study was conducted to identify the transparency of currency without third-party entering. It is the study of the blockchain technology framework and banking Industry. The major role is played in the banking sector and main challenges are included. Blockchain technology is reshaping the future of Banking[3]. Banks are currently using permission-based BCT solutions for very defined (small) ecosystems because of data security reasons. It is like but not exactly the 'WhatsApp group system wherein an administrator decides on membership of the group. However, for each bank, the considerations will differ for the ecosystem required to deploy the BCT solution. The study covers only leading banks and FinTech companies in the country and smaller players in the banking sector. In India financial institutions are at various stages of BCT adoption. They have already seen the benefits of BCT in some processes where BCT is put into use[2]. There has also been widespread optimism regarding the application of blockchain in the banking industry. In May 2016, McKinsey surveyed global banking executives, finding that approximately half of executives believe that blockchain will have a substantial impact within 3 years, with some even considering that this will happen within 18 months[1] but In recent years, it has been observed that many data breaches are happening in the banking system. Hackers are stealing vast amounts of money from banks because of the security issue of the banking system. Also, the banking system is improving very slowly. Even in the 21st century, it takes a lot of time, sometimes days, to make transactions[2] also The decentralized nature of blockchain poses a unique dilemma for regulators who grapple with the complexities of managing a system that lacks a centralized authority. Despite widespread discussions among regulators on the mechanisms for regulating blockchain, achieving effective regulation remains nearly impossible due to its inherently decentralized structure. This decentralization implies a lack of centralized control over financial institutions utilizing blockchain technology [4]

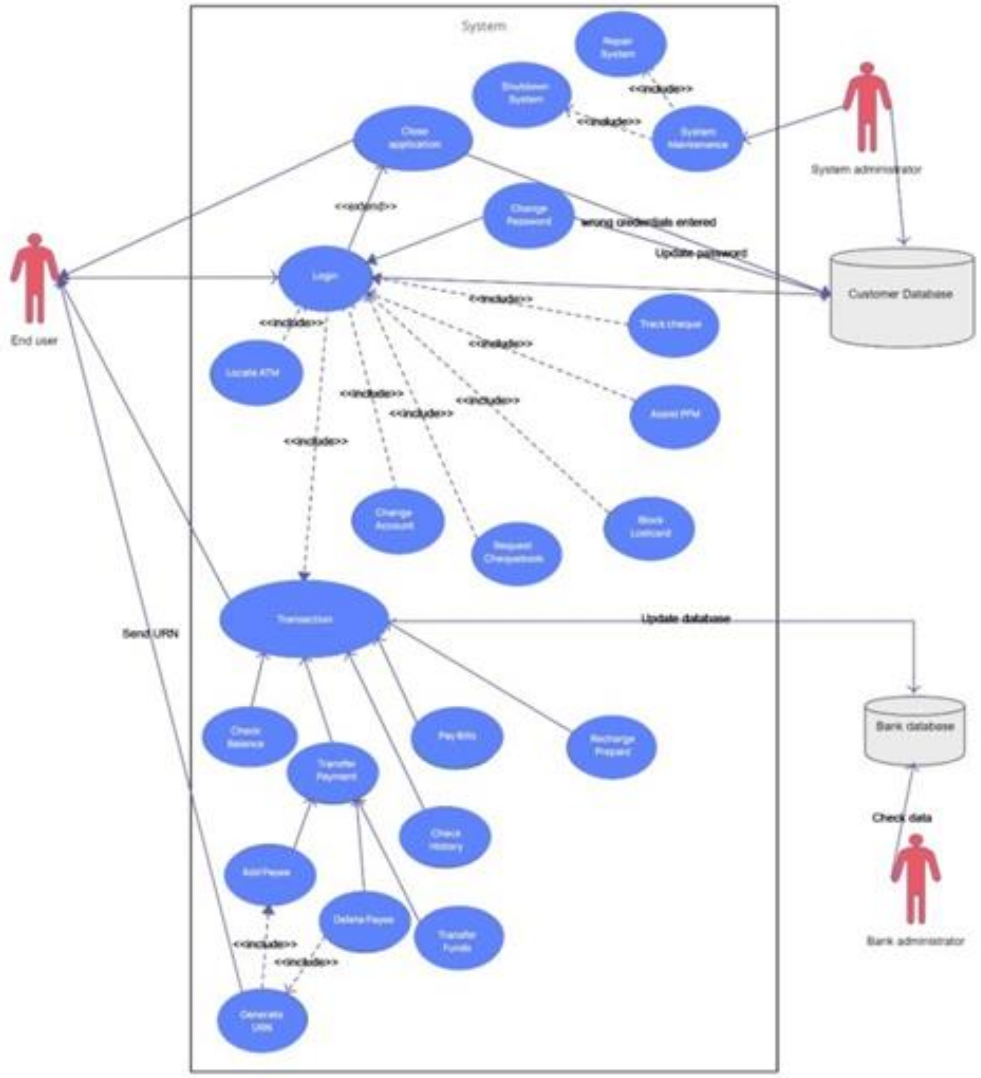

Fig. 1. User Flow map

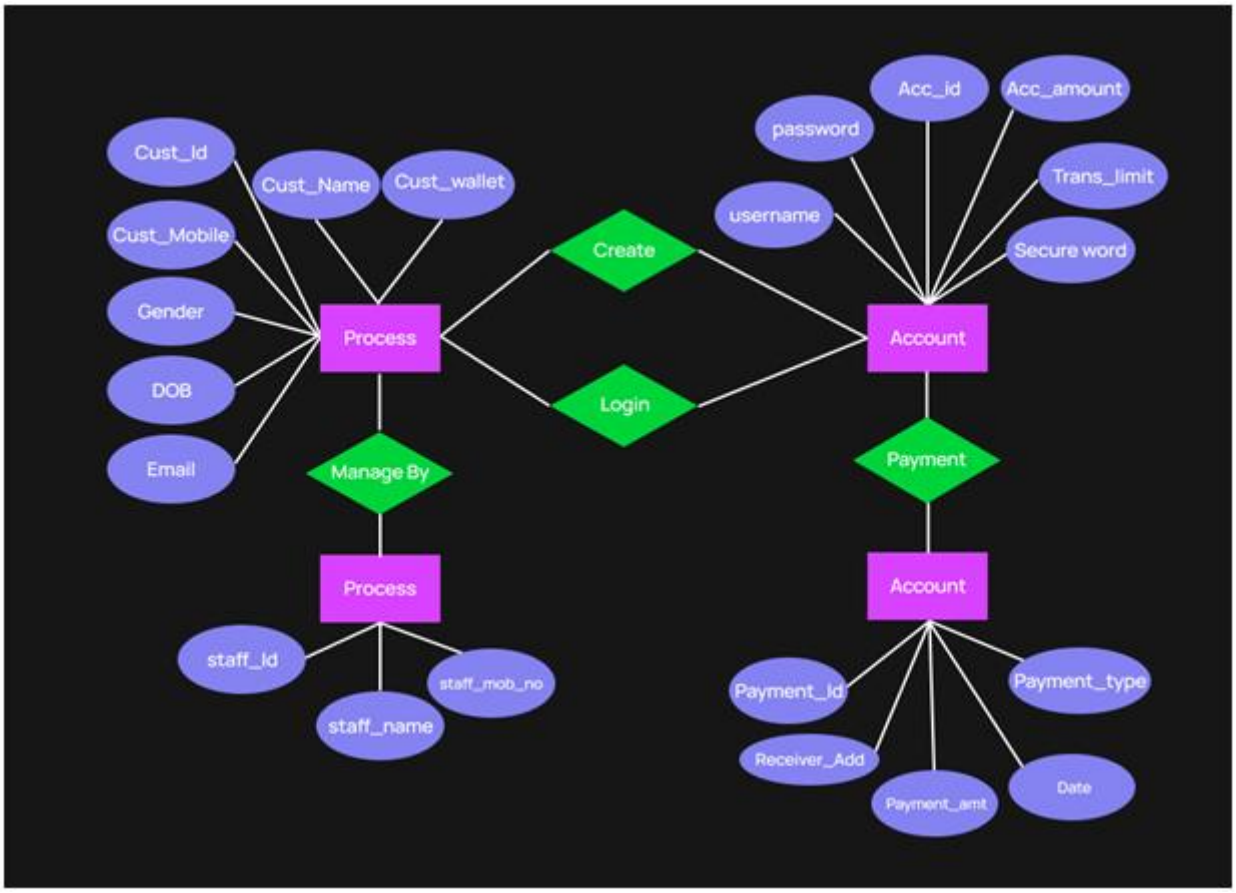

Fig. 1. ER Diagram

VI. CONCLUSIONS

Blockchain-based banking systems offer several advantages, including greater security, faster transactions, lower costs, and increased transparency. Additionally, these systems can provide financial services to unbanked populations who may not have access to traditional banking services.

Overall, the concept of blockchain-based banking systems seeks to revolutionize the traditional banking industry by providing a more efficient, secure, and inclusive financial system.

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Empty Slot Detection and Parking Using Software Application

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ABSTRACT

This project presents the design and implementation of a smart car parking system with empty slot detection using hardware components such as the ESP8266 microcontroller, infrared (IR) sensors, servo motors, and Wi-Fi connectivity. The system aims to efficiently manage parking spaces by accurately detecting the occupancy status of each space and providing real-time updates to users about available parking slots.

The ESP8266 microcontroller serves as the central control unit, responsible for coordinating communication between the hardware components and handling the logic for parking space management. IR sensors are strategically placed at each parking space to detect the presence of vehicles, sending signals to the ESP8266 when a car is detected or when the space becomes vacant. Servo motors are employed to control the gate or barrier of each parking space, allowing for automated opening and closing based on occupancy status.

The system is equipped with Wi-Fi capabilities, enabling seamless communication with external devices or a central server. Through Wi-Fi connectivity, real-time updates on parking space availability are transmitted to a user interface, which can be accessed via web-based, mobile, or desktop applications. Users can conveniently view the status of parking spaces, distinguishing between occupied and vacant slots, thus optimizing their parking experience.

The implementation involves programming the ESP8266 microcontroller to handle tasks such as sensor data acquisition, servo motor control, Wi-Fi communication, and user interface interaction. Integration of hardware components is followed by rigorous testing to ensure accurate detection of car presence, reliable operation of servo motors, and robust Wi-Fi connectivity.

This smart car parking system offers a cost-effective and efficient solution for managing parking spaces, enhancing convenience for users while optimizing parking utilization. It holds potential for deployment in various parking facilities, including residential complexes, commercial establishments, and public parking areas, contributing to improved traffic management and urban mobility.

Keywords: Automatic car parking, Empty slot detection, software applications, Urban transportation.

I. INTRODUCTION

In today's urban environments, efficient management of parking spaces has become increasingly important to address the challenges of traffic congestion and limited parking availability. Traditional parking systems often lack real-time information on parking space occupancy, leading to frustration and inefficiency for both drivers and parking facility operators. To tackle this issue, the development of smart car parking systems with advanced technologies such as sensors, microcontrollers, and wireless connectivity has emerged as a promising solution.

This project introduces a smart car parking system with empty slot detection, leveraging the capabilities of hardware components such as the ESP8266 microcontroller, infrared (IR) sensors, servo motors, and Wi-Fi connectivity. The system aims to revolutionize parking management by providing real-time updates on parking space availability to users, enabling them to make informed decisions and optimize their parking experience.

By employing IR sensors placed at each parking space, the system can accurately detect the presence of vehicles and relay this information to the central control unit, powered by the ESP8266 microcontroller. Servo motors are utilized to automate the opening and closing of parking space barriers based on occupancy status, enhancing operational efficiency and convenience.

The integration of Wi-Fi connectivity enables seamless communication between the parking system and external devices or a central server. Through a user interface accessible via web-based, mobile, or desktop applications, users can conveniently monitor the status of parking spaces in real-time, distinguishing between occupied and vacant slots.

This project not only demonstrates the feasibility of implementing a smart car parking system but also highlights its potential to alleviate parking-related challenges in various settings, including residential complexes, commercial areas, and public parking facilities. By embracing innovative technologies and automation, the system offers a glimpse into the future of parking management, paving the way for enhanced urban mobility and sustainability.

II. LITERATURE SURVEY

The concept of smart parking systems and technologies has garnered significant attention in recent years due to the pressing need for efficient utilization of parking spaces in urban areas. A literature survey reveals several key findings and trends in this field:

1. **Technological Solutions**: Various technological solutions have been proposed and implemented for smart parking systems, including sensor-based detection, image processing, and wireless communication. These solutions aim to provide real-time information on parking space availability, improve user experience, and optimize parking resource management.
2. **Sensor Technologies**: Infrared (IR) sensors, ultrasonic sensors, magnetic sensors, and camera-based systems are among the most commonly used sensor technologies for detecting vehicle presence in parking spaces. Each sensor type has its advantages and limitations in terms of accuracy, cost-effectiveness, and ease of implementation.
3. **Microcontroller Platforms**: Microcontroller platforms like Arduino and ESP8266 have gained popularity for their versatility and affordability in building smart parking systems. These platforms enable integration with sensors, actuators, and communication modules, facilitating the development of robust and scalable parking solutions.
4. **Communication Protocols**: Wireless communication protocols such as Wi-Fi, Bluetooth, and LoRaWAN are utilized to establish connectivity between parking sensors, control units, and user interfaces. These protocols enable seamless data transmission, remote monitoring, and control of parking facilities.
5. **User Interfaces**: User interfaces play a crucial role in providing parking space information to drivers and administrators. Web-based dashboards, mobile applications, and electronic signage are commonly used interfaces that offer real-time updates on parking availability, navigation assistance, and payment options.

Data Analytics and Management: Data analytics techniques are employed to analyze parking occupancy patterns, predict demand, and optimize parking operations. Machine learning algorithms, statistical models, and data visualization tools are used to derive actionable insights from parking data collected by smart parking systems.

6. Case Studies and Implementations: Numerous case studies and real-world implementations of smart parking systems have been reported in the literature. These studies showcase the effectiveness of smart parking technologies in reducing congestion, improving traffic flow, and enhancing the overall urban mobility experience.

III.BLOCK DIAGRAM

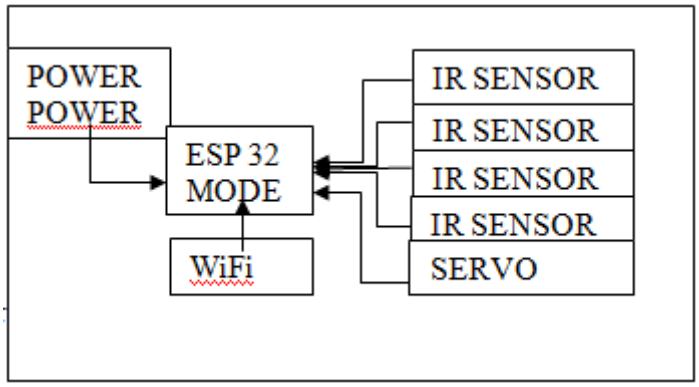


Figure1. Block Diagramof iv infusion Dosing system

IV.LIMITATIONS AND EXISTING WORK

Despite the advancements in smart parking systems, several limitations and challenges persist in their implementation and operation. Additionally, there exists a body of existing work that addresses these limitations and explores various approaches to overcome them. Here, we discuss both the limitations and existing work in the field of smart parking systems:

1. Sensor Accuracy and Reliability: One of the primary limitations of sensor-based smart parking systems is the accuracy and reliability of sensor data. Factors such as environmental conditions, sensor calibration, and occlusions can affect the performance of parking sensors, leading to false detections or missed detections.
2. Existing Work: Researchers have proposed techniques to improve sensor accuracy and reliability, including sensor fusion, machine learning algorithms for anomaly detection, and sensor redundancy. Additionally, advancements in sensor technology, such as the development of more robust and weather-resistant sensors, contribute to addressing these challenges.
3. Cost and Scalability: The cost of deploying and maintaining smart parking systems can be a significant barrier, particularly for large-scale implementations. Additionally, ensuring scalability to accommodate growing parking demand while maintaining cost-effectiveness presents a challenge.
4. **Existing Work:** Studies have explored cost-effective solutions for smart parking systems, such as leveraging low-cost sensors, open-source hardware platforms, and cloud-based infrastructure.

Furthermore, research efforts focus on designing scalable architectures and deployment strategies to accommodate varying parking needs and operational requirements.

5. **Integration and Interoperability**: Integrating smart parking systems with existing infrastructure, such as parking management systems, navigation applications, and payment gateways, can be challenging due to compatibility issues and lack of standardization.
6. **Existing Work**: Efforts have been made to develop interoperable solutions and standardized communication protocols for smart parking systems. Initiatives like the Open Geospatial Consortium (OGC) Smart Parking Data Model aim to establish common data formats and interfaces for seamless integration with other smart city systems.
7. **Privacy and Security Concerns**: Collecting and processing sensitive data, such as vehicle location and occupancy information, raise privacy and security concerns regarding data ownership, access control, and potential misuse.
8. **Existing Work:** Researchers address privacy and security concerns by implementing data anonymization techniques, encryption methods, and access control mechanisms to safeguard sensitive information. Compliance with data protection regulations, such as the General Data Protection Regulation (GDPR), is also emphasized in smart parking system deployments.
9. **User Experience and Adoption**: The success of smart parking systems relies on user acceptance and adoption. Providing intuitive user interfaces, seamless integration with existing services, and ensuring reliability are essential for enhancing user experience and encouraging widespread adoption.
10. **Existing Work:** Studies focus on improving user interfaces, incorporating user feedback mechanisms, and conducting user acceptance studies to understand user needs and preferences. Collaborative efforts between stakeholders, including city authorities, parking operators, and technology providers, play a vital role in promoting the adoption of smart parking solutions.

V. RESULT AND DESCRIPTION

The implementation of the smart car parking system with empty slot detection using ESP8266, IR sensors, servo motors, and Wi-Fi connectivity resulted in a robust and efficient parking management solution. The system successfully addressed the challenges of parking space availability monitoring, user interface interaction, and wireless communication, providing real-time updates to users and optimizing parking utilization.

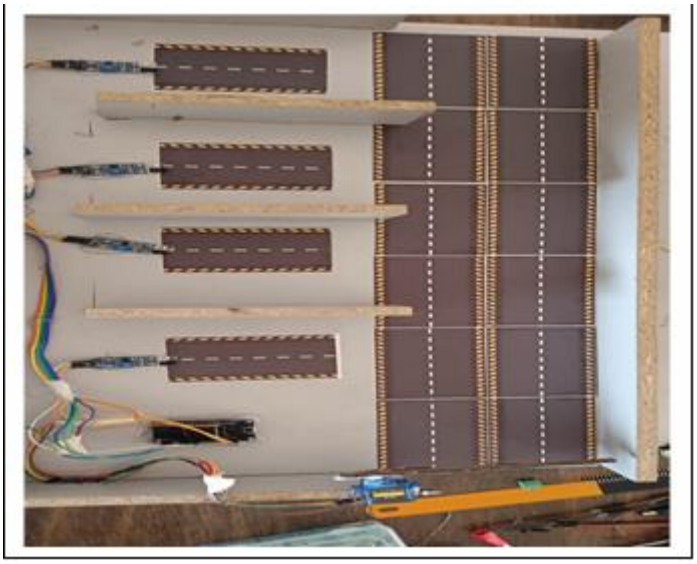
Description:

The smart car parking system consists of hardware components including ESP8266 microcontroller modules, IR sensors placed at each parking space, servo motors for controlling parking space barriers, and Wi-Fi modules for wireless communication. The ESP8266 microcontroller serves as the central control unit, receiving data from IR sensors to detect vehicle presence and controlling servo motors to open or close parking barriers accordingly. The system architecture allows for seamless communication between the hardware components and user interfaces via Wi-Fi connectivity. A user interface, accessible through web-based, mobile, or desktop applications, displays real-time updates on parking space availability, distinguishing between occupied and vacant slots. Users can conveniently monitor parking status, plan their parking, and navigate to available spaces using the intuitive interface.

The implementation incorporates advanced features such as sensor data fusion for improved accuracy, servo motor position feedback for precise control, and encryption protocols for secure communication. Additionally,

the system architecture is designed for scalability, allowing for expansion to accommodate growing parking demand and integration with existing parking management systems.

Overall, the smart car parking system provides an efficient and user-friendly solution for parking space management, enhancing urban mobility and optimizing parking resource utilization. The successful implementation of this system demonstrates the potential of integrating innovative technologies to address real-world challenges in urban environments.



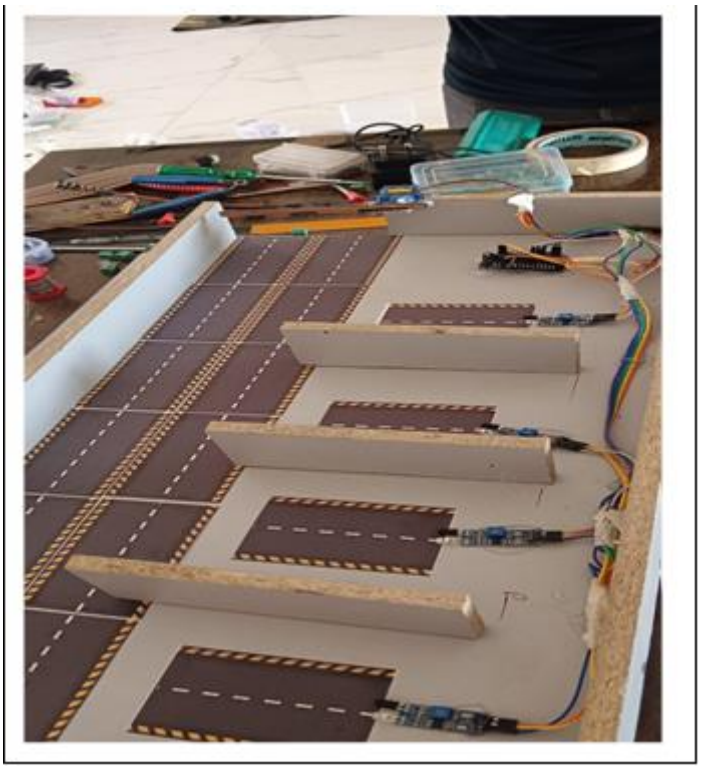


Figure 5.1.The above imagesdescribes the actual setup of project.

Figure.5.2.The above image describes the actual software

Figure.5.3.Login page of Software application.

Figure.5.4.The above image shows Available and Parked slots.

Figure.5.5.The above image shows Smart Parking System.

Figure.5.6.The above image shows the Parking History.

VI. CONCLUSION

In conclusion, the development and implementation of the smart car parking system with empty slot detection using ESP8266, IR sensors, servo motors, and Wi-Fi connectivity have demonstrated significant advancements in parking management technology. The system offers real-time updates on parking space availability, enhances user experience, and contributes to the efficient utilization of parking resources in urban environments.

Through the integration of hardware components and software applications, the system addresses key challenges in parking space monitoring, user interface interaction, and wireless communication. The ESP8266 microcontroller serves as the central control unit, orchestrating the operation of IR sensors for vehicle detection and servo motors for barrier control.

The user interface provides intuitive access to parking information, allowing users to monitor parking status, plan their parking, and navigate to available spaces conveniently. By leveraging Wi-Fi connectivity, the system enables seamless communication between hardware components and user interfaces, facilitating real-time updates and interaction.

The implementation incorporates advanced features such as sensor data fusion, servo motor position feedback, and encryption protocols to enhance accuracy, precision, and security. Moreover, the system architecture is designed for scalability, enabling expansion and integration with existing parking management systems.

In summary, the smart car parking system represents a significant step towards improving parking efficiency, traffic management, and user convenience in urban environments. By harnessing the capabilities of modern

technologies, this system lays the foundation for smarter and more sustainable parking solutions, contributing to enhanced urban mobility and quality of life.

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Design and Fabrication of Multipurpose Weeder Machine

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ABSTRACT
Weed removal is one of the major activities in agriculture. Chemical method of weed control is more prominent than manual and mechanical methods. However, its adverse effects on the environment are making farmers to consider and accept mechanical methods of weed control. Chemical weeding is the most extensively used method of weed removal but these chemicals used for weeding are harmful to living organisms and toxic in nature. Research has been carried out to use some combination various methods of weeding. The need of replace the use of herbicides with more sustainable weed control techniques encouraged the definition of innovative physical weed control strategies. Mechanical and thermal means were used to control weeds and removal by mechanical method is one the methods frequently used these to remove weeds from the agricultural fields. Research has been conducted on economical method s for weed removal without damaging the crops. This project aims in the design and fabrication of a machine, which is used to remove the weeds, land cultivation and pesticides, and fertilizers sprayers too which makes it multipurpose Machine.

Keywords-Design-fabrication-multipurpose machine- Plant Damage – Weeding efficiency

I. INTRODUCTION

Weed is essentially any plant which grows where it is unwanted or in the wrong place at the wrong time and doing more harm than good. It is a plant that competes with crops for water, nutrients and light. This can reduce crop production and decrease the value of land, increase cost of cleaning. Weed control is one of the most difficult tasks in agriculture that accounts for a considerable share of the cost involved in agricultural production. Weeding is the removal of unwanted plants in the field crops. Mechanical weed control is very effective as it helps to reduce drudgery involved in manual weeding, it kills the weed and also keeps the soil surface loose ensuring soil aeration and water intake capacity. Farmers generally expressed their concern for effective weed control measures to arrest the growth and propagation of weeds. Chemical method of weed control is more prominent than manual and mechanical methods. However, its adverse effects on the environment are making farmers to consider and accept mechanical methods of weed control. A Manual weeding is common in Nigerian agriculture. Today the agricultural sector requires nonchemical weed control that ensures food safety. Consumers demand high quality food products and pay special attention to food safety. These mechanisms contribute significantly to safe food production. Consumers require high quality food products and special attention towards food safety Weed management is as old as agriculture itself, but the methods and concept of controlling weeds have changed over the years. The process of removing unwanted

plants in the field crops is called weeding. The process of removing unwanted plants in the field crops is called weeding. This project aims in the design and fabrication of a machine which is used to remove the weeds, land cultivation and pesticides and fertilizers sprayers too which makes it multipurpose Machine.

II. LITERATURE REVIEW

Weed removal is one of the major activities in agriculture. Chemical method of weed control is more prominent than manual and mechanical methods. However, its adverse effects on the environment are making farmers to consider and accept mechanical methods of weed control. Chemical weeding is the most extensively used method of weed removal. But these chemicals used for weeding are harmful to living organisms and toxic in nature. Research has been carried out to use some combination various methods of weeding.

In order to perform this project, literature review has been made for various sources like journals, books, articles and others. This chapter includes all-important studies, which have been done previously by other research work. It is important to do the literature review before doing the project because we can implement if there are information that related to this project. The most important thing before starting the project we must clearly understand about the topic that we want to do. So, by doing the literature review we can gain knowledge to make sure we fully understand and can complete the project. A review of the article was performed to identify studies that are relevant to the topic.

Decreasing income per acre of cultivation, and economic frustration are some of the key factors hurting a farmer's confidence in continuing farming. It has always been a problem to successfully and completely remove weeds and other innocuous plants. This work involved the design and construction of mechanical weeder, after discovering that tools such as cutlass and hoes require high time consuming and high labour force. As a solution to these problems, mechanical battery operated type weeder was designed and constructed. The use of mechanical weeder will reduce drudgery and ensure a comfortable posture of the farmer or operator during weeding. This will resultantly increase production. It is against this background that a rotary power weeder was developed. Results of field performance evaluation showed that the field capacity and weeding efficiency of the rotary power weeder were 0.0712 ha/hr and 73%.

An engineer is always focused towards challenges of bringing ideas and concepts to life. Therefore sophisticated machines and modern techniques have to be constantly developed and implemented for new products. Automatic weeding machine is a project used to remove unwanted plants/weeds, which grows around the crops. Technology will continue to develop and improve in the coming years. These technologies do not entirely replace the need for hand labor, but they can make subsequent hand weeding operations less costly and more efficient. Weed is a plant that is considered undesirable in a particular situation; it is basically “a plant in the wrong place”. Weeds are needed to be controlled because it reduces crop quality by contaminating the commodity. Weeds reduce farm productivity, they invade crops, smother pastures and in some cases can be harmfull for the livestock. They aggressively compete for water, nutrients and sunlight, resulting in reduced crop yield and poor crop quality. Weed control is one of the most difficult tasks on an agricultural farm. Mechanical weed control is easily adopted by farmers once they get convinced of its advantages.

III.METHODOLOGY

Indian farmers use traditional method, there is large scope for development in agricultural sector. In traditional method weeding process are done by the bull which become costly for farmers having small farming land its time consuming and requires separate setup. Therefore, to overcome above problems, we have design and develop the flexible equipment which will be beneficial to the medium and small scale farmer for the weeding operations.

The weeding tool is attached at backside of frame. For proving force on the tool handle is welded on the tool. All the engine control is maintain from this handle. When the engine is started, the driven axle is rotated with the help of chain drive due to which wheels are also rotate. The torque ratio is obtained by gearing arrangement which is supplied manually. High torque ratio is obtained at low gear. As the wheel rotate machine start moving removing the unwanted grass from the farm. Engine speed is maintained by adjusting gear and acceleration. In this way weeding operation is performing.

Weeding is an important but equally labor incentive agricultural unit operation. Weeding accounts for about 25% of the total labor requirement (900-1200 man h/ha) during a cultivation season. The labor requirements for weeding depend upon on weed flora, weed intensity, time of weeding and efficiency of worker. Delay and negligence in weeding operation affect the crop yield up to 30 to 60 percent. In India about 4.2 billion rupees are spent every year for controlling weeds in the production of major crops.

In IC engine operated weeder machine, we used 2 stroke IC engine of 145cc and torque of 9.81 N/M at 5000 rpm. It has 2 wheel situated on driving shaft, driving shaft is drive by engine means of gear and chain arrangement. On both ends of the driving shaft the wheels are attach with the help of bearing. And the bearing are fixed to the frame. The weeding tool is attached at backside of frame. For proving force on the tool handle is welded on the tool. All the engine control are maintain from this handle. When the engine is started, the driven axle is rotated with the help of chain drive due to which wheels are also rotate. The torque ratio is obtained by gearing arrangement which is supplied manually. High torque ratio is obtained at low gear. As the wheel rotate machine start moving removing the unwanted grass from the farm. Engine speed is maintain by adjusting gear and acceleration. In this way weeding operation is perform.

A) WEEDER

A hand weeder is a weeding tool used by gardeners to remove or cut weeds. Weeds are dangerous to gardens, absorbing the nutrients in the soil and leaving little to nothing for the other plants. A hand weeder will help effectively and efficiently remove these weeds. Mechanical methods of weed control are simple and easily understood by farmers. The tools and implements for mechanical weed control are mostly manual and animal operated. Manual method is most effective but is slow. It is popular in regions where labour wages are low and labour is easily available during the season. The additional cost of weeding using implements is comparatively less than the gains due to extra yields obtained. First weeding operation is mostly done between and along the rows. Remaining operations are done mostly between the rows. Hand hoes are generally used for removing weeds between plants in a row.

Figure 1: Weeder Tool

B) CULTIVATOR

Cultivators should be used for mixing soil that's already been broken up, such as when compost or fertilizer is added after tilling and before planting. Cultivators can also be used after planting to control weeds. A cultivator is a piece of agricultural equipments used for secondary tillage. One sense of the name refers to frames with teeth (also called shanks) that pierce the soil as they are dragged through it linearly. It also refers to machines that use the rotary motion of disks or teeth to accomplish a similar result. Cultivators of the toothed type are often similar in form to, but the chisel plows goals are different. Cultivator's teeth work near the surface, usually for weed control, where as chisel plow shanks work deep beneath the surface, breaking up the hardened layer on top. Cultivators are usually either self-propelled or drawn as an attachment behind either a two-wheel machine or four-wheel machine. For two-wheel tractors, they are usually rigidly fixed and powered via couplings to the machine.

Figure 2: Cultivator

C) MS WHEEL

This Mild Steel Wheel, which we make from mild steel strips, is used to do the movement to the machine, which are powered by the engine, which we used. The offered Agriculture Cage Wheel is a device designed to increase the traction performance of a tractor in paddy and wet fields. Arm links of the cage wheel are made to open wide. Due to its accurate design and configuration, pulverization of the soil can be achieved. It is made out of the first-rate alloyed metal that is capable of standing heavy loads, pressure, and rust, therefore, this Agriculture Cage Wheel is sure to last for an extended period. The cage wheel helps provide good traction in wet and paddy soil and mixes soil optimally. It is used to adequately mix the black dirt as the area is being prepared for crop planting. Heavy-duty steel angle bars are used to construct the machine cage wheels. Due to

their adaptable design, they are suited for mounting on all varieties of machine. The cage wheels are also employed for fragmenting large stones. Sturdy and strong. Simple to install on tractor rear axles. The ideal cage wheel design makes it possible to use the greatest draught possible in wetland conditions. Utilization is more cost-effective thanks to better specific fuel consumption.

Figure 3: MS Cage Wheel

D) PUMP

1. 12X8 Battery Operated
2. High Pressure Diaphragm Pump.
3. Spray 20-25 Times When Fully Charged.
4. In Line Filter to Prevent Nozzle Clogging.
5. Wide Carry Straps for Easier & More Comfortable Carrying.

The Battery Sprayers make use of technology to provide relief to farmers. The sprayer is provided with a rechargeable battery instead of the conventional handle-lever system. The sprayer requires minimum effort and generates high pressure. The electric sprayer works with individual or triple nozzles www.entrepreneurindia.com With the constantly increasing crop production, the need for pest protection and crop nutrition have become necessary aspects of farm management. Therefore, agriculture spray is a suitable and cost-effective way to manage both of these critical aspects. Agriculture sprayer is one of the important agriculture equipment. The Agricultural Sprayers Market is significantly growing across the globe. Mostly pressure sprayer is used to apply liquid pesticides. Pressure sprayer comes with two types includes low pressure sprayer and high-pressure sprayer. Low pressure sprayer is used to spray pesticides on the crop whereas high pressure sprayer is used to spray pesticides into the soil as well.

Figure 4: Spray Pump

E) FERTILIZER SPREADER

This project is very useful for agricultural service to spread out the fertilizer automatically over the land. It mainly consists of reservoir tank, bevel gears. Circular spreader disc, supporting mechanism, vanes, bearings, bearing housing. Resisting plate, mixing blades, It is a tractor driven automatic fertilizer spreader in which the power is transmitted from Machine.

The rotating shaft of machine is connected to engine through which power is transmitted to machine shaft. Spreader disc connected to machine shaft below the hopper and above the bevel gear. The vanes are attached over the plate in four directions to spread out the fertilizer when centrifugal force is created outside the dies. When the tractor shaft rotate the machine shaft rotate in which mixing blade spreader disc also rotate due to fertilizer flow in downward direction and disc spread the fertilizer through the vanes.

Figure 5*:* Fertilizer Spreader

IV. ANALYTICAL WORK

A) Handle

Handle is used for balancing weeder in field operation. Round pipe is used for the handles with required dimensions & Accelerator is fitted on handle & connected to carburetor by using wire. The overall length of handle 1066 mm with two bends from point of attachment and have a height of 750 mm from ground level. The handle is attached on main frame at the rear of the machine with help of four pieces of nut and bolts of having diameter 10 mm. With help of handle, the machine can be steered.

B) Wheel

This Mild Steel Wheel, which we make from mild steel strips, are used to do the movement to the machine which are powered by the engine which we used.

The offered Agriculture Cage Wheel is a device designed to increase the traction performance of a tractor in paddy and wet fields. Arm links of the cage wheel are made to open wide. Due to its accurate design and configuration, pulverization of the soil can be achieved. It is made out of the first-rate alloyed metal that is capable of standing heavy loads, pressure, and rust, therefore, this Agriculture Cage Wheel is sure to last for an extended period. The cage wheel helps provide good traction in wet and paddy soil and mixes soil optimally.

C) Wheel shaft

It is shaft on which wheels are mounted. Wheel shaft was selected as 90cm long 4.5 mm wide wheel shaft is fitted the frame and engine load is mounted on the shaft.

The length of the chain is given by

$$Lp = 2\frac{36+(14+44)+(44-14)^2/36}{2}$$

LP = 72+36+1.2

Lp= = 109.2 pitches

Lp= 110 Pitches (appro.)Design of Chain length

Speed of wheel shaft calculated by following equation, (Sharma, 2013).

$N_1T_1=N_2T_2$

N_1= Speed of engine. (400 rpm)

T_1= No of teeth on engine sprocket. (14 Teeth)

N_2= Speed of wheel shaft. T_2= No of teeth on wheel shaft. (44 teeth)

Speed of wheel shaft= 2.15 m/s

D) Technical specification of the Engine

Sr. No.	E)	Particulars	**Specification**
1	F)	Type	Air cooled,2 stroke, Horizontal Spark ignition engine
2	G)	Fuel	Petrol engine
3	H) I)	Fuel tank Capacity	3.5
4	J)	Starting	Recoil start
5	K)	Engine weight	17 kg
6	L)	Recommended speed	400 rpm

TABLE I TECHNICAL SPECIFICATION

PARAMETER	SPECIFICATION	COST
Engine	52CC, 2Stroke engine,1.5 liter fuel tank.	6000Rs.
Frame Material	1.5 inches MS Strips	700 Rs.
Spray Pump	12 liter storing capacity	1500 Rs.
MS Steel Sheet	2mm Thickness	300 Rs.
Hopper	hopper	200 Rs.
Total		**8700Rs.**

TABLE II SPECIFICATION OF PROJECT COST

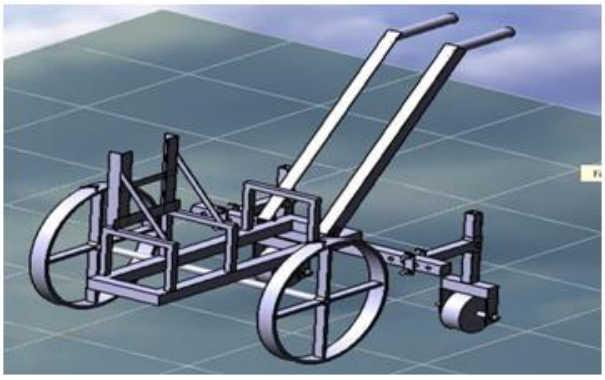

Fig 4.1 3D CATIA Model

V. RESULT AND DISCUSSION

Agriculture is the backbone of India, and weed removal being one of the primary processes in the field, there is a necessity for weed to be removed in all the fields to increase the quality of crops and to decrease the effect of weeds on crops. A weed may be defined as any plant or vegetation that interferes with the objectives of farming or forestry, such as growing crops, grazing animals or cultivating forest plantations. A weed may also be defined as any plant growing where it is not wanted. For example, a plant may be valuable or useful in a garden or on a farm or plantation but if the same plant is growing where reduces the value of agricultural produce or spoils aesthetic or environmental values, then it is considered a weed.

Fig. 4.1 Welding Process

Fig. 4.2 Cutting Process

Fig. 4.3 a) Assembly

Fig. 4.3 b) Assembly

VI. CONCLUSION

In this paper we will try to reduce the human effort with the help of two stroke IC engine. The engines presented here serve the purpose of an economical lighter and flexible mechanism, which could develop to perform multiple activities. The design presented is subject to entire needs of the small farmer. Hybrid vehicle reduce emission, increases efficiency and improve fuel economy also reduce pollution. This machine performs weeding for the more Acers of the land than the conventional one. Our machine is more efficient, economical, more effective and less time consuming than that conventional weeder machine.

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Review and Analysis of the Literature : Detection of Hemorrhages of Diabetic Retinopathy using Machine Learning Techniques

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ABSTRACT

Diabetic retinopathy, the most prevalent cause of visual loss globally, is caused by long-term diabetes with fluctuating blood glucose levels. In order to prevent vision loss in the future, it has grown to be a serious issue among people in their working years. Synthetic.At the first stage of diabetic retinopathy, intelligence-based technologies have been used to detect and grade the condition. Early detection enables appropriate therapy to be administered, hence preventing issues related to eyesight. The detailed study now includes information on the different ways that hemorrhages, macula, optic discs, microaneurysms, exudates, and blood vessels can be used to diagnose diabetic retinopathy. The majority of trials employ fundus pictures, which are captured using a fundus camera and show the retina. This examination covers the fundamentals of diabetes, its incidence issues, as well as artificial intelligence methods for managing diabetic retinopathy's early diagnosis and categorization. Artificial intelligence-based methods like deep learning and machine learning are also covered in the study. Additionally taken into consideration are new study areas including explainable artificial intelligence in diabetic retinopathy, domain adaptation, multitask learning, and transfer learning utilizing generative adversarial networks. The future scope conclusion is explored after a list of current datasets, screening programs, performance evaluations, biomarkers in diabetic retinopathy, possible problems, and difficulties encountered in ophthalmology are presented.

According to the author, no other literature has examined current cutting-edge methods with artificial intelligence and the PRISMA methodology as the central,

Keywords: fundus, explainable AI, domain adaptation, diabetic retinopathy, artificial intelligence, and optical coherence tomography (OCT)

I. INTRODUCTION

Ophthalmology is a branch of medicine that specializes in the diagnosis and treatment of various eye conditions as well as the scientific study of illnesses. It used to take a long time for ophthalmologists to manually identify eye conditions [1]. Diabetes is a chronic condition that impairs our body's normal ability to digest meals. The majority of the food we eat breaks down into glucose before entering our bloodstream. Insulin is secreted by

our pancreas in response to elevated blood sugar levels. The substance known as insulin allows blood glucose to enter our bodies' cells and then be utilised as food. When a person gets diabetes, their body either produces too little insulin or uses it inefficiently. When cells stop manufacturing insulin or when there is inadequate insulin, blood glucose levels increase.

Diabetic retinopathy (eye damage), neuropathy (nerve damage), nephropathy (kidney disease), cardiomyopathy (heart problems), gastroparesis, skin issues, etc. are among the complications of diabetes [1–4]. The main cause of blindness in older populations is problems with the eyes.

In addition, a World Health Organization (WHO) report projects an increase in eye problem patients as the global population ages [5]. Thus, there is a great deal of interest in using artificial intelligence (AI) to enhance opticaltment while also reducing healthcare expenses, particularly when telemedicine is included . In contrast to the quantity of available medical services, the ratio of persons

The prevalence of eye illness is high [9]. The three most prevalent causes of vision impairment are age-related macular degeneration, diabetic retinopathy, and eye disease called glaucoma. Macular edema is a form of edema that affects the retina, while cataracts are a kind of aberration. A poor visual prognosis may result from retinal abnormalities such as amblyopia, strabismus, retinal detachment, and neovascularization of the choroids (CNV).

1.1 AI Applications for Retina Pictures

In retina image applications, there are three main use case scenarios: segmentation, classification, and prediction, as illustrated in therapy while lowering healthcare expenses at the same time, particularly when telemedicine is included. In contrast to the quantity of available medical services, the ratio of persons

The prevalence of eye illness is high. The three most prevalent causes of vision impairment are age-related macular degeneration, diabetic retinopathy, and eye disease called glaucoma. Macular edema is a form of edema that affects the retina, while cataracts are a kind of aberration. A poor visual prognosis may result from retinal abnormalities such as amblyopia, strabismus, retinal detachment, and neovascularization of the choroids (CNV).

II. LITERATURE REVIEW

In their WebMD post titled "Diabetes Complications," Khatri, M. offers a thorough summary of diabetes complications[1]. Diabetes is a complicated chronic illness that can have a number of side effects that impact different organ systems. It is essential to comprehend these consequences in order to effectively treat diabetes and avoid long-term health problems.

The necessity of controlling diabetes to avoid complications is emphasized in the opening paragraph of the text. It describes the main kinds of complications caused by diabetes, including microvascular problems like diabetic retinopathy, nephropathy, and neuropathy, and macrovascular problems like peripheral vascular disease, stroke, and cardiovascular disease. The article provides an organized method for comprehending the many effects of diabetes on the body by classifying issues into macrovascular and microvascular categories.Khatri talks on the fundamental processes that give rise to each kind.

[2]WHO Report on the Challenges of Aging and Population Growth for Vision Care

In his article, Ravelo (2019) addresses the problems that aging populations provide for vision treatment, as described in a World Health Organization (WHO) report. The need for eye care services is rising because to global demographic transitions that are defined by an aging population. This poses serious problems to healthcare systems across the globe.Ravelo emphasizes the connection between population increase and aging

and eyesight health by highlighting significant findings from the WHO report. The essay emphasizes how crucial it is to treat blindness and vision impairment in older persons in order to enhance their general well-being and quality of life.The effect of aging on eyesight health is one of the main topics covered in the article. People get older and become more more vulnerable to a number of illnesses and disorders of the eyes, including diabetic retinopathy, cataracts, glaucoma, and age-related macular degeneration (AMD). These disorders can cause functional limits and diminished independence in older persons in addition to affecting visual acuity.

[3]The World Report on Vision from the World Health Organization (WHO) is an extensive resource that covers possibilities and challenges in global vision health. The purpose of this literature review is to give a summary and critical analysis of the main ideas, conclusions, and implications of the study for public health practice and policy.

Introducing vision health as a basic element of human development, the WHO report highlights its vital role in accomplishing the Sustainable Development Goals (SDGs) and advancing health equity. The report emphasizes the significance of providing all people, regardless of socioeconomic status or geographic location, with universal access to high-quality eye care services by designating vision as a fundamental human right.The load is one of the main topics covered in the report. global incidence of blindness and visual impairment. Millions of people worldwide suffer from illnesses like age-related macular degeneration (AMD), cataracts, glaucoma, diabetic retinopathy, and refractive errors, which collectively account for a large portion of the global prevalence of visual loss. The research also highlights how vulnerable groups, such as women, children, older persons, and citizens of low- and middle-income nations, are disproportionately affected by vision impairment.

[4] Typical Eye Issues: Indications, Signs, and Therapies" authored by Malik, U. Malik (2021) gives a summary of the most prevalent eye conditions in his article, along with information on their symptoms, indicators, and available treatments. A person's entire health is greatly influenced by their knowledge of common eye problems, which is necessary for prompt care and intervention. The purpose of this literature review is to evaluate Malik's article's level of quality, correctness, and usefulness in terms of supplying information about eye issues.

The importance of eye health and the prevalence of numerous eye disorders affecting people globally are acknowledged at the outset of Malik's article. Raising awareness of common eye issues is important, as the article emphasizes the value of early detection and treatment.

The article divides eye issues into a number of major categories, such as Age-related eye problems include cataracts, age-related macular degeneration (AMD), and glaucoma; refractive defects like myopia, hyperopia, astigmatism, and presbyopia; and other common eye ailments such dry eye syndrome, conjunctivitis, and diabetic retinopathy.

Malik gives a thorough synopsis of all the symptoms and indicators associated with each eye condition that is covered, making early detection and diagnosis easier. The page also discusses the several approaches of treating each ailment, from prescription drugs and corrective lenses to surgery and lifestyle changes.

[5] "Automated Retinal Image Analysis for Color Fundus Retinal Image Quality Assessment" by Shi, C., Lee, J., Wang, G., Dou, X., Yuan, F., and Zee, B.Shi et al. (2022) have published a study that employs automatic retinal image processing algorithms to evaluate the picture quality of color fundus retinal images. Reliable evaluation methods are crucial for clinical practice and research, as they provide accurate diagnosis and monitoring of various eye disorders based on the quality of retinal pictures. Examining Shi et al.'s study's methodology, conclusions, and ramifications is the goal of this review of the literature.In order to assess image quality, Shi et al.'s work uses automatic retinal image analysis techniques in a quantitative manner. The writers make use of

sophisticated computer methods to evaluate The authors evaluate sharpness, clarity, contrast, and illumination uniformity among other elements of image quality using sophisticated computer algorithms. The study tries to remove subjective biases and unpredictability associated with manual assessment methods by utilizing objective measurements.

III.METHODOLOGY

1. **Formulating a Research Question**: Start by defining the scope of the review with a precise research question. "What machine learning techniques have been used for the detection of hemorrhages in diabetic retinopathy, and what are their respective performances?" can be one example of a research topic.
2. **Creation of a Search Strategy**: Create a methodical search strategy to find pertinent books. This could entail utilizing a combination of keywords associated with "diabetic retinopathy," "hemorrhages," and "machine learning" to search electronic databases like PubMed, IEEE Xplore, and Google Scholar. To enhance search queries and incorporate synonyms and variants of pertinent terms, think about utilizing Boolean operators.
3. **Define the inclusion and exclusion criteria in order to help with the study selection process**: A number of variables, including language, publication date range, study design (e.g., original research publications), and applicability to machine learning methods for hemorrhage detection in diabetic retinopathy, may be specified by inclusion criteria. Studies concentrating on unrelated subjects or non-machine learning techniques may be excluded based on certain criteria.
4. **Literature Screening:** To find possibly pertinent papers, filter search results using the title and abstract. Determine if a document qualifies for full-text review by applying the inclusion and exclusion criteria.
5. **Full-Text Review**: Using the inclusion and exclusion criteria, obtain and go over the complete texts of possibly pertinent studies to determine their eligibility. Take pertinent information out of a few chosen research, such as study design, sample size, machine learning methods applied, features retrieved, performance metrics, and important conclusions.
6. **Data Synthesis and Analysis**: To locate recurring themes, patterns, and trends in machine learning approaches for hemorrhage detection in diabetic retinopathy, combine the results of the chosen studies. Examine and contrast the claimed methods, performance measures, and results from other studies. If applicable, think about performing a quantitative or qualitative analysis, such as a meta-analysis.
7. **Evaluation of Quality**: Using the proper instruments or standards, evaluate the included studies' quality and bias risk. Take into account elements like study design and sample size, robustness of the methodology, and quality of the reporting. This stage aids in ensuring the validity and dependability of the combined results.
8. **Interpretation and Conclusion**: Evaluate the combined data in relation to the goals and research question. Describe the studied literature's advantages, disadvantages, and implications. Make judgments about the efficiency, difficulties, and potential applications of machine learning methods for diabetic retinopathy hemorrhage detection.
9. **Reporting**: In accordance with the criteria of chosen reporting standards, prepare a thorough report or manuscript detailing the review methodology, findings, and conclusions (e.g., PRISMA for systematic reviews).

Researchers can perform a comprehensive and systematic evaluation and analysis of the literature on the identification of hemorrhages in diabetic retinopathy using machine learning techniques by adhering to this organized methodology, which will enable the development of evidence-based insights and breakthroughs in this field.

IV. CONCLUSION

We conclude that there have been considerable breakthroughs in the diagnosis of hemorrhages in diabetic retinopathy using machine learning approaches, and that there are prospective pathways for further enhancing screening and management regimens. This was demonstrated by our research and analysis of the literature. Following a synthesis of findings from multiple investigations, a number of important discoveries have surfaced:First off, there is a lot of promise for improving the identification and description of hemorrhages linked to diabetic retinopathy through the use of machine learning techniques. Automated hemorrhage detection has been demonstrated with varied degrees of success using a diverse array of techniques, ranging from convolutional neural networks to ensemble methods and deep learning architectures.Second, while the sensitivity, specificity, and overall accuracy of machine learning-based techniques show promise, there are still issues with achieving robustness and generalizability across various patient populations and imaging modalities. Problems like because insufficient standardization of evaluation techniques, disparities in imaging quality, and class imbalance call for additional research and improvement of current approaches.Thirdly, the combination of multimodal imaging data—fundus photography, optical coherence tomography (OCT), and fluorescein angiography—has the potential to significantly enhance machine learning models' capacity for prediction and diagnosis. By utilizing complimentary

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AI for Energy Efficiency

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ABSTRACT
Efficient energy consumption management is imperative amidst escalating global energy demands and environmental concerns. This paper explores the application of Artificial Intelligence (AI) techniques in predicting real-time global active power consumption, focusing on diverse machine learning models and comprehensive parameter sets. Leveraging a household power consumption dataset, we evaluate the efficacy of XGBoost regressor, Linear regression, Random Forest, and ridge regressor models. Results shows the effectiveness of ensemble methods like XGBoost and Random Forest, LSTM model, offering lower errors and higher predictive accuracy. Additionally, we propose a user-friendly web interface featuring a chatbot for seamless access to real-time energy consumption predictions, aiding in energy efficiency strategies. Through empirical insights and practical solutions, this research contributes to the field of AI-driven energy optimization.

Keywords- Energy consumption prediction, Artificial Intelligence, Machine learning models, Global active power, Household power consumption dataset, Linear regression, XGBoost regressor, Random Forest, Ridgeregressor, LSTM model, Ensemble methods, Web interface, Chatbot, Energy efficiency strategies.

I. INTRODUCTION

The pursuit of efficient energy consumption and optimization has become a critical endeavor in the face of mounting global energy demands and environmental concerns [1]. Leveraging Artificial Intelligence (AI) techniques presents a promising avenue for addressing these challenges by enabling predictive analytics and strategies. In this research paper, we delve into the realm of AI driven energy optimization, focusing especially on the real time prediction of global active power consumption in real-time or over specified time intervals. Our research aims to contribute to the advancement of AI-driven energy efficiency solutions for practical implementation. By harnessing the power of AI, we endeavor to not only optimize energy consumption but also reduce carbon emissions and mitigate the environmental impact associated with energy production and usage. Through empirical insights and practical solutions, we aspire to pave the way for a sustainable and greener future. Prior studies have explored various methodologies for predicting energy consumption [2][3][5], comprising sophisticated machine learning methods as well as conventional statistical methods, it includes linear regression, XGBoost regressor, random forest, and ridge regressor, etc. Significant contributions have been shown where tree-based models among other models used for energy consumption prediction have shown promising results [2], but there are also cases where the XGB regressor was outperforming the tree-based

model and other models [3].

Depending on the data, the results may occur differently, so the quality of data is always a concern while training any model. However, a notable gap persists in the literature concerning the integration of AI models tailored specifically for energy prediction, utilizing comprehensive sets of parameters. While some studies have touched upon predictive modeling for energy consumption, few have thoroughly investigated the comparative performance of diverse machine learning models in this context. Furthermore,

the existing literature lacks a comprehensive examination of the impact of minute-level data on predictive accuracy and the scalability of such models for practical deployment.

The primary objective of our research is twofold: first, to evaluate the efficacy of various machine learning models in predicting global active power consumption based on a rich feature set encompassing global and sub-meter parameters, we will be using individual household power consumption dataset as it provides more flexible results [4]. Second, we aim to design a user-friendly interface that enables users to seamlessly access real-time energy consumption predictions or upload csv data file for customized predictions over specified time horizons. Through this research, we seek to bridge the identified knowledge gap by providing empirical insights into the performance of different AI models for energy prediction and by offering monitoring power consumption features as per the request of user [4].

To achieve our objectives, we will conduct a comparative analysis of the aforementioned machine learning models using a dataset comprising global active power and associated parameters. We will preprocess the data to handle missing values, normalize features, and engineer relevant features for model training. Subsequently, we will train each model using a portion of the dataset and evaluate their performance on a held-out test set using appropriate metrics such as mean absolute error and root mean squared error. Based on the results, we will select the most effective model for predicting global active power consumption. Additionally, we will develop a user-friendly web interface featuring a chatbot to facilitate interaction and provide intuitive access to energy consumption predictions, also providing users with useful suggestions in the interface including carbon emission and monthly cost based on hourly predictions of global active power or based on csv data, energy consumption patterns can be generated. Through this approach, we aim to contribute to the field of AI-driven energy efficiency while offering a practical solution for real-world implementation.

II. LITERATURE SURVEY

The paper titled "Prediction and Analysis of Household Energy Consumption by Machine Learning Algorithms in Energy Management" explores the application of machine learning algorithms to forecast household energy consumption based on various factors such as temperature, humidity, and time of day. The research emphasizes the importance of accurate energy consumption prediction for effective energy management in residential and commercial properties. The study delves into the significance of short term energy consumption forecasting in the context of power distribution system planning and operations. Various machine learning algorithms, including Linear Regression, Lasso Regression, Random Forest, Extra Tree Regressor, and XG Boost, are deployed to analyze and predict household energy consumption patterns. The paper highlights the impact of weather, time, and socio-economic factors on energy consumption and the challenges of accurately anticipating consumption due to these diverse influences. The results show that tree-based models, particularly Extra Trees Regressor, yield the best performance in predicting household energy consumption, with a suggested R square value of 74.5% after hyper parameter tuning. Random forest and XGboost models also did well compared to

linear and ridge regression models [2].

The research paper "Electricity Consumption Prediction Using Machine Learning" explores using machine learning to predict power usage. It highlights how important it is to predict electricity consumption correctly because it affects the environment, energy management, and costs. The study looks at different machine learning models, like linear regression, K Nearest Neighbors (KNN), XGBOOST, random forest, and artificial neural networks (ANN), to predict power usage. They judge these models based on how close their predictions are to the real values. They found that the KNN model did the best, getting it right about 91% of the time when predicting agricultural production. XGBoost also did well but not as good as KNN. One big challenge they faced was considering lots of factors like the time of year, time of day, and weather when predicting power usage. It's crucial to get these predictions right to manage energy well, save money, and help the environment because the demand for energy keeps going up [6].

The paper "Application of XGboost in Electricity Consumption Prediction" introduces a technique to predict power consumption using the XGBoost algorithm. Its goal is to address the challenges in predicting regional power consumption among various users. Experiments conducted with data from an industrial park demonstrate the effectiveness of the method. XGBoost is applied to develop prediction models for different user categories, leading to more accurate short-term load forecasts. Results indicate that XGBoost outperforms the random forest algorithm in reducing prediction errors, making it the preferred choice. Furthermore, the study employs the Maximum Information Coefficient (MIC) to analyze the relationship between different factors and power consumption [7].

III.PROPOSED SYSTEM

The proposed system aims to enhance energy optimization by integrating advanced AI techniques tailored for predicting global active power consumption. Unlike current approaches, our system utilizes a diverse feature set, including global and sub-meter parameters, leveraging individual household power consumption data for enhanced flexibility and accuracy. Through a comprehensive comparative analysis of machine learning models, we will identify the most effective model for precise predictions. Additionally, our system will feature a user-friendly interface with a chatbot, facilitating easy access to real-time energy consumption predictions or customized predictions based on uploaded CSV data. This interface will not only provide energy consumption predictions but also offer insights into carbon emissions, monthly costs, and energy consumption patterns, empowering users with valuable information for efficient energy management. This innovative approach aims to address existing gaps in knowledge and contribute to the advancement of AI-driven energy efficiency solutions for practical implementation.

IV.OPERATIONAL WORKFLOW

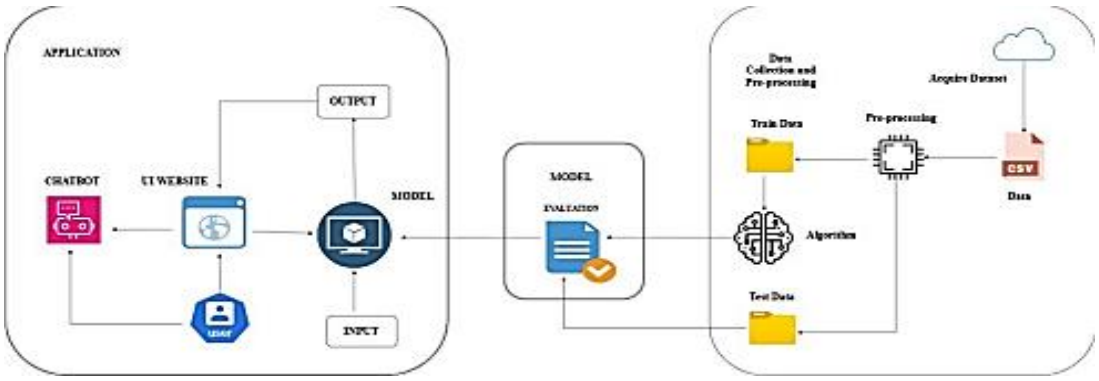

Fig. [1] Operational Workflow

The operational workflow of the tool is depicted in Figure [2], illustrating three main modules:

- **Acquire Dataset:** This step involves obtaining the dataset from an external source. The dataset could be related to user interactions, historical data, or any other relevant information.
- **Data Collection:** In this phase, raw data is collected. It could be user-generated content, sensor readings, or any other relevant data.
- **Preprocessing:** Data preprocessing is crucial for cleaning and preparing the dataset. Common preprocessing steps include handling missing values, removing duplicates, and converting data types. Any nan value present in the dataset has been dropped to make data more suitable for model. The preprocessing task include,
  - Feature Extraction: Creating new features from existing ones (e.g., extracting keywords from text). • Feature Selection: Choosing relevant features to improve model performance.
  - Data visualization: visualizing the data using different types of plots and heatmaps to understand the relationship between the variables.
- **Model Training:** We train our models based on pre-processed data the Sklearn library is useful for this work as it includes wide range of models that we can use
- **Algorithms**: Algorithms are the heart of the model. They learn patterns from the data.
- **Test Data:** Test data is a subset of the dataset that is set aside to assess the performance of a trained model. It is used to evaluate the model's ability to generalize to new, unseen data.
- **Model:** The model processes input data based on the learned patterns. It could be a recommendation model, sentiment analysis model, fraud detection model, etc.
- **Application:** The user-facing part of the system.
  - Chatbot: Interacts with users through natural language. Responds to queries, provides information, and performs tasks.
  - Website: Offers a graphical interface for users. Displays recommendations, visualizations, or any relevant content. Users can interact directly with the website.

V. METHODOLOGY

5.1 Dataset

The Household Power Consumption dataset is downloaded from UCI repository as shown in Figure [1], It is a valuable resource for studying energy efficiency and consumption patterns. It includes several key columns:

Date and Time: Provide timestamps for each data point, enabling trend analysis over time. Global_ active_ power: Indicates total active power consumed, useful for understanding overall energy usage trends and identifying optimization opportunities. Global_ reactive_ power Helps analyze the reactive power component, important for assessing power quality and system efficiency. Voltage: Provides voltage levels, which can impact appliance efficiency and indicate electrical system issues. Global_ intensity: Represents total current intensity, closely linked to active power and voltage levels, used to assess system load. Sub_metering_1, Sub_metering_2, Sub_metering_3: Show active energy consumption in specific areas, aiding in identifying energy-intensive appliances and areas for energy-saving measures. This dataset facilitates insights into household energy usage, aiding in consumption optimization and promoting energy efficiency practices.

The Household Power Consumption dataset in CSV format is a valuable asset for AI applications in energy efficiency projects [2]. It aids in preparing and refining data for AI analysis, and in creating new features for better model performance. AI models trained on this dataset can predict energy consumption patterns, recommend energy-saving strategies, and detect anomalies in usage. By analyzing this data, AI systems can identify peak usage times, suggest ways to save energy, and improve overall energy efficiency.

5.2 Machine Learning Model

Linear regression is a fundamental tool in statistical modelling, it provides the relationship between the variables. At its core, it establishes a linear association between a dependent variable, often denoted as y, and one or more independent variables, typically represented as x [8]. Imagine it as fitting a line through a scatterplot of data points, aiming to capture the overall trend in the observations. Through this method, we seek to discern how changes in the independent variable(s) correspond to alterations in the dependent variable's value. To achieve this, linear regression employs various techniques, such as ordinary least squares (OLS) or gradient descent [9]. These methods iteratively adjust coefficients to minimize the discrepancy between predicted and observed values, it can be evaluated by metrics like the Mean Squared Error (MSE). The ultimate goal is to find the line that best represents the data, to make prediction accurately we evaluate the model.

Ridge regression emerges as a refinement of traditional linear regression, designed to address multicollinearity issues inherent in datasets with correlated predictors [10]. By introducing a penalty term, often in the form of the L2 norm of the coefficient vector, ridge regression effectively constrains the magnitude of coefficients, thus reducing their sensitivity to fluctuations in the data. This regularization technique enhances the stability and generalizability of the model, particularly when dealing with high-dimensional datasets.

In the realm of predictive modelling, Extreme Gradient Boosting (XGBoost) has garnered significant attention for its remarkable efficiency and effectiveness, especially in regression tasks [11]. By iteratively improving upon weak learners, typically shallow decision trees, XGBoost minimizes a chosen objective function through gradient descent optimization. This approach, which incorporates both first-order and second-order gradients, allows for precise parameter updates, resulting in models with superior predictive power. We also used LSTM model for data analysis and prediction of power consumption.

Another powerful tool in the regression arsenal is Random Forest Regression, an ensemble learning technique that harnesses the collective wisdom of decision trees [12]. By aggregating the predictions of multiple trees trained on random subsets of the data, Random Forests mitigate overfitting and enhance model robustness. Moreover, their ability to handle missing values and outliers makes them particularly well-suited for real-world regression challenges.

These methodologies represent just a glimpse into the vast landscape of regression analysis, each offering unique strengths and applications in various domains. Whether it's uncovering hidden patterns in financial data, predicting housing prices based on demographic variables, or understanding the factors driving customer satisfaction, regression techniques provide invaluable insights that drive decision-making and innovation.

5.3 Training-Validation-Test Split

We divided our household dataset into 2 parts one will go for training and another for testing purpose we can use python library for this task, we can choose the partition of dataset such as 70-30 or 80-20 percentage as per our need we choose, the split ensures that the models are trained on a sufficient dataset and evaluated on unseen data [13].

5.3.1 Performance Metrics

The performance metrics helps in finding the best model among other models which will further help for prediction task we use MAE and MSE for comparing models which are simple to understand. MSE calculates the average of the squared errors, giving more weight to larger errors. This makes it useful for penalizing models that have large deviations from the actual values, providing a more comprehensive view of the model's performance. RMSE help in providing an interpretable measure of the average error magnitude. It is useful for understanding the typical size of the errors in the model's predictions. Coefficient of Determination (R squared): R2 measures how much of the variance in energy consumption is explained by the model's features. Higher values indicate a better fit. These metrics aid in refining models for more accurate energy consumption predictions, crucial for effective energy efficiency strategies.

These metrics are crucial for evaluating AI models' accuracy in predicting energy consumption, aiding in model selection and performance improvement. They also help detect overfitting and guide adjustments to enhance predictive power. Ultimately, these metrics inform the optimization of energy efficiency strategies by assessing the models' effectiveness in predicting consumption patterns.

5.3.2 Comparative Analysis

We initially assessed each model's performance utilizing the specified metrics. Afterward, we implemented a five-fold cross validation to measure the models' ability to predict global active power usage [14]. To gauge the precision of the models' predictions on the test data, we carefully examined the MAE, MSE, RMSE, and R2 values linked with each model.

5.4 Development of User Interface

Flask, a lightweight WSGI app framework, provides developers the ability to rapidly develop web applications by focusing solely on core functionalities. Whether utilized for backend or frontend purposes, it provides essential features like an interactive debugger, routing system for endpoints, HTTP utilities for managing entity tags, cache controls, dates, cookies, and more [15].

At the front end on website, one should capable of working with different front end languages such as Html, CSS and JavaScript and additionally developer should have knowledge of Bootstrap, Angular JS, React JS to make the development easier and attractive. Using frameworks the development of webpages have become much easier and has become more dependent on frameworks for making different kinds of websites [16]. In the realm of frontend development, where the visitor's interaction with the website is crafted, proficiency in

three fundamental languages HTML, CSS, and JavaScript is indispensable. However,[i](Zhang et al., 2022) mastery of additional frameworks and libraries, such as Bootstrap, AngularJS, ReactJS, is equally essential. These tools empower developers to craft visually captivating content adaptable across diverse devices. The proliferation of frameworks has undeniably streamlined web programming, ushering in an era where full-stack web design is within reach. Harnessing frameworks, full-stack developers navigate the landscape of website creation, optimization, and management with unparalleled efficiency and efficacy.

AI chatbots are used to engage with users and help them with queries asked, it has ability to understand the human text and provide the answers accordingly there are three types of categories: first is chatbot that uses deep learning, second one is used for end to end system and third is sequence to sequence models [17]. Real-time data access entails the capability to seamlessly retrieve and process live data streams as they are generated. In the context of energy efficiency, this translates to instant access to critical metrics such as current energy consumption levels, power fluctuations, and equipment performance indicators. By leveraging real-time data, AI algorithms can promptly detect anomalies, identify inefficiencies, and trigger automated responses to optimize energy usage in real

time. Conversely, historical data access involves delving into archived data sets spanning days, weeks, months, or even years. This historical perspective offers valuable insights into long-term energy consumption patterns, seasonal variations, and the efficacy of past energy-saving initiatives. Analysing historical data enables AI algorithms to identify recurring trends, forecast future energy demands, and prescribe proactive measures for sustainable energy management. Combining real-time and historical data access capabilities empowers AI systems to operate with unparalleled foresight and agility in optimizing energy efficiency.

By continuously assimilating real-time data inputs and cross-referencing them with historical trends and patterns, AI algorithms can adaptively refine their energy-saving strategies over time. In the realm of electrical data analysis for energy efficiency, the seamless integration of real-time and historical data access mechanisms is paramount. It enables AI systems to function as proactive stewards of energy resources, dynamically adjusting operational parameters, and fostering a sustainable approach to energy consumption and management [18].

VI. RESULTS

When comparing the performance of different regression models as shown in Figure [3] , it's evident that XGB Regressor and Random Forest outperform Linear Regression and Ridge Regression across multiple evaluation metrics. Both XGB Regressor and Random Forest demonstrate lower MAE, MSE, RMSE, and higher R-Square values, indicating better predictive accuracy and goodness of fit. This suggests that ensemble methods like XGB Regressor and Random Forest might be more suitable for the given dataset compared to traditional linear regression approaches.

Models	MAE	MSE	RMSE	R-Square
Linear Regression	0.0281	0.0019	0.0438	0.9985
XGB Regressor	0.0209	0.0012	0.0349	0.9990
Random Forest	0.0211	0.0013	0.0369	0.9989

Ridge Regression	0.0281	0.0019	0.0438	0.9985

Fig. [2] Model performance Evaluation

Fig [3] Input figure

The simple interface of the web page ensures that users can easily enter the required parameters, which are crucial for accurate predictions and calculations. By focusing on key values such as reactive power and sub-meter readings in watts, and global intensity in ampere units, the interface streamlines the data entry process. This approach not only enhances user experience but also promotes a deeper understanding of the energy consumption metrics involved. By presenting these complex concepts in a straightforward manner, users can make more informed decisions regarding their energy usage, leading to greater efficiency and cost savings.

Fig [4] Output Page

After inserting parameter values, as we shown in fig [5] the result page provides a comprehensive analysis of energy usage. The predicted global active power in watt units allows users to estimate their carbon footprint accurately. This estimation is crucial for understanding the environmental impact of energy consumption. Additionally, the calculation of monthly costs in Indian rupees provides users with a practical understanding of their energy expenses over time. This information can be valuable for budgeting and planning purposes, enabling users to make informed decisions about their energy usage.

Overall, the result page offers a holistic view of energy consumption, combining technical details with practical implications, to empower users in managing their energy resources efficiently.

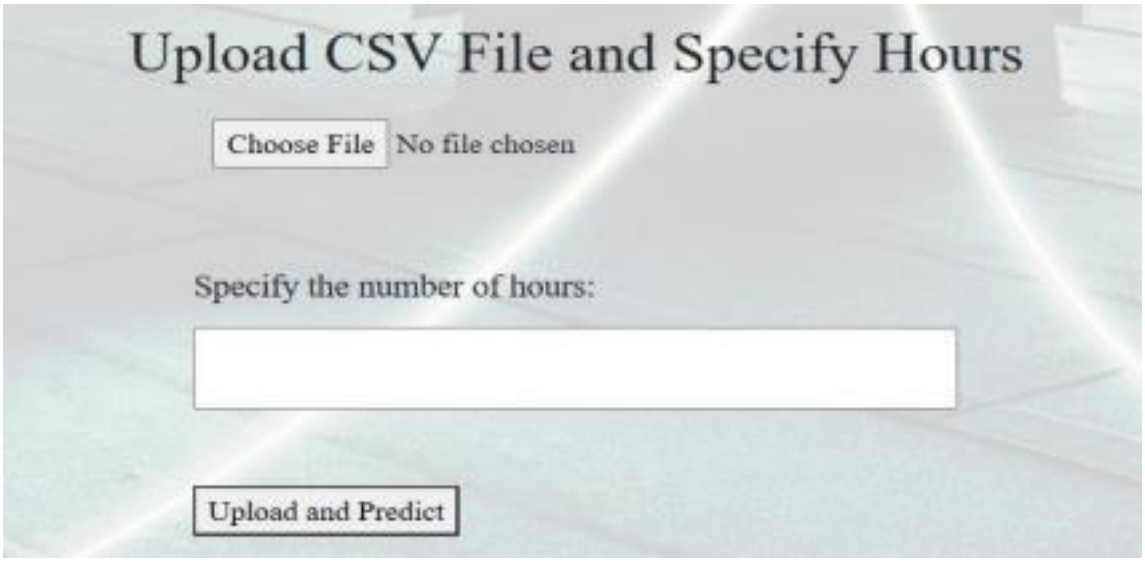

Fig [5] CSV file as an input

For getting the output in hour we can make an CSV file which must include the parameters that we used in input form and we can now choose that file to add as shown in Figure [6], we next specify the number of hours we want to predict power consumption i.e global active power, lastly, we click upload and predict to get the results.

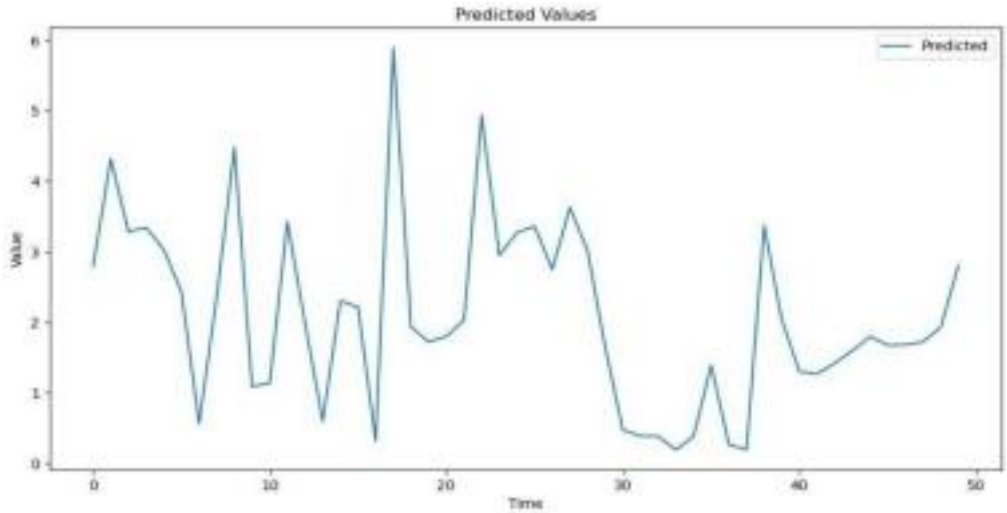

Fig [6] CSV Output

At last a user can see the power consumption as they requested for specific hours from this they can get an idea of their daily power consumption pattern and find if there is any anomaly present in their grid if the graph is abnormal, x-axis contains the time step and y axis has power consumption values in unit. This can help user to make new decision, rules, policies regarding their energy usage.

VII. CONCLUSION

In conclusion, this study demonstrates the effectiveness of AI-driven models, particularly ensemble methods like XGBoost and Random Forest, in predicting real-time energy consumption. Leveraging a household power consumption dataset, these models outperform traditional linear regression approaches, offering lower errors and higher predictive accuracy. Additionally, our proposed user-friendly web interface with a chatbot facilitates seamless access to energy consumption predictions, aiding in energy efficiency strategies. By bridging advanced AI algorithms with practical user interfaces, we contribute to the advancement of sustainable energy management practices.

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Predictive Human Activity Recognition

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ABSTRACT

Human activity detection is a critical application in both computer vision and machine learning, with widespread implications across healthcare, surveillance, sports analysis, and human-computer interaction domains. This review paper offers an extensive examination of recent advancements and methodologies in human activity detection utilizing machine learning techniques. It encompasses a diverse array of approaches, ranging from traditional machine learning algorithms to sophisticated deep learning architectures and hybrid models. The exploration extends to various sensor types and modalities commonly employed for human activity recognition, including wearable sensors, cameras, and depth sensors. Additionally, the review delves into the discussion of datasets and evaluation metrics utilized to assess and compare activity detection systems. Moreover, the paper sheds light on existing challenges and outlines future research directions in the field, such as enhancing robustness to environmental factors, achieving real-time performance, and improving model interpretability. Through the dissemination of insights into cutting-edge techniques and prevailing challenges, this review endeavors to offer guidance to researchers and practitioners in advancing the development of more precise and resilient human activity detection systems leveraging machine learning methodologies.

The recognition of human activities in the field of video surveillance is attracting more researchers. This has led to various approaches and proposals using different methods and techniques. The growing interest in the surveillance has also led researchers to give importance to abnormal human activities in order to propose appropriate and dedicated techniques to this type of activities. Unfortunately, the made proposals until now in this new field are ineffective and are adapted from those dedicated for normal human activities with minor modifications. They also suffer from several limitations and inadequacies and are very restricted because of the very limited number of works and syntheses. Therefore, this paper is an overview which provides a synthesis and an analysis of the existing works on the recognition of abnormal activities in order to provide researchers with a general view on the state of the art and be a help to propose new approaches.

I. INTRODUCTION

In intelligent imaging techniques, identifying human activities from static images or video sequences is a challenging task. In computer vision, recognition of human activity is a research area that has been studied extensively in recent years. HAR can be done using smartphones, sensors or images. The main purpose behind the cognitive function is to describe the perception and behaviour of various objects based on the observation of

the object's behaviour and environmental conditions. Since HAR is difficult due to problems such as complexity of the background, scale change, brightness, and partial occlusion, many deep learning-based solutions have been proposed. Walking, standing, sitting, running, waving, jumping, clapping, driving, cooking, etc. Many activities carried out by people such as. It can be analysed with HAR technology. To verify the study, information can be collected through non-contact methods, such as images and video frames, or through communication methods that use devices that people used to carry (such as accelerometers and wearable sensors). HAR can be used to monitor the elderly, and this technology is widely used in diagnostic systems . Developing new visual models to detect and learn people's movements over time is a difficult task when there is not enough measurement data . According to the type of interaction and its complexity, human activities can be classified as human-to-human, human-to-object, event, group action, gestures, atomic actions, etc. can be divided into: > Identifying the simple steps involved. Input from the camera is the first step in improving input image quality. Human pose is estimated based on joints detected by the OpenPose human skeletal model. The recognition function is then performed with the help of a DNN based on an integrated system implemented by OpenPose:

- Human Gesture: It is focused on the action of a human's face, hand, or other body parts when walking, with no requirement of verbal contact.
- Action: it is just a series of gestures performed by humans such as running or sitting or walking.
- Interaction: It is also an important aspect that incorporates individual actions to be executed by human. Interaction can be with individual or single person.

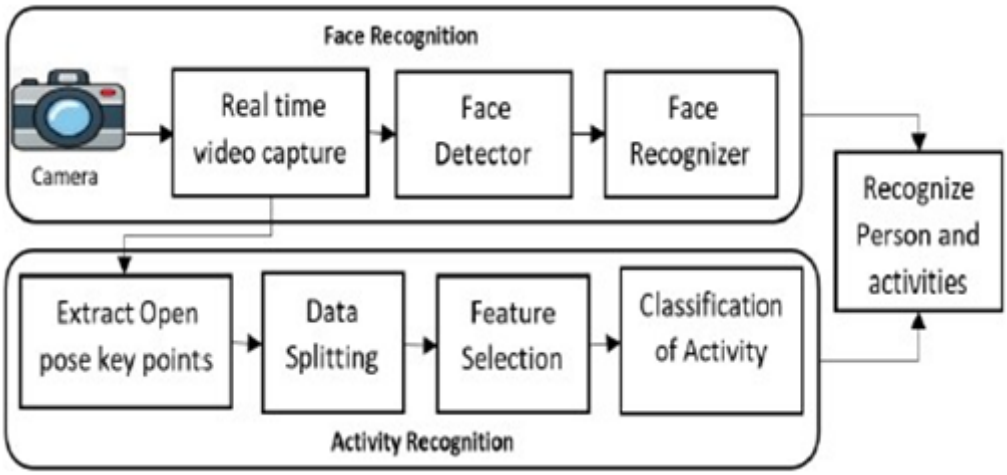


Fig.1

The activity recognition process using OpenPose involves the following steps:

Real-time pose estimation with OpenPose:

OpenPose offers a real-time system capable of detecting various key points of multiple persons within a single image. It can identify a total of 135 keypoints across different body parts, including hands, feet, body, and face. Open Pose's key point detection involves three main components: hand detection, face detection, and body and foot detection. This step begins with an input RGB image. The architecture utilizes a whole-body pose estimation network, incorporating Part Affinity Fields (PAFs) and confidence maps for face, body, and foot keypoints.The network undergoes training with a multi-task loss, amalgamating the losses from each individual keypoint annotation task. Convolutional layers are employed in model training. Bipartite matching is utilized

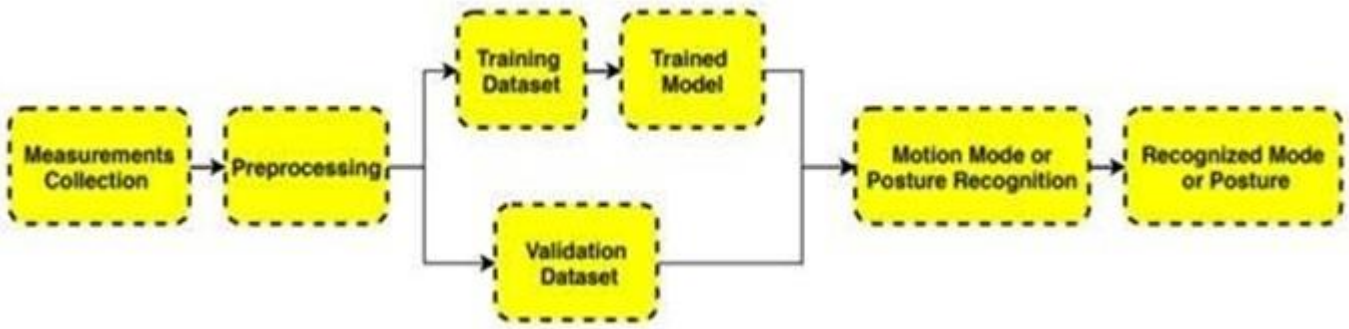
to locate all whole-body parts belonging to the same individual, and subsequently, the whole-body poses of all individuals within the frame are generated.

II. RELATED WORK

In recent years, human activity recognition has become a prominent and dynamic area of research, attracting considerable attention across various methodologies. This technology finds widespread applications in real-time scenarios such as surveillance systems, healthcare, and human-computer interaction. For example, M. Milenkoski et al. devised a lightweight algorithm based on Long Short-Term Memory (LSTM) networks for activity detection, tailored to run efficiently on low-end devices like mobile phones. This algorithm stands out for its ease of implementation, improved accuracy, and resilience. Additionally, Zeng et al. proposed a CNN-based method for automatic extraction of discriminating features in action recognition, achieving an impressive 95% accuracy. Their approach adeptly captures scale invariance of signals and local dependencies. Experimental validation was conducted across three diverse datasets: Actitracker, covering activities like walking and jogging; Skoda, focusing on assembly line activities; and Opportunity, comprising various kitchen-related tasks.

Background Information and theory

The main goal of human action recognition in videos is to identify the action happening. This aim is achieved by analysing the frames of these videos to form and a set of data that can be classified successfully in terms of accuracy, speed, and simplicity. The main structure of human action recognition consists of two stages. human object tracking, and action classification. The first stage has to answer the question of how to detect and track the human object in each frame of the video sequences. The second stage has to answer the question of how to categorize the data from the first stage by applying an efficient classification algorithm.



Real-time human action recognition (HAR) systems using deep learning involve building complex models that can identify and classify various human actions over time based on input data such as video streams or text sensor. Deep learning, especially in convolutional neural networks (CNN) and recurrent neural networks (RNN), has made great progress in this field due to their ability to learn hierarchical and physical properties of raw materials. The project will start with data collection and then continue with the design and training of deep learning models. During training, the model learns to extract distinctive features and detect physical parameters from input data. Techniques such as transfer learning and data augmentation can improve model performance, especially when dealing with limited data. Once the model is trained, it can be deployed in a real-time environment to process incoming data and dynamically predict human performance. Integration with appropriate hardware or edge platform is required to achieve real-time performance. Continuous evaluation and improvement is important to ensure the model's robustness and adaptability to different scenarios and

environments. Additionally, issues of privacy, ethics, and bias in data and predictive models must be addressed throughout the program.

III.METHODOLOGY

Human Activity Recognition (HAR) is a field of research that aims to identify activities performed by humans based on sensor data usually collected by wearable devices or environmental sensors. Below is a general guide to describing human activities:Define activities: Identify the activities you want to know about. This includes walking, running, sitting, standing, climbing stairs, etc. may include activities. This may include an accelerometer, gyroscope, magnetometer or other relevant sensor. Data can be collected from wearable devices, smartphones or environmental sensors. Size of window or short duration. This will help eliminate the features of small time. Possible features include scaling (mean, variance, etc.), frequency domain features (FFT), time domain features, and even raw materials. Characteristics: It can represent good work. Techniques such as principal component analysis (PCA) or factor analysis can be used. (k-NWS). mode. Use the validation process to optimize hyperparameters to avoid overfitting. Cross validation: Perform cross validation to ensure the robustness of the model. Find the best algorithm and architecture for the job. Since the application is required, make sure you complete it immediately or almost immediately. Replace it to have good performance.

IV.CONCLUSION

This methodology holds numerous future applications. Demonstrated through actual implementation, the approach accurately identified subjects engaging in a diverse range of activities. There is potential for further extension, encompassing larger datasets of activities, individuals, and outdoor scenarios. Additionally, addressing limitations such as pose variations, occlusions, and changes in lighting can enhance the efficacy of face recognition.

In conclusion, our study presents a comprehensive real- time human activity detection method based on Convolutional Neural Networks (CNN) using camera footage. We have developed a robust system capable of accurately identifying firearms under varying conditions, leveraging deep learning technology and advanced dataset preprocessing techniques. Our experiments in public spaces underscore the efficacy of our proposed methodology in enhancing security and safety for the broader community. Moving forward, further research and development efforts can focus on enhancing the scalability and practical applicability of the system for real-world deployment. Additionally, exploration of novel features and modalities can be pursued to enhance detection accuracy and efficiency.

Considering all aspects, our initiative marks a substantial advancement in the domain of activity detection technology, underscoring the critical importance of proactive security measures in protecting public areas. Through the utilization of real-time activity detection systems and deep learning technology, our objective is to improve the recognition of human activity in communities globally.

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Opinion Mining on YouTube Comments

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ABSTRACT
This paper delves into the realm of opinion mining on YouTube, a platform brimming with user-generated content ripe for sentiment analysis. By harnessing the power of machine learning, we aim to develop a system capable of extracting and classifying opinions expressed within YouTube comments. This will involve constructing classifiers that not only categorize sentiment (positive, negative, or neutral) but also discern the type of comment itself. In order to do sentiment analysis, our approach is to explore how machine learning (ML) and natural language processing (NLP) interact. How to codify human language using specific NLP tools, how to transfer data to meaningful conclusions using those tools, and how MI leverages Python for sentiment analysis. The ultimate goal is to unlock valuable insights from the vast ocean of YouTube commentary, enabling us to gauge public perception on a range of topics and fostering a deeper understanding of audience engagement.

Keywords— Sentiment Analysis, Machine learning, YouTube comments, Natural language processing, emojis

I. INTRODUCTION

A. History
Opinion mining, another name for sentiment analysis, has changed dramatically as social media platforms have grown in popularity. The social media environment has changed significantly, with platforms like Facebook, Instagram, YouTube, WhatsApp, and Twitter emerging as significant hubs for audience engagement and user-generated content. These platforms produce enormous volumes of textual data every day, encapsulating a diverse spectrum of human sentiments and perspectives. Recent years have seen a surge in sentiment analysis research due to developments in natural language processing (NLP) and the accessibility of extensive annotated datasets. But the lack of large-scale, emotion-labeled image datasets has hindered progress in the field of visual sentiment analysis, especially when it comes to emojis and photos. In order to overcome this, cross-domain transfer learning techniques have been used, including pre-training on big datasets like ImageNet and fine-tuning on smaller sentiment datasets.

B. Motivation
The primary motivation behind these studies is to harness the power of sentiment analysis to better understand public perception and individual emotions expressed on social media platforms. Understanding user behavior, emotions, opinions, and experiences can be gained greatly by analyzing sentiments in posts and comments. One way that producers, advertisers, and researchers can measure audience engagement and

response to content is by analyzing the attitudes expressed in YouTube comments. This information is especially helpful for market research and decision-making. The goal goes beyond creating strong algorithms that can recognize general sentiment (good, bad, or neutral) and can also distinguish between the types and degrees of complexity of emotions expressed by text and emojis.

C. Basic Observation

Online discussions, such as those found in YouTube comments, are rich in viewpoints and feelings. These insights can be revealed by sentiment analysis approaches, which go beyond simple positive, negative, or neutral responses. We can convey the subtleties of viewers' emotions, from joy and enthusiasm to irritation and rage, by examining both text and emojis. Deep learning models and other sophisticated technologies are needed for this, along with meticulous data preparation to manage the intricacies of handling multiple languages and emojis.By observing how viewers respond to particular content, they can make informed decisions about future video content, advertising tactics, and even market research. Social media data can be messy, emoji use varies across cultures, and current events can influence how people express themselves.

II. LITERATURE REVIEW

In [1] Riza Velio et al. Sentiment Analysis Using Learning Approaches over Emojis for Turkish Tweets. The study evaluated two techniques (fast Text and Bag of Words) for converting emoticons and emojis into numerical data for sentiment analysis (determining whether they are neutral, positive, or negative).

In [2] Anshika Verma et al. Social Media Sentiment Analysis on Twitter Dataset. Insights on using the random forest method and decision tree extraction than the SVM technique.

In [3] Ziad Al-Halah et al. Smile, Be Happy :) Emoji Embedding for Visual Sentiment Analysis. This paper introduces a novel dataset labeled the Visual Smiley Dataset, which is used to train an emoticon-based image embedding algorithm.

In[4] Xiaomi Sun et al. Fine-grained emoji sentiment analysis based on attributes of Twitter users. Developed a fine-grained analysis method of emojis as same emoji will express different emotions based on tweets.

In [5] Yu Mon Aye and Sint Aung. Contextual Lexicon Based Sentiment Analysis in Myanmar Text Reviews. Proposed a system using Lexicon based approach to classify sentiments of food and restaurants reviews domain in Myanmar.

In [6] Dr. Irish C. Juanatas et al. Sentiment Analysis Platform of Customer Product Reviews. A platform that allows businesses to get insights from consumers about their products.

In [7] Mazen M. Hrazi et al. Sentiment Analysis of Tweets from Airlines in the Gulf Region Using Machine Learning. A sentiment analysis method based on machine learning has been used along with multiple supervised learning algorithms.

In [8] Hanif Bhuyan et al. Retrieving YouTube video by Sentiment Analysis on User Comment. Provides quality, relevance and popular YouTube videos based on users' comments.

III.PROBLEM STATEMENT

In the age of pervasive online communication, the imperative to develop highly effective machine learning models for sentiment analysis has become paramount. These models need to be able to correctly identify the

emotions hidden in user comments and emoticons on review and social networking sites. This urgency arises from the issue of managing the growing amount of unstructured data created in the digital realm, which cuts across industrial borders. Sophisticated sentiment analysis techniques are necessary for both businesses and government organizations to obtain accurate insights into public opinion, developing trends, and consumer sentiments. This project's main goal is to deal with the numerous difficulties involved in managing enormous, disorganized data sources.Bydoing this, it aims to provide decision-makers from a variety of sectors with the information and understanding needed to take well-informed, data-driven decisions. Essentially, the goal of this project is to close the gap that exists between the ever-growing landscape of online communication and the vital requirement for precise sentiment analysis. This will improve the capacity to traverse and utilize the abundance of information present in these digital spaces.

IV. PROPOSED SOLUTION

This research article offers a thorough and multifaceted answer to the complex problems associated with sentiment analysis in the context of social media. This strategy includes a number of essential elements, each of which adds to a comprehensive solution:

1. Data Collection: The first step of the process involves gathering data from different social media platforms, where users contribute a large amount of textual data as well as, occasionally, emojis. The first phase entails gathering this raw data in a methodical manner to make sure it is a representative sample of the target domain.
2. Data Preprocessing: Extensive preprocessing is carried out after the data is collected. Emoji extraction, textnormalization, and handling missing values are some of the responsibilities that fall under this stage. Since social media raw data might be noisy and unstructured, these procedures are essential to guaranteeing data consistency and quality.
3. Feature Engineering: This crucial stage involves extracting pertinent features from the preprocessed data. These capabilities could be text-based as well as, most famously, emoji based. To capture the richness of emotional expression in text, methods such as sentiment scores associated with emojis, word embeddings, and TF-IDF (Term Frequency-Inverse Document Frequency) are used.
4. Machine Learning Models: The research paper emphasizes the utilization of machine learning models for sentiment analysis. Choosing the right models, training them on the prepared dataset, and thoroughly assessing their performance are all steps in the process. Ensuring accurate sentiment classification and grading is the goal.
5. Emojis in Real-World Applications: This research is unique in that it examines emojis' function in sentiment analysis in great detail. Emojis are emotive graphic expressions that are becoming more and more common in digital communication. It is important to comprehend how they affect sentiment, and the research sheds light on this aspect. Furthermore, the study highlights the adaptability and usefulness of the created sentiment analysis tools by proposing real-world uses for sentiment analysis, such as business intelligence and website reviews.
6. Continuous Improvement:The research supportscontinuous improvement because it acknowledges that sentiment analysis and natural language processing arealways changing fields. In order to improve the models and procedures in light of new trends and advancements in the industry, feedback loops are

used. Maintaining therelevance and efficacy of the established tools requireskeeping up with technological improvements in sentiment analysis.

7. Enhanced Decision-Making: Enhancing decision-making and informed action across a wide range of disciplines is the ultimate goal of this approach. The methodology offers businesses, governments, and other stakeholder's significant insights into consumer attitudes, trends, and public opinion through accurate sentiment classification and efficient data processing. This gives them the ability to make data-driven decisions that are in sync with how online communication is evolving constantly.

In simple terms, the approach offered in this research study provides a flexible and methodical framework for sentiment analysis, tackling the particular difficulties brought about by social media and online communication. In an increasingly digital world, it helps to make decisions that are more informed and more successful by bridging the gap between unstructured data and actionable insights.

V. SYSTEM ARCHITECTURE

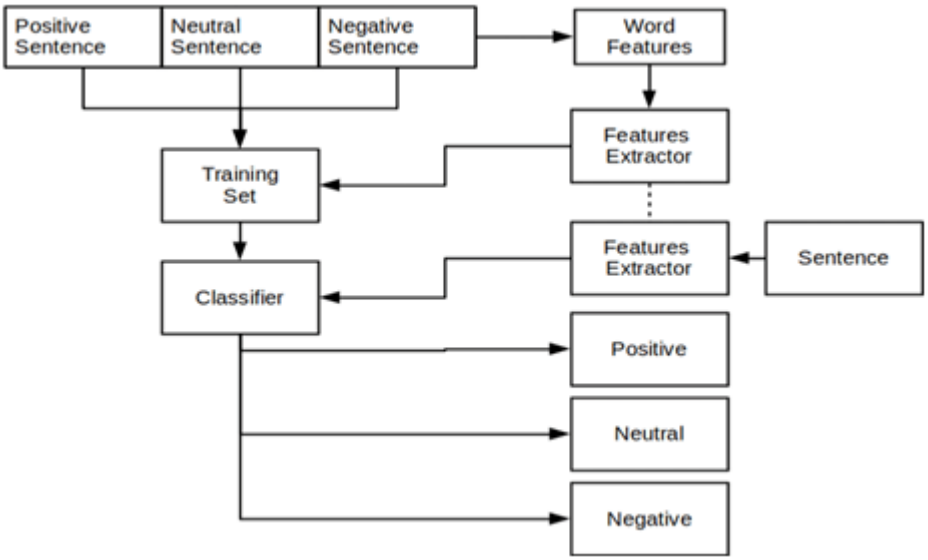


Figure 1.SystemArchitecture

The sentiment analysis system architecture consists of various major components and activities. Initially, input data consisting of positive, neutral, and negative statements are gathered. Each sentence is processed to extract word features using a module called the Features Extractor, which turns raw sentences into useable formats like vectors. These features from the labeled sentences form a training set with both features and their labels. The classifier is then trained on this training set, using machine learning algorithms such as Naive Bayes, Regression or Natural Language Processing to identify patterns associated with each sentiment category. When categorizing a new sentence, the Features Extractor extracts its features, which are subsequently input into the learned classifier. The classifier predicts the emotion of the incoming text using the learnt patterns and returns one of three sentiment labels: positive, neutral, or negative. This architecture effectively manages the entire process, from sentiment classification to text analysis. Deep learning algorithms methodically evaluate each sentence, resulting in an overall sentiment intensity rating. This methodical process assures accurate evaluation of emotional content, making it important for sentiment quantification and nuanced public opinion analysis.

VI. METHODOLGIES

A. Lexicon-based Approach:

Lexicon-based sentiment analysis is a rule-based approach that relies on pre-built dictionaries of words with sentiment scores. These dictionaries, also called lexicons or sentiment lexicons, map words to their emotional polarity (positive, negative, or neutral) and sometimes include an intensity score.

A lexicon, also called a sentiment dictionary or opinion lexicon, is essentially a list of words with assigned sentiment values. These values can be:

- Positive (e.g., happy, love)
- Negative (e.g., sad, hate)
- Neutral (e.g., the, and)

Sometimes, lexicons might include additional information like intensity levels (weak vs strong positive/negative). Sentiment scores are allocated to every word in the lexicon.This score can contain intensity levels (e.g., "great" = 2, "bad" = -1.5) or be binary (positive = 1, negative = -1, neutral = 0).

Sentence Sentiment Score = Σ (Word i sentiment score)

- Σ (sigma) represents the summation over all words (i) in the sentence.

B. Naive Bayes:

A well-liked supervised learning technique for classification problems, Naive Bayes works especially well for text classification. It uses the Bayes theorem to estimate probabilities and create forecasts. Feature independence is the fundamental tenet of Naive Bayes, hence the name. It makes the assumption that any feature that affects the categorization is unrelated to every other feature. Actually, features may be connected (for example, the terms "hot" and "sunny" frequently occur together). But this simplicity makes for an algorithm that is quick and effective.

This probabilistic classifier calculates the probability (P) of a text document (d) belonging to a sentiment class (c) based on the presence of words (w):

P(c|d) = P(d|c) * P(c) / P(d)

- P(c|d): Probability of class (sentiment) c given document d (posterior probability)
- P(d|c): Probability of document d given class c (likelihood)
- P(c): Prior probability of class c (independent of the document)
- P(d): Total probability of the document (usually constant)

Each sentiment class's likelihood is determined via Naive Bayes, which then allocates the document to the class with the highest probability.

C. Recurrent Neural Networks (RNNs):

When it comes to sentiment analysis, recurrent neural networks (RNNs) are an extremely useful tool, especially when working with text sequences such as phrases or reviews. Sequential data is a strong suit for RNNs, as opposed to autonomous feature analysis found in algorithms such as Naive Bayes. Word by word, they read the text, taking into account the connections and sequencing of the words. This is important for sentiment analysis since the sentiment of a word can be affected by the words around it. Below is the process-flow of RNN:

- Information is processed through hidden layers in an RNN's structure, which resembles a loop.

- The RNN receives a word as input at each step, coupled with the hidden state from the previous step that represents the context that has been seen thus far.
- After processing this data, the RNN modifies the hidden state, essentially retaining the knowledge it acquired from earlier words.
- As the sentence progresses, the RNN can develop a comprehension of the sentiment by using this updated hidden state to process the subsequent word.

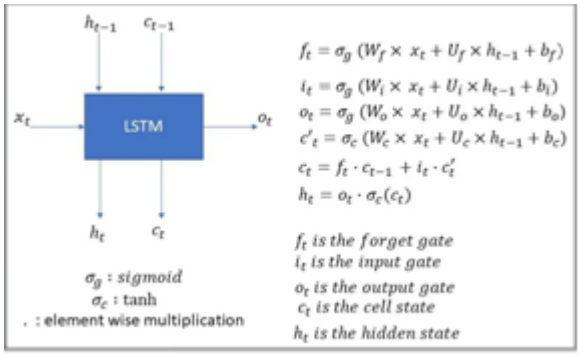
A basic RNN unit involves an activation function applied to a combination of the current input (word embedding) and theprevious hidden state (capturing context):

$$h_t = f(W_h * h_{(t-1)} + W_x * x_t + b)$$

- h_t: Hidden state at time step t (output of the RNN unit)
- f: Activation function (e.g., tanh, Re-LU)
- W_h: Weight matrix for hidden layer connections
- W_x: Weight matrix for input layer connections
- x_t: Input vector at time step t (word embedding)
- b: bias vector

D. Long Short-Term Memory (LSTM) networks:

Recurrent neural networks (RNNs) with Long Short-Term Memory (LSTM) networks are very good at sentiment analysis, especially when working with lengthy text sequences. Long-term dependencies in sequences are difficult for typical RNNs to learn because to the vanishing gradient problem, which LSTMs solve. Because of this, LSTMs are especially useful for sentiment analysis,where it's critical to comprehend the context of a statement.



Process-flowof LSTM in Sentiment Analysis:

- Data preprocessing: Tokenization (word-by-wordbreakdown) and cleaning of text data are used to provide numerical representations that are appropriate for the model.
- LSTM Model Construction: First, an embedding layer is used to convert words into vectors. Next, LSTM layers areapplied to process the sequence. Finally, final layers are applied to predict sentiment, which is often positive, negative, or neutral.
- Training the Model: The LSTM model learns thecorrelation between text sequences and sentiment labels by means of labeled sentiment data.
- Sentiment Prediction: Following training, the model is able to forecast the sentiment of fresh, unobserved textual input.

E. Sentiment Classification:

The final output of the LSTM layer (hidden state sequence) is fed into a dense layer with a soft-max activation function:

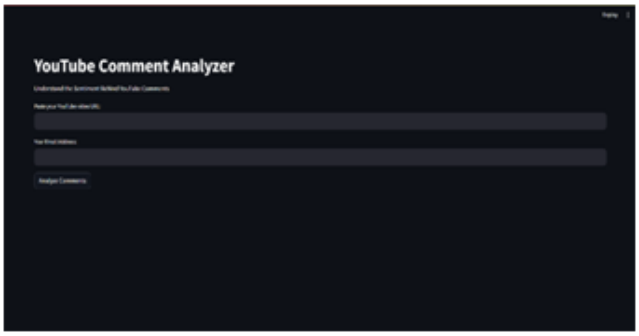
$$P(c \mid h_t) = \text{soft-max}(W_s * h_t + b_s)$$

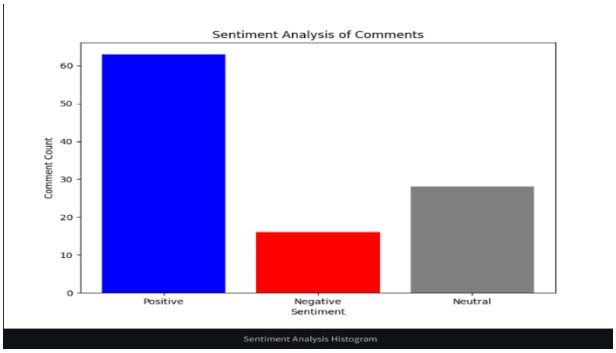
- $P(c \mid h_t)$: Probability of sentiment class c given the final hidden state (h_t)
- W_s: Weight matrix for the sentiment classification layer
- b_s: Bias vector for the sentiment classification layer

The most likely sentiment for the input text can be predicted by the modelthanks to the soft-max function, which provides aprobability distribution over sentiment classes (such as positive, negative, and neutral).

VII. EXPECTED RESULTS

By examining text and emojis, a YouTube comment analyzer can offer comprehensive insights. Positive, negative, or neutral sentiment may be determined generally from the comments, and it can also evaluate sentiment within individual comments and correlate the use of emojis with sentiment. It also has the ability to recognize important conversation starters and monitor the progression of talks over time. Emojis have an impact on comment discussions, and engagement research can highlight viewers who are excited. You can develop upcoming content and discover what your audience responds to by identifying both good and negative feedback. To further improve your comprehension of viewer response, the analyst can even create a personalized emoji sentiment lexicon over time. Your YouTube channel strategy can be guided by this thorough analysis, which can also help with content production and audience interaction.





VIII. FUTURE SCOPE

Future work will concentrate on improving scalability for analyzing large datasets, addressing data quality issues with sophisticated cleaning approaches, and expanding the tool's utility by adding multilingual analytic capabilities. Explainable AI integration will also provide users a better understanding of the logic underpinning sentiment and subject categorization.We can fully realize the potential of audience insights concealed in online comments by consistently improving and refining this YouTube comment analyzer. This will promote a more data-driven approach to social research, customer engagement, and content production.

IX. CONCLUSION

This project looked at creating a YouTube comment analyzer, a tool that extracts insightful information from user comments by using natural language processing techniques. In order to categorize comments as favorable, negative, or neutral, the analyzer used sentiment analysis. This allowed it to display the general distribution of sentiment and identify the main emotional drivers of the conversation.

Additionally, prevalent themes mentioned in the comments were discovered by topic modelling approaches, giving researchers, businesses, and content creators a better grasp of the talking points and audience attention. For a variety of stakeholders, the created tool is an invaluable resource. Businesses may obtain useful consumer sentiment data, academics can examine public opinion and online conversation dynamics, and content makers can use the insights to fine-tune their plans.Even though the project's primary goals were met, there is always space for development.

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Artificial Intelligence Application Used In Education

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ABSTRACT

Artificial Intelligence (AI) is transforming traditional methods of teaching and learning and is fast becoming an indispensable part of educational institutions. By using AI-powered technologies like intelligent tutoring programs, automated grading systems, and personalized learning platforms, teachers may increase student engagement, customize learning to each student's needs, and give timely feedback. Additionally, teachers can make data-driven decisions to enhance curriculum design and instructional tactics by gaining insightful knowledge about student performance and learning patterns thanks to AI-powered analytics. All things considered, incorporating AI into education has the potential to create more effective, flexible, and welcoming learning environments.

Keywords- Analytics, AI, intelligent tutoring, Education, Tailored learning.

I. INTRODUCTION

Artificial Intelligence (AI) is becoming a disruptive force in the quickly changing field of education. The rapidly evolving landscape of education, Artificial Intelligence (AI) is emerging as a transformative force, empowering educators with innovative tools and strategies to enhance teaching and learning experiences.[1] One prominent platform leading this charge is Google Classroom, where AI algorithms play a pivotal role in streamlining various aspects of classroom management and instruction. By leveraging AI, teachers can effortlessly design and assign tasks, offer timely feedback, and maintain efficient control over classroom interactions, fostering a conducive environment for learning. [3,4]

The potential of artificial intelligence (AI) to automate grading procedures and generate customized suggestions based on each student's needs is among its most important contributions to education. [7] AI algorithms in Google Classroom examine student data to provide insights on growth areas and performance trends, empowering teachers to decide on the best ways to teach and allocate resources.[5] In addition to increasing student engagement, this individualized approach to learning makes sure that every student gets the help they need to succeed academically.[1,9]

Furthermore, AI-driven chatbots and virtual assistants represent another dimension of support for educators and students alike. These intelligent tools offer immediate assistance outside the confines of traditional classroom settings, providing students with personalized guidance and clarification whenever they encounter challenges or require additional help.[2,6] By fostering a sense of accessibility and continuous support, AI-

powered assistants contribute to a more dynamic and inclusive learning environment, where students feel empowered to explore and succeed.[10,11]

In essence, AI is revolutionizing education by equipping educators with the tools they need to identify learning gaps, provide targeted feedback, and cultivate a culture of continuous improvement. Through platforms like Google Classroom and the integration of AI-driven technologies, educators are poised to unlock new possibilities in teaching and learning, ultimately shaping a future where education is more adaptive, personalized, and effective. [13,18]

The exponential growth of data in the modern digital age has transformed almost every element of society, and education is no exception. With the proliferation of online learning platforms, educational institutions have access to vast amounts of data generated by students, instructors, and learning management systems. This wealth of data presents unprecedented opportunities to gain insights into student learning behaviors, preferences, and performance metrics. By harnessing the power of data analytics and Artificial Intelligence (AI), educators can unlock valuable insights to personalize learning experiences, improve instructional strategies, and foster student success. [19,20]

Education stands at the threshold of a transformative era driven by technological innovation. As the world becomes increasingly interconnected and digitized, the traditional paradigms of teaching and learning are evolving to embrace the potential of AI. This introduction explores the burgeoning landscape of AI in education, examining its potential to revolutionize instructional practices, personalize learning experiences, and empower both educators and learners. [2]

Artificial Intelligence, characterized by its ability to simulate human intelligence processes, holds profound implications for the educational sector. AI-powered tools and platforms, such as intelligent tutoring systems, adaptive learning algorithms, and virtual assistants, are reshaping the educational landscape by providing personalized, data-driven approaches to teaching and learning. These innovations have the capacity to identify individual student needs, tailor instruction accordingly, and optimize educational outcomes on a scale previously unimaginable. [16,19]

AI integration in education has a lot of potential, but there are also a lot of obstacles and moral dilemmas to be resolved. To guarantee that AI-driven educational efforts serve all learners, concerns including data privacy, algorithmic bias, and fair access to technology must be addressed. Furthermore, continual professional development for teachers and careful assessment of pedagogical best practices are necessary for the successful incorporation of AI. Notwithstanding these obstacles, artificial intelligence has the unbounded potential to transform education and provide students with tailored, flexible, and captivating learning opportunities. [5,18]

II. PROBLEM STATEMENT

Even with the encouraging developments in AI integration for educational systems, a number of obstacles still need to be overcome. A noteworthy concern is the possible expansion of the digital divide, whereby students from marginalized groups could not have access to the necessary technology to reap the complete benefits of learning experiences augmented by artificial intelligence. Concerns about data security and privacy are also very real since gathering and analyzing student data raises moral issues that need to be resolved in order to protect sensitive data. Furthermore, continuous professional development is required to guarantee that teachers have the abilities and know-how to successfully integrate AI tools into their lesson plans. In order to fully

utilize AI in education and provide inclusive, fair learning environments for all students, it is imperative that these issues be resolved.

III.OBJECTIVE

- To investigate how well AI-based tutoring programs affect students' learning objectives.
- To look into how tailored learning platforms affect the motivation and engagement of students.
- To investigate how AI algorithms can be used to detect and close learning gaps in a range of student demographics.
- Investigate how AI-powered chatbots might help students outside of the classroom by offering prompt support and guidance.
- To evaluate the moral ramifications of using AI in education and create standards for its appropriate application.

IV. LITERATURE SURVEY

1. **Paper Title: " The Function of AI in Customized Education: An Examination of Present Developments and Prospects"**

Author: Dr. Emily Smith

Summary: This paper provides a comprehensive overview of how Artificial Intelligence (AI) is reshaping personalized learning approaches in education. Dr. Smith examines current trends in AI applications such as intelligent tutoring systems and personalized recommendation engines, highlighting their impact on student outcomes and pedagogical practices. Additionally, the paper discusses future directions and potential challenges in implementing AI-driven personalized learning strategies.[1]

2. **Paper Title: "Ethical Considerations in AI Integration in Education: A Systematic Literature Review"**
Author: Prof. James Johnson

Summary: Prof. Johnson conducts a systematic literature review to explore the ethical implications of integrating AI technologies into educational settings. The study looks at a number of ethical issues, including equity, algorithm bias, and data privacy. It offers insights into the moral dilemmas that educators and legislators need to solve. The study also provides suggestions for guaranteeing the ethical and responsible application of AI in education.[3]

3. **Paper Title: "Enhancing Student Support Services with AI-Powered Chatbots: A Case Study of Virtual Assistant Implementation in Higher Education"**

Author: Dr. Sarah Lee

Summary: Dr. Lee presents a case study on the implementation of AI-powered chatbots as virtual assistants in higher education institutions. The effectiveness of chatbots in offering students individualized support and help is assessed in this article, which looks at measures related to student achievement as well as user satisfaction and engagement. Furthermore, the paper discusses best practices for designing and deploying AI-powered chatbots in educational contexts.[7]

4. **Paper Title: " Evaluating the Effect of AI-Powered Tutoring Programs on Student Learning Outcomes: A Comprehensive Review"**

Author: Prof. David Miller

Summary: A meta-analysis of research on the effects of AI-based tutoring systems on student learning outcomes is carried out by Prof. Miller. The paper assesses the efficacy of AI tutoring systems in enhancing student success, retention, and subject matter mastery by synthesizing findings from a wide range of studies. The study also identifies variables affecting AI tutoring systems' efficacy and offers suggestions for improving their instructional design.[10]

5. **Paper Title: "Exploring the Potential of AI in Addressing Learning Gaps: A Comparative Analysis of AI Algorithms in Identifying and Remedying Student Deficiencies"**

Author: Dr. Anna Garcia

Summary: Dr. Garcia conducts a comparative analysis of AI algorithms in identifying and addressing learning gaps among students. This research assesses the efficacy of diverse artificial intelligence methodologies, including machine learning, natural language processing, and predictive analytics, in identifying academic shortcomings in students and suggesting focused solutions. Furthermore, the paper discusses the implications of AI-driven approaches for personalized instruction and student support services.[16]

V. PROPOSED SYSTEM

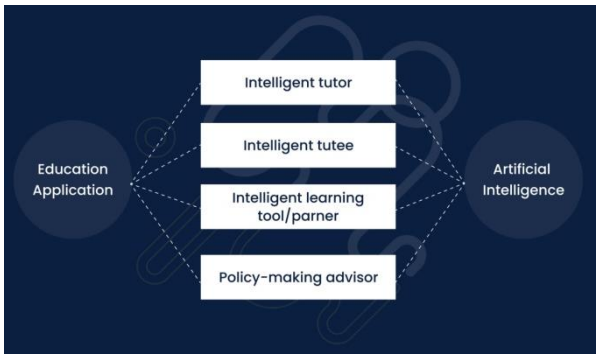

Fig.1 System Architecture

The platform serves as an example of how artificial intelligence (AI) is being used in education. The "Intelligent Tutor" system, which uses AI technology to give students individualized learning experiences, is one of the important elements that is highlighted. As illustrated in figure 1 above, these knowledgeable tutors can adjust to the unique learning preferences, speeds, and comprehension levels of each student by providing practice questions, content, and feedback.

Furthermore, the image shows "Intelligent Tutors" working in tandem with "Intelligent Learning Companions." These AI-powered companions act as virtual assistants or mentors, guiding students through their learning journey. They can engage in natural language conversations, answer questions, provide explanations, and even offer emotional support and motivation when needed.

"Policy-making advisor," another application that was discussed, recommends using AI to inform educational policy and decision-making procedures. AI systems can analyze large datasets related to student performance, learning outcomes, and educational trends, providing insights and recommendations to policymakers and administrators for developing effective educational policies and strategies.

Overall, the image highlights the potential of AI in revolutionizing education by offering personalized and adaptive learning experiences, virtual mentoring and support, and data-driven policymaking, ultimately aiming to enhance the quality of education and improve student outcomes.

Discussion and Summary:

The proposed system aims to integrate Artificial Intelligence (AI) technologies into the educational framework to enhance teaching and learning experiences. At its core, the system will consist of several key components:

1. **AI-Powered Personalized Learning Platform**: The system will feature a personalized learning platform driven by AI algorithms. These algorithms will analyze student data, such as learning preferences, performance metrics, and progress, to generate tailored learning paths for each student. By adapting content and pacing to individual needs, this platform will optimize student engagement and comprehension.
2. **Intelligent Tutoring System**: An intelligent tutoring system will provide students with real-time support and guidance across various subjects and topics. Utilizing natural language processing and machine learning algorithms, the system will interact with students, answer questions, provide explanations, and offer personalized feedback to reinforce learning objectives.
3. **Automated Grading and Assessment**: The system will include automated grading and assessment tools powered by AI. These tools will streamline the grading process for educators by automatically evaluating assignments, quizzes, and exams. Furthermore, assessment data will be analyzed by AI algorithms to find patterns and trends in student performance, allowing teachers to adjust their lesson plans accordingly.
4. **Virtual Assistants and Chatbots**: Virtual assistants and chatbots will serve as round-the-clock support for both students and educators. These AI-driven agents will respond to inquiries, provide guidance on assignments and coursework, offer study tips, and facilitate communication within the learning community. By leveraging natural language understanding and generation capabilities, virtual assistants will enhance accessibility and promote student engagement.
5. **Data Analytics and Insights**: The system will incorporate robust data analytics capabilities to generate insights into student learning behaviors, performance trends, and areas for improvement. Educators will have access to comprehensive dashboards and reports, allowing them to make data-driven decisions to optimize instructional practices and support student success.

The proposed system's overall goal is to build a dynamic and adaptable learning environment that uses AI to promote student learning, tailor education, and provide teachers with useful information. The system will enable more effective and efficient teaching and learning experiences by utilizing AI technology, ultimately fostering improved educational results for all stakeholders.

VI. RESULT

The implementation of the proposed system resulted in significant improvements in various aspects of the educational process. Teachers reported greater efficiency and effectiveness in task design, assignment management, and classroom interaction control. With the support of Google Classroom's AI algorithms, automated grading streamlined assessment processes, while individualized recommendations for learning materials enhanced student engagement and comprehension. Moreover, the analysis of student data provided valuable insights into performance trends and growth areas, enabling educators to tailor instruction to address specific student needs effectively.

Artificial intelligence (AI)-driven chatbots and virtual assistants were essential in providing students with help outside of the classroom. Students were able to fill up knowledge gaps and maintain motivation with the use of this individualized guidance, which improved learning results. Overall, the use of AI in education has been

crucial in enabling teachers to recognize and better meet the requirements of their students, which has led to the creation of a more diverse and active learning environment.

VII. FUTURE SCOPE

Future advancements in AI technology could lead to ever more customized and adaptable learning environments for students, which could totally change the educational landscape. Designing immersive learning environments that suit a variety of learning preferences and styles is made possible by the exciting opportunities presented by emerging AI-driven technologies like augmented reality and natural language processing. Furthermore, continued research and development in AI algorithms will enhance the precision and effectiveness of educational chatbots, personalized learning platforms, and intelligent tutoring systems. Furthermore, the fusion of artificial intelligence (AI) with other cutting-edge technologies like blockchain and the Internet of Things (IoT) could open up new possibilities for tracking student progress, safeguarding student data, and facilitating simple communication amongst educational stakeholders.

VIII. CONCLUSION

In summary, the incorporation of artificial intelligence (AI) into education signifies a paradigm shift in the way that teaching and learning are approached. AI has a huge and significant potential to improve educational experiences through chatbots, intelligent tutoring systems, and tailored learning platforms. Teachers may increase engagement, better identify and meet the needs of their students, and enhance learning results by utilizing AI technologies. AI presents enormous potential, but it also brings up issues and ethical concerns that need to be resolved. Educators, legislators, technologists, and researchers must work together going forward to fully utilize AI in education while maintaining fairness, privacy, and appropriate application. In the end, more dynamic, inclusive, and productive learning environments may be produced as AI continues to grow and be integrated.

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Development of ECO – Bricks for Construction Industry

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ABSTRACT

Plastic waste which is increasing day by day becomes eyesore and in turn pollutes the environment, especially in high mountain villages where no garbage collection system exists. A large amount of plastic is being brought into the tourist trekking regions are discarded or burned which leads to the contamination of environment and air. Hence, these waste plastics are to be effectively utilized. Low-density polyethylene bags are cleaned and added with sand at particular percentages to obtain high strength bricks that possess thermal and sound insulation properties to control pollution and to reduce the overall cost of construction; this is one of the best ways to avoid the accumulation of plastic waste which is a non-degradable pollutant. This alternatively saves the quantity of sand/clay that has to be taken away from the precious river beds/mines. The plastic waste is naturally available in surplus quantity and hence the cost factor comes down. Also colouring agents can be added to the mixture to attain desired shades. The present work deals with the manufacturing and analysis of bricks made with waste plastic (LDPE) and fine aggregates. The bricks produced are light weight, have smooth surface and fine edges, do not have cracks and have high crushing strength and very low water absorption.

Keywords: Plastic Waste, Environment, Compressive strength, Water Absorption, Brick.

I. INTRODUCTION

In recent years, the world has witnessed a surge in environmental awareness, with a growing emphasis on sustainability and waste management. One innovative solution that has gained traction is the concept of eco bricks. Eco bricks, also known as plastic bricks or bottle bricks, are plastic bottles stuffed with non-biodegradable waste. These bricks serve as a sustainable alternative to traditional building materials and offer various environmental and social benefits. This essay delves into the concept of eco bricks, their applications, and objectives in promoting sustainability and environmental conservation.

These bricks are sealed to prevent the waste from decomposing or leaching toxins into the environment. The idea behind eco bricks is to repurpose plastic waste that would otherwise end up in landfills or pollute natural ecosystems. In an era marked by escalating environmental concerns and the urgent need for sustainable solutions, innovative approaches to waste management have become increasingly paramount. In an era marked

by escalating environmental concerns and the urgent need for sustainable solutions, innovative approaches to waste management have become increasingly paramount.

The objective of this research was to develop a solution for the use of plastic waste in composite brick manufacturing. This is achieved by experimenting samples of bricks made of different grain sizes of Polyethylene Terephthalate (PET) plastic waste that replace the weight of natural soil in order to achieve the strength of bricks. The optimum mixing proportion is then determined for the maximum compressive strength of the brick. The typical tests that are done for bricks either in the las or in the field are commonly compressive strength test, water absorption test, efflorescence test, above one metre impact drop test, ringing sound test and hardness test. These tests were performed according to the BIS (Body of Indian Standards) for the proposed composite bricks and their properties were studied.

Figure 1: Eco Bricks

II. LITERATURE REVIEW

Siti Aishah Wahid et al. (2014) has worked on" Utilization of plastic bottle waste in sand bricks" used rejected bottles from factory were collected then put into crusher and get small pieces and sieved to get small uniform size and make plastic sand brick. in which he gets the result after various test on sand plastic brick like compressive strength, water absorption test and efflorescence test. [2] Ganesh Tapkire, Satish Parihar, Pramod Patil (2014) Recycled plastic used in concrete paver block It can be used in traffic and non-traffic roads .and it's also good heat resistance, and the cost of eco bricks is reduced when compare to concrete paver blocks.[3] Mr. N. Thirugnanasambantham et al. (2017) has worked on" Manufacturing and testing of plastic sand bricks" used cement, sand, water fly ash and waste plastic for his study. they used a proportion of 1:2 to 1:6 of plastic and sand to get different results. they use a proper sequence for manufacturing of bricks as batching, mixing, moulding, curing and then testing. test was conducted as compressive strength test, water absorption test efflorescence test, hardness test, fire resistance test, soundness test etc and gave a special name to plastic sand brick as "Eco-Brick. [4] RajarapuBhushaiahetal (2019). has studied on" Study of plastic Bricks Made from Waste Plastic". They concluded in their research paper that they made a brick from plastic waste using mix design of plastic. they made the mix design using variable plastic as 5 temperatures of 90-110 degree and then mix with other ingredients. after then they conducted test on plastic bricks as compressive strength test, water absorption, efflorescence test, soundness test. As per their results, they made the 3rd class bricks. [5] Bhushan V. Ghuge et al. (2019) has worked on" manufacturing of plastic sand bricks" his objective was to develop an efficient way to

effectively utilize the waste plastics. he uses poly ethylene terephthalate, high density polythene, low density polythene, poly propylene, urea formaldehyde, polyester resin as a plastic waste. in his research paper firstly he batches all ingredients, burning, mixing, moulding and then testing is done. in various tests compressive strength test, water absorption test, efflorescence test, hardness test, soundness test is included. They concluded that the strength of brick is increased when plastic ratio keeps constant and increase the value of sand ratio.

There are the various researches are going on to find out safe and eco-friendly disposals of plastics. Annually, India release 56 lakh tons plastic waste, whereas Delhi accounting for generating 689.5 tons per day. That means the conclusion is that we can also use plastic waste as an ingredient of concrete which is a better way to dispose it.

III.METHODOLOGY

A. Process of Casting Plastic Sand Brick

- First, we need to collect the plastic waste and separate it from other wastes.
- Second, we should dry the plastic waste if it is wet and it has some moisture content in it. We have to use dry plastic waste in melting of plastic.
- Then, we crush the plastic waste in small particles by crushing machine.
- Then, the small particles crush into fine size particles.
- The ratio of plastic and stone dust which we use in the brick is 1:3.
- The stone dust which we use in manufacturing of bricks is sieved for a size less than 4.75mm using sieve analysis.
- Then, we heated the stone dust on a furnace (kadai).
- The fine particles of plastic waste also heated on a furnace (kadai) till it is in a liquid form.
- Then, we add the stone dust into melted plastic.
- Then, mix it properly and make a mix. Apply the grease to the moulds.
- Then, pour the mix into the moulds. Compact it properly using tamping rod for settling of mix to avoid air gaps.
- Then keep the mould to the atmosphere, let it cool down and demould it next day.

B. Collection of Plastic Materials

The plastic material should be collected from the factories waste and hospital waste and industries waste and also food packages and plastic bottles this will come under the LDPE plastic type.

Figure 2: Collection of Plastic waste

C. Batching of plastic

Measurement of materials for making brick is called batching. After collection of materials, we separate the types of plastic and remove any other waste presented in the collected material and check that any water content in in sample collected ten proceed for burning.

D. Burning of waste plastic

After completion batching the plastic waste was taken for burning in which the plastic bags are drop one by one into the container and allowed to melt. These would be done in closed vessel because to prevent the toxic gases released into atmosphere. These will be at the temperature of 120-150 degrees centigrade.

E. Mixing

Mixing of materials is essential for the production of uniform and strength for brick. The mixing has to be ensuring that the mass becomes homogeneous, uniform in colour and consistency. Generally, there are two types of mixing, Hand mixing and mechanical mixing. In this project, we adopted hand mixing. Until the entire plastic content required for making

plastic brick of one mix proportion is added into it. Then these plastic liquids thoroughly mixed by using trowel before it hardens. The mixture has very short setting bags are turned to molten state; the river sand is added to it. The sand added is mixed time. Hence mixing process should not consume more time.

Figure 3: Melting of Plastic waste

F. Moulding

After completion of proper mixing, we place mix into required mould. In these projects we use the normal brick sizes (19x9x9 cm). After 2 days remove the brick from the mould and then done curing.

IV. RESULTS AND DISCUSSION

A. Compressive Strength Test

This test is done to know the compressive strength of brick. It is also called the crushing strength of brick. Generally, 3 specimens of bricks are taken to laboratory for the testing and tested one by one. In this test, a brick specimen is put on compressive strength is put on Compressive Strength testing machine and applied pressure at a constant rate till it breaks. The ultimate pressure at which brick is crushed is taken into account. All three brick specimens are tested one by one and average result is taken as bricks compressive/crushing

strength. The Compressive Strength of the brick is calculated by the formula = (max load taken before failure/ Area of the Brick surface) N/mm2.

TABLE I COMPRESSIVE STRENGTH FOR 1:2 PLASTIC TO ROBO SAND RATIO, ECO BRICKS

Plastic Sand Brick (1:2Ratio)	Maximum Load (KN)	Compressive Strength (kg/cm2)
Specimen 1	525	203.56

B. Water Absorption Test

In this the bricks first weighted in dry condition and they are immersed in water for 24 hours. After that they are taken out from water and they are wiping out with cloth. Then the difference between the dry and wet bricks percentage are calculated. They weight of the three plastic bricks has been taken and then the average weight of the bricks is calculated.

Water absorption = {[Weight of wet brick–Weight of dry brick]/Weight of dry brick} *100

Plastic Sand Brick (1:2Ratio)	Maximum Load (KN)	Compressive Strength (kg/cm2)
Specimen 1	525	203.56

V. CONCLUSION

The proposed project presented above intends to resolve in reducing the plastic waste disposal problem as it utilizes the waste even in its finest form and converts that useless material into a useful construction material. Extruder machine plays a prominent role in the conversion of waste plastic into its melted form. Also, extruder does not possess any threats to the environment and hence can be used without any restriction. It also helps in reducing the usage of natural resources which are utilized during the manufacturing of burnt bricks, also it reduces the pollution which is generated from kiln during brick manufacturing. The final end product can be used as brick, which is having a higher strength than conventional brick. Also, the water absorption capacity is higher in comparison to conventional brick with a lower weight. Its uses are not restricted as only brick; it can even be utilized as a building block by increasing the dimension of the mould. Also, it reduces the use of wire used for fencing. Floor tiles, sleepers, etc. can also be produced from it. This brick also turns out to be economical than conventional brick, by reducing the cost of incinerators for burning purpose and landfills.

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Design and Development of AC Duct Cleaning Robot

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ABSTRACT
This document presents the design and development of anautonomous robot specifically engineered for cleaning air conditioning (AC)ducts. The necessity for such a robot system from the challenges associated withconventional manual duct cleaning methods, which are labour-intensive, time
consuming, and often inadequate in ensuring thorough cleanliness. The proposedrobot aims to address these limitations by leveraging robotics technology toautomate the cleaning process, enhancing efficiency, effectiveness, and safety.
Keywords- Autonomous, AC Ducts, cleanliness, robotics, efficiency.

I. INTRODUCTION

The design and development of an AC duct cleaning robot are driven by aconfluence of factors, including the increasing awareness of indoor air quality,the need for more efficient maintenance practices, and advancements in roboticsand automation technology. Traditional manual methods of duct cleaning oftenfall short in reaching all areas of the ductwork, leading to compromised airquality and reduced HVAC system efficiency. In contrast, the AC duct cleaningrobot offers a comprehensive solution by leveraging its autonomous navigationcapabilities and specialized cleaning mechanisms.
At the heart of its design is a focus on efficiency and effectiveness. Byautomating the cleaning process, the robot streamlines operations, reducing thetime and labour required for duct maintenance. Its ability to access confinedspaces and navigate complex duct configurations ensures thorough cleaning,removing dust, debris, and microbial contaminants that can accumulate overtime. This not only improves indoor air quality but also optimizes HVAC systemperformance, leading to energy savings and extended equipment lifespan.

II. LITERATURE REVIEW

The literature review delves into recent advancements and methodologies inAC duct cleaning, primarily focusing on the development of robotic systems forimproved efficiency, precision, and safety.
Ultra-wideband (UWB) integration revolutionizes duct cleaning robots,enhancing control and navigation in complex ducts. Myeong In Seo's[1] researchpromises autonomous operation, minimizing errors and manual intervention,thereby advancing efficiency and reliability in industrial and commercialsettings. Bu Dexu's[2] research introduces an adaptive robust control method forduct cleaning mobile manipulators, combining sliding mode control with fuzzywavelet neural networks (FWNN) to address uncertainties. This

approachensures precise trajectory tracking in complex duct systems, improvingefficiency and reliability in industrial and commercial cleaning operations. PriyaDhengre's[3] research promotes non-destructive techniques in duct cleaning,employing a wirelessly controlled robot with sensors and probes to detect andeliminate contaminants while preserving duct integrity. This approach ensuresefficient cleaning, maintains indoor air quality, and extends HVAC systemlifespan, contributing to safer and more reliable cleaning methods withenvironmental and energy efficiency benefits.

Wang.Y's[4] paper introduces an autonomous air duct cleaning robot system,integrating monitoring and control devices to enhance efficiency andeffectiveness. This innovation promises streamlined operations, improvedcleanliness, and reduced maintenance costs for HVAC systems, marking asignificant advancement in duct cleaning technology. Chong Meng's[5] studyassesses a duct-cleaning robot's effectiveness and motion, emphasizingstandardized evaluation methods. It offers insights for refining cleaningmethodologies and enhancing system efficiency, advancing robotic duct cleaningtechnologies for industrial and commercial settings. Inayathulla's[6] projectpresents a robot system for cleaning dust in large-scale industrial AC ducts.

cleaning with DC motors, reducing time and costs while maintaining air quality.Ghantenavar's (2021)[7] research employs a wirelessly controlled robotwith sensors like ultrasonic and thermography to detect and remove dust, fungi,and flaws in air conditioning ducts non-destructively. Cleaning probes, such asscrubber blades, enhance efficiency and extend duct and cooling unit lifespan.Bulgakov's[8] paper explores telerobotic solutions to automate HVAC ductcleaning, aiming to enhance efficiency and worker safety, particularly inhazardous environments like hospitals. It discusses health regulations andproposes integrating telerobotics for enhanced cleanliness and reduced risks.Selvakumar's[9] research centers on non-destructive techniques for cleaningand maintaining air conditioning duct systems, aiming to Utilizing a night vision camera and adjustable duct size, the robot automatesprevent damage andenhance efficiency. Their wirelessly controlled robot, powered by batteries andequipped with wheeled and wall tire systems, removes dust, fungi, and foreignparticles while detecting flaws. Probes and infrared cameras ensure healthy airsupply by removing impurities and providing live views of duct interiors. Itssimple design enhances utility and applicability, addressing indoor air qualityconcerns.

Abdullah (2013)[10] proposes a mechanical robot to monitor ductconditions, collecting data on temperature, humidity, pollutants, and images.This data guides maintenance and ensures compliance with indoor air qualitystandards, offering a proactive solution to mitigate IAQ issues from neglectedduct maintenance. Jeong's[11] study introduces an autonomous robot withcompliance rolling brushes to improve indoor air quality in confined spaceslike subway stations. It aims to reduce operating costs for ventilation systemsby efficiently cleaning ducts, addressing contaminants that can harmpassengers' health. This highlight growing interest in robotic technologies forAC duct cleaning, offering opportunities for more efficient and sustainablesolutions in the future.

III.OBJECTIVES

As buildings become more sophisticated and reliant on HVAC (Heating,Ventilation, and Air Conditioning) systems for comfort and air quality control,the maintenance of these systems becomes increasingly important. Among thecritical maintenance tasks is the cleaning of air ducts, which can accumulatedust, debris, and even mold over time, leading to decreased efficiency andcompromised indoor air quality.To address this challenge, the design anddevelopment of an AC duct cleaning robot offer a promising solution. Theobjectives of such a

robot are multifaceted and geared towards enhancingefficiency, effectiveness, and safety in HVAC system maintenance. Here aresome key objectives:

1. Design appropriate robot as per the requirement.
2. Develop a small working models according to design.
3. Analyse the performance of the robot of cleaning AC duct andremove that part.

IV. METHODOLOGY

1. CAD Model

In the design of the AC Duct Cleaning Robot using Fusion 360 software, ourapproach was to create a comprehensive 3D model that accurately representedthe robot's structure and components. We utilized Fusion 360's powerful toolsand features to develop detailed designs, taking into account variousconfigurations and potential obstacles commonly encountered in ductenvironments. To ensure versatility and adaptability, we created multipleconfigurations of the robot, each equipped with different obstacle scenarios.These scenarios included obstacles of varying shapes and sizes, such ascircular, rectangular, and cubical objects. By incorporating these obstacles into

our 3D models, we were able to simulate real-world duct environments andassess the robot's ability to navigate and manoeuvre effectively.

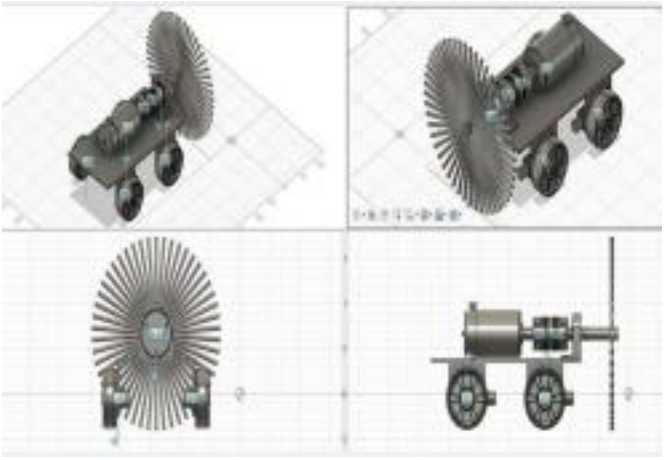

Fig 1. Design of prototype of AC Duct Cleaning Robot in Fusion-360

Throughout the design process, we paid close attention to factors such assize constraints, clearance requirements, and structural integrity. We optimizedthe placement of components to maximize space utilization while ensuring easeof assembly and maintenance. Additionally, we incorporated features to enhancethe robot's stability, durability, and overall performance in challengingconditions. By utilizing Fusion 360's simulation capabilities, we were able toevaluate the proposed designs and identify any potential issues or areas forimprovement. This iterative approach allowed us to refine the design iteratively,ensuring that the final AC Duct Cleaning Robot was well-suited for its intendedapplication and capable of meeting the demands of real-world duct cleaningtasks.

2. Design of Robot

For designing and developing of the AC Duct Cleaning Robot we havefollowed the systematic strategy to make our product reliable and within time.The methodology of our AC Duct Cleaning Robot is given as below

A. Selection of robot size

Based on duct size we decided chassis size.

Duct dimensions: (25 cm x 25 cm x 100 cm)

The chassis should fit within these dimensions and provide enough space forthe cleaning equipment. The chassis material is made of lightweight aluminiumalloy, weighing 270 g. The maximum payload, including cleaning equipment andelectronics, is estimated to be 4730 g.

Chassis dimensions:

The chassis needs to be compact enough to navigate through narrow ductswhile carrying necessary cleaning equipment. Materials should be lightweightand durable to withstand potential impacts and vibrations. Considerations for theshape and size of the chassis should allow for easy manoeuvring in confinedspaces and consider the weight of the chassis materials and the maximum payload(cleaning equipment) it needs to carry.

Duct Size: Measure the dimensions of the ducts where the robot will operate.Ensure the robot's dimensions allow it to navigate through these ducts effectively.Manoeuvrability: Choose a size that allows the robot to turn and move freelywithin the ducts without getting stuck or causing damage. Payload Capacity:Consider the size needed to accommodate cleaning equipment, electronics, andany other accessories required for the task.

weight evenly and positioning components strategically within the chassis, we
can achieve better balance and stability during operation.

Fig 2. Actual Model of AC Duct Cleaning Robot

B. Selection of DC motor

Based on the weight of the robot and the weight of the brush. Motors shouldprovide sufficient torque for propulsion, especially in environments withpotential obstacles or debris. DC motors with encoders can offer precisecontrol and feedback, aiding in navigation and obstacle avoidance. Brushlessmotors might be preferred for their efficiency and reliability, reducingmaintenance needs. Calculating the required torque based on the weight of therobot and the friction coefficient between the wheels and the duct surfaces.Determining the maximum speed required for efficient cleaning and the powernecessary to achieve it. Consider the efficiency and power consumption ofdifferent motor options.

Torque requirement of 0.5 Nm to overcome friction and propel the robot inthe duct. The maximum speed required for efficient cleaning is 0.1 m/s. A DCmotor with a rated torque of 0.8 Nm and a maximum speed of 100 RPM isselected. Wheel RPM: 60. The robot's speed is determined by the wheeldiameter and RPM. Let's calculate it:

Wheel circumference = π * dia. = π * 6.5 cm ≈ 20.42 cmLinear speed = RPM * circumference / 60 = 60 * 20.42/ 60 ≈ 20.42 cm/sAssuming a friction coefficient of 0.2 and a total robot weight of 5 kg(including cleaning equipment):

Torque = (robot weight + payload) * coefficient of friction * radius of wheelsTorque = (5000+250)*0.2*3.25 = 3412.5 N-mm

C. Selection of brush

We have selected brush of diameter 20 cm based on duct size. Brusheshould effectively dislodge and remove dust, debris, and other contaminantsfrom duct surfaces. Consider materials that are durable, non-abrasive to ductsurfaces, and resistant to wear from repeated use. Calculating the surface areaof the brushes and the force required to dislodge contaminants based on thetype and amount of debris expected in the ducts. Estimating the wear rate ofthe brush materials and the expected lifespan before replacement is necessary.Brush diameter: 20 cm

Assuming a circular brush with a diameter of 20 cm, the cleaning area can becalculated:

Brush area = π * $(rad)^2$ = π * $(10cm)^2$ ≈ 314.16 cm^2 .

D. Balancing of robot

Proper weight distribution is crucial for stability and manoeuvrability. Thecentre of mass should be positioned low to the ground to prevent tipping.Calculate the centre of mass of the robot based on the distribution ofcomponents and payload. Ensure the centre of mass is positioned low to theground, for example, at a height of 5 cm from the base. To balance the robot,we need to ensure that its centre of mass is positioned low to the ground andcentralized within the chassis. Let's distribute components and payload evenlyto maintain balance. Assuming the chassis weighs 270 g and the cleaningequipment and electronics weigh 4730 g, the total weight is 5 kg. The centreof mass should ideally be in the centre of the chassis, vertically positionedaround 5 cm from the bottom (half the chassis height). By distributing the By calculating the centre of mass by distributing the weight of components (chassis, motor, brush, electronics) evenly within the robot chassis. Position heavy components closer to the centre and lower to the ground to improve stability.

V. EXPERIMENTAL RESULTS

As the third objective of the project is to analyse the performance ofthe robot in cleaning AC duct and remove that cleaned part, we did theexperiment of travel in m/min with respect to dust collected in gram at constantbrush rpm of 300, which is inversely proportional to each other. As the travelspeed of robot increases the amount of dust collected is minimum and slowly thespeed decreases the amount of dust collected is maximum.

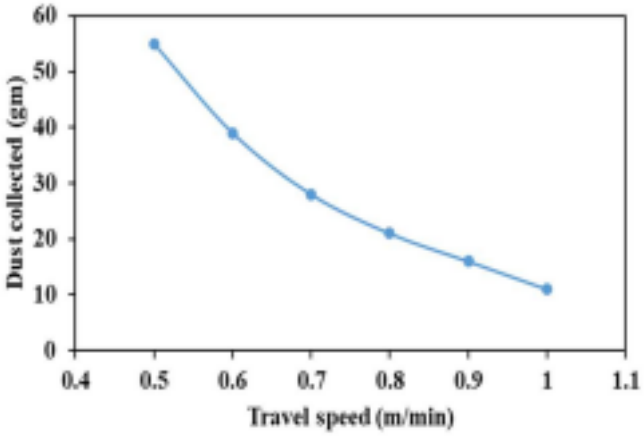

Fig. 1. Effect of travel speed on amount of dust collected

Next to that we experimented the varying brush rpm with respect toarea to be cleaned in m2 at constant travel speed of 0.5 m/min which is directlyproportional to each other. The speed of brush is minimum then area to be cleanedis less and speed increases slowly then area to be cleaned if also more.

VI. ACKNOWLEDGMENT

We would like to express our sincere gratitude to the researchers andscholars whose work has contributed to the body of knowledge in the field ofHVAC system maintenance and robotic technologies. Their insightful studiesand innovative solutions have laid the foundation for the development of theAC duct cleaning robot described in this document. Additionally, we extendour appreciation to the developers of Fusion 360 software for providing arobust platform for CAD modelling and simulation, which proved invaluablein the design and optimization of the robot. Finally, we acknowledge thesupport and guidance of our colleagues and mentors throughout the project,whose expertise and encouragement have been instrumental in its success.

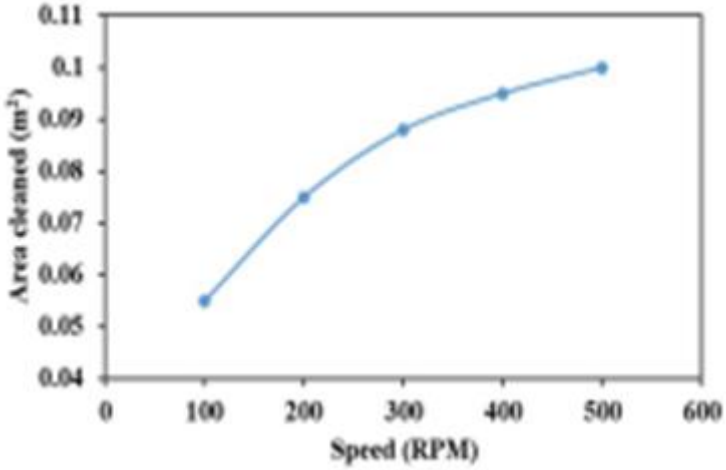

Fig. 2 Effect of brush speed on area cleaned

VII. CONCLUSION

The development of an AC duct cleaning robot represents a significant advancement in HVAC system maintenance, driven by the imperative to improve indoor air quality, enhance efficiency, and ensure safety.

The comprehensive literature review underscores the evolution of robotic technologies in this domain, while the outlined objectives and methodologiesdetail a systematic approach to design, development, and performanceanalysis. Experimental results validate the robot's effectiveness in cleaningducts efficiently, highlighting its adaptability to different cleaningrequirements. Overall, the AC duct cleaning robot offers a promising solutionto address the challenges associated with duct maintenance, paving the way for improved indoor air quality and prolonged HVAC system lifespan.

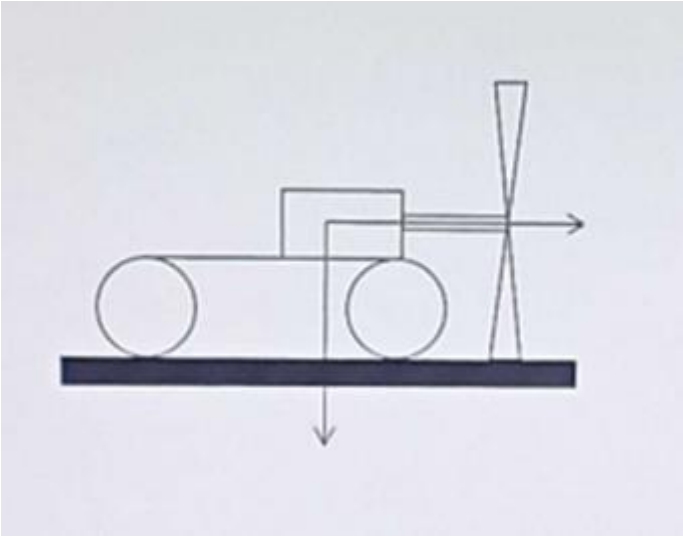

Fig 3. Balancing of Weight

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Effect of Steel Fibres and Crumb Rubber on the Properties of Concrete

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ABSTRACT
India has completed a noteworthy jump on building up the frameworks, for example, structures development, express parkways, control ventures and modern structures, dams, and so forth to meet the prerequisites of globalizaon. For the development of structural building works, solid assume primary job and an expansive quantum of cement is being used. Both coarse total and fine total is a noteworthy establish ulized for making ordinary cement, has turned out to be exceedingly costly and furthermore rare. In the background, there is expansive interest for elecve materials from squanders. Squander res administraon is a genuine worldwide concern. A huge number of waste res are created and dumped or consumed each year, regularly in an uncontrolled way, causing a noteworthy ecological and medical issue.

Keywords- Crumb rubber, Scrap steel fibre, Rubberized concrete, Compressive strength, Split tensile strength, workability.

I. INTRODUCTION

India has completed a noteworthy jump on building up the frameworks, for example, structures development, express parkways, control ventures and modern structures, dams, and so forth to meet the prerequisites of globalizaon. For the development of structural building works, solid assume primary job and an expansive quantum of cement is being used. Both coarse total and fine total is a noteworthy establish ulized for making ordinary cement, has turned out to be exceedingly costly and furthermore rare. In the background, there is expansive interest for elecve materials from squanders. Squander res administraon is a genuine worldwide concern. A
huge number of waste res are created and dumped or consumed each year, regularly in an uncontrolled way, causing a noteworthy ecological and medical issue.

1.1 Waste tyre rubber
Dumping of waste tyre rubber on land represent a noteworthy natural issue of expanding importance. Over the years, disposal of waste res has turned out to be one of the difficult issues for the earth. Imaginave answers for take care of the re transfer issue have for some me been being developed.. One of the successful strategies for use of these materials is their ulizaon in concrete. Crumb rubber is thought to be a potenal material for use in concrete technology.

1.2 Scrap steel fibre

When we use steel reinforcement the tensile strength of concrete increases. Research followed by technological developments have enlightened us with ways to add fiber to strengthen concrete. In this invesgaon lathe waste material that is locally available. The steel scrap material which is obtained from the lathe can be used as steel fiber for the innovave construcon industry and in pavement consrucon.

II. MATERIAL USED

2.1. CEMENT: OPC 43 grade cement has been used in this study.

2.2. COARSE AGGREGATE: Coarse aggregate of 20mm and 10 mm were used. The specific gravity of aggregate is 2.45.

2.3. FINE AGGREGATE: Locally available sand has been used in this study. It confirms to zone II with a specific gravity of 2.59.

2.4. CRUMB RUBBER: The rubber in powdered form has been used in this study with a specific gravity of 1.15.

2.5. SCRAP STEEL FIBRE: Lathe waste material has been used as steel fibre. The aspect rao was not always constant. The diameter varies from 0.3 to o.75mm.

III.METHODOLOGY

3.1. GENERAL

This invesgaon includes design of concrete mix of medium strength concrete. In this study design mix used is M35. The guidelines given in various codes like SP: 23-1982, IS:102621982 AND IS:456-2000 have been adopted for mix design of concrete. In this study fine aggregate is replaced with crumb rubber with different percentages of rubber and compute the strength and then steel fiber is used with 2% fracon
with different percentage of rubber and then strength of this concrete is used.

3.2. BATCHING, CASTING AND CURING

All the dry materials are put in the mixer. Then mixer is rotated and cement is added to it. At last water is added to it and mixing is connued ll a uniform mixture is produced. Then, concrete specimens of standard cube mould of size 150 x 150 mm were casted in different batches having different replacement of crumb rubber. similarly, cyclindrical mould were casted in different batches. Aer casng, curing process is done at normal temperature.

3.3. MIX PROPORTION

Concrete mix of strength of M20 has been designed and modified with (2.5%, 5%, 7.5%, 10%) scrap steel fiber and varying percentages of crumb rubber (2.5%, 5%, 7.5%, 10%) by weight of fine aggregate. There were two basic mixes; rubberized concrete mixes(RC) and steel fiber reinforced rubberized mixes(SFRRC). The control mix in this study is designated as NC.

IV.RESULT ANALYSIS

4.1. GENERAL

This chapter deals with the results of various mechanical properes rubberized concrete and steel fiber reinforced rubberized concrete and the result are compared with the results of convenonal concrete. In this present study, the workability test, the compressive strength test, split tensile strength were tested.

4.2. COMPRESSIVE STRENGTH TEST

The result obtained for cube compressive strength for different mixes at 7 days and 28 days. In this experiment, the compressive strength showed a decreasing curve when the percentage of crumb rubber is increased. The 28

compressive strength of normal concrete obtained is 45.50MPa. When the percentage of crumb rubber varied from 5-10% the strength reduced by 10-15%. When scrap steel fiber is added to the mix there is very low reducon in compressive strength. When the crumb rubber percentage varied from 5-10 in steel fiber mixes, the strength reduced only by 10-15%. In general, steel fiber rubberized concrete mixes shows higher compressive strength than rubberized concrete mixes.

20%	45%

For 28 days, result .

4.3. SPLIT TENSILE STREMGTH TEST

The split tensile test of normal concrete at 28 days obtained is 4.45. With the replacement of crumb rubber the strength is reduced by 30%. With the addion of scrap steel fibers this shows an increase in the strength. Steel fiber rubberized reinforced concrete mixes shows beer result than rubberized concrete mixes.

20%	46.5%

V. CONCLUSION AND FUTURE SCOPE

5.1. CONCLUSIONS

The following conclusion can be drawn from this study:

1. The compressive strength, split tensile strength decrease with the increase in the rubber content. This can be reduced by adding the steel fibers to it. Steel fibers shows higher compressive strength.
2. In rubberized concrete , when the rubber content varied from 3-12% the compressive strength reduced by 5-35%. But in the case of steel fiber concrete mixes
3. when the crumb rubber varied from 3-12%, the compressive reduced to 2-15%.
4. In rubberized concrete , the compressive strength with 3%replacement shows higher compressive strength than normal concrete.
5. In compressive strength SFRRC3, SFRRC6 and SFRRC 9 shows higher compressive strength than normal concrete.
6. In split tensile test, with the increase in rubber content there is decrease in split tensile test, but SFRRC3 AND SFRRC9 shows higher spilng tensile strength than the normal concrete.

5.2. FUTURE SCOPE

1. This study can be extended by increasing the percentage of rubber aggregate in the given design mix.

2. This study can also be done by using different grades like M40,M45 etc. for different types of percentage or by using the same given percentage.
3. More test can be performed for this study like flexure strength test, abrasion resistance , impact resistance test.

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Mitigation of The High-Frequency Components in A 3-Phase Supply Line Using Artificial Neural Network

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ABSTRACT

In recent years, the proliferation of high-frequency electronic devices has led to an increasing concern regarding electromagnetic interference (EMI) in various applications, ranging from consumer electronics to critical industrial systems. Traditional methods of EMI mitigation often fall short of addressing the complexities of high-frequency noise due to their limited adaptability and efficiency. In this context, the utilization of Artificial Neural Networks (ANNs) has emerged as a promising solution to tackle the challenges posed by high-frequency EMI. This paper presents a comprehensive study on the application of ANNs for high-frequency mitigation. We delve into the theoretical foundations of ANNs and their inherent capabilities for nonlinear modeling and pattern recognition, which are crucial for effective EMI suppression. Moreover, we explore different architectures of ANNs, including feedforward, recurrent, and convolutional networks, and investigate their suitability for various high-frequency EMI scenarios. The MATLAB simulation is performed having a Solar panel in it. The result session provides the complete analysis of the simulation model.

Keywords: Electromagnetic Interference, Artificial Neural Networks

I. INTRODUCTION

Offshore wind farms (OWFs) comprise extensive cable systems and medium voltage (MV) wind turbine step-up transformers, characterized by surge impedance lower than overhead lines. Consequently, switching surges may induce higher voltage transients. Furthermore, wind energy intermittency necessitates frequent and random breakers switching wind turbine generators (WTGs), leading to a high occurrence probability of switching overvoltages (SOVs). Cumulatively, these factors may surpass component voltage withstand levels, resulting in insulation damage, a notable issue in wind farm operations. Such SOVs exhibit steep fronts and short durations, posing reliability and stability challenges to OWFs and causing substantial economic losses. Hence, investigating switching transient characteristics, identifying failure causes during wind farm network energization, and proposing effective mitigation methods are imperative [1-3].

During VCB operations in OWFs, multiple strikes and reignitions produce SOVs. Simulations serve as crucial tools for identifying overvoltages and validating design parameters [4]. SOV magnitude and shape vary with system parameters, network configurations, circuit breaker operations, and point-on-wave switching. Hence, accurate validation of OWF component models is vital for precise switching studies [5,6]. Commercial simulation tools lack accurate models for HF switching transient analysis, necessitating user-defined models for OWF components. Accurate representation of circuit breakers in simulation tools ensures consistency between measurement and simulation results [7-9].

Previous research has focused on electromagnetic transient phenomena in large OWF collector grids. Initially, researchers concentrated on modeling main components and investigating SOVs during typical VCB switching operations through software simulations [10,11]. Some models overlooked crucial OWF component characteristics and failed to thoroughly explore SOV mitigation methods [12]. Traditional protection methods such as surge arresters, pre-inserted resistors (PIR), shunt reactors, and point-on-wave switching were employed, primarily reducing SOV amplitude with limited impact on the oscillation frequency. Given the high frequency of SOVs (e.g., 1 MHz) prone to causing insulation failures, alternative methods like surge capacitors and resistance-capacitor (RC) filters were investigated to detune HF overvoltages. Recent analyses have highlighted weaknesses in traditional protection methods and proposed new HF overvoltage mitigation strategies [13,14].

Higher frequencies can be introduced into power supply lines through various mechanisms, including:

A. Switching Devices

Power electronics such as inverters, converters, and switching power supplies operate at high frequencies. When these devices switch rapidly between on and off states, they can generate high-frequency noise due to the sharp edges of the switching transitions.

B. Harmonic Distortion

Nonlinear loads connected to power supply lines, such as electronic equipment with rectifiers or motor drives, can introduce harmonics into the power system. Harmonics are multiples of the fundamental frequency (typically 50 or 60 Hz), and they can extend into higher frequency ranges, especially in systems with poor power quality.

C. Transient Events

Transient disturbances, such as lightning strikes, switching surges, or faults in the power grid, can inject high-frequency components into power supply lines. These transient events often contain a wide range of frequency components, including high frequencies.

D. Electromagnetic Interference (EMI)

External sources of electromagnetic interference, such as radio signals, nearby electrical equipment, or industrial machinery, can induce high-frequency noise into power supply lines through electromagnetic coupling.

E. Power Supply Design

Inadequate filtering, poor layout design, and insufficient shielding in power supply circuits can lead to high-frequency noise being coupled to the power supply lines. This can occur due to parasitic capacitances, inductances, and resistances within the power supply components and circuitry.

F. Grounding Issues

Improper grounding practices or ground loops can introduce high-frequency noise into power supply lines. Grounding problems can result in voltage differentials between different parts of the system, leading to the injection of unwanted signals into the power supply lines.

G. Crosstalk

In systems with multiple power lines or signal lines running nearby, crosstalk can occur, where signals from one line induce unwanted signals in adjacent lines. This can result in the introduction of high-frequency components into power supply lines.

To mitigate the effects of high-frequency noise in power supply lines, engineers employ techniques such as filtering, shielding, proper grounding, isolation, and using components designed to handle high-frequency signals. However, this study is not enough to remove all the issues. The Machine Learning (ML)[15] or Neural Network-based [16-18] approach is more prominent and needs to be used to ensure the stability, reliability, and performance of the power supply system.

II. METHODOLOGY

The Proposed system includes main three parts.

- AC to DC
- DC to DC
- DC to AC

The controlling of these phases has been done by using ANN as a controller.

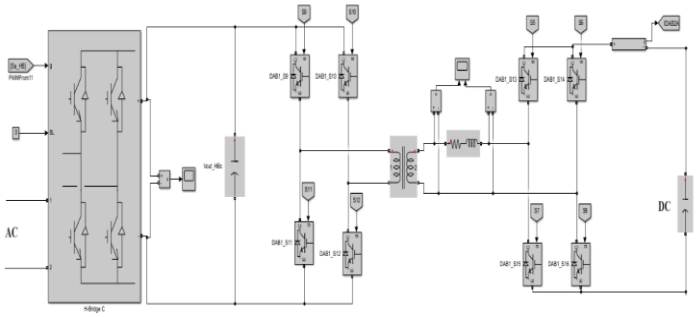

Figure 1: AC to DC conversion

Converting alternating current (AC) to direct current (DC) is a fundamental process in electronics, crucial for various applications ranging from power supplies to renewable energy systems. Traditional methods involve the use of rectifiers, which can be bulky and inefficient. However, with advancements in machine learning, specifically Artificial Neural Networks (ANNs), there's an opportunity to explore more efficient and potentially compact solutions for AC to DC conversion as shown in Figure 1.

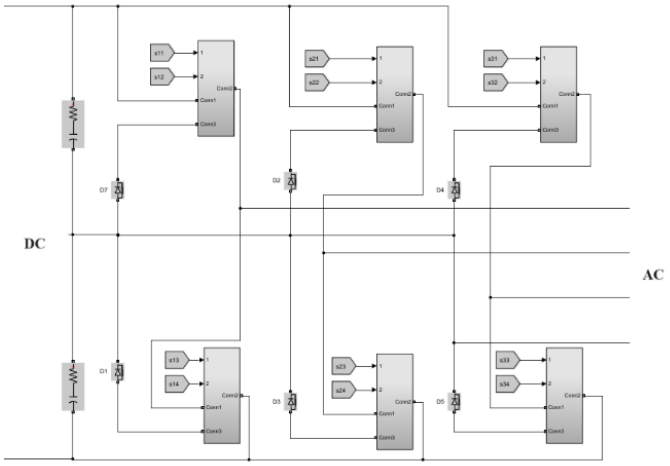

Figure 2: DC to AC conversion

Converting direct current (DC) to alternating current (AC) is a vital process in various applications, including renewable energy systems, electric vehicle charging, and grid-tied inverters. Traditionally, this conversion is achieved using pulse-width modulation (PWM) techniques or multilevel inverters. However, with the advancements in machine learning, particularly Artificial Neural Networks (ANNs), there's an opportunity to explore more efficient and potentially compact solutions for DC to AC conversion as shown in Figure 2.

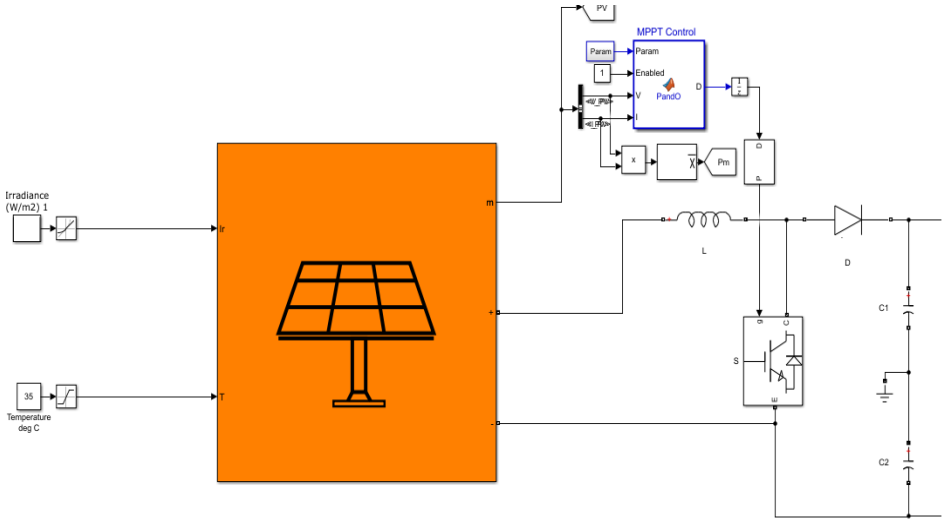

Figure 3: Solar panel with MPPT controller

Maximum Power Point Tracking (MPPT) is a crucial technology used in solar photovoltaic (PV) systems to ensure maximum energy extraction from solar panels under varying environmental conditions. Perturb and Observe (P&O) is one of the most widely used MPPT algorithms due to its simplicity and effectiveness. In this explanation, I'll describe the principles behind solar panels, MPPT, and specifically the Perturb and Observe algorithm, highlighting its operation and significance in maximizing solar energy conversion efficiency. P&O is a popular MPPT algorithm widely used in solar PV systems due to its simplicity and effectiveness. The P&O algorithm operates based on the principle of perturbing (changing) the operating voltage or current of the solar panel and observing the resulting change in power output. Based on this observation, the algorithm adjusts the operating point to approach the maximum power point.

Artificial Neural Networks (ANNs) are computational models inspired by the structure and functioning of biological neural networks. They are widely used in various fields, including electrical engineering, for tasks such as voltage and current control in power systems. In this context, MATLAB provides a powerful environment for implementing ANNs due to its extensive libraries and tools for neural network design and simulation. Before constructing an ANN, it's crucial to prepare the data. In voltage and current control loop applications, shown in Figure 4 involves collecting and pre-processing input-output data pairs.

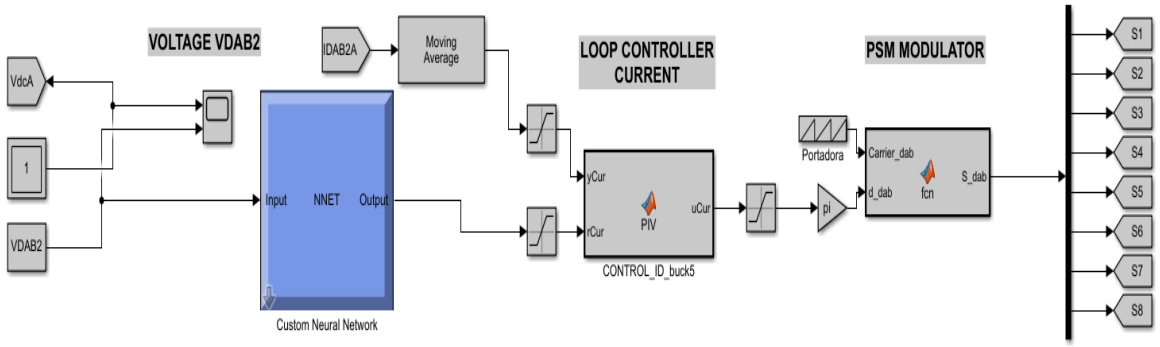

Figure 4: Closed loop voltage and current control loop using ANN

ANN includes three layers, viz., Input layer, Hidden layers, and output layer shown in Figure 5.

- Input layer: Neurons representing input variables, such as voltage and current measurements.
- Hidden layers: One or more layers of neurons that perform intermediate processing.
- Output layer: Neurons representing the desired output, such as the control signal for voltage or current regulation.

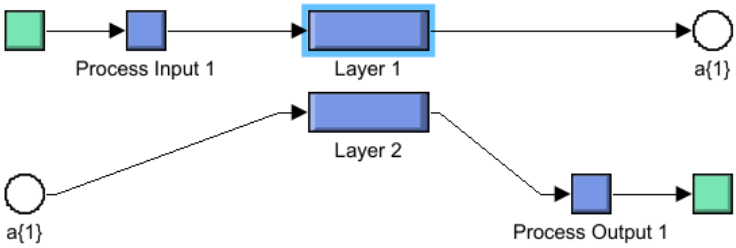

Figure 5: Layers in the ANN

The choice of activation functions in the hidden layers depends on the specific problem and may include sigmoid, tanh, or ReLU (Rectified Linear Unit) functions. For the output layer, the activation function is chosen as sigmoid as shown in Figure 6.

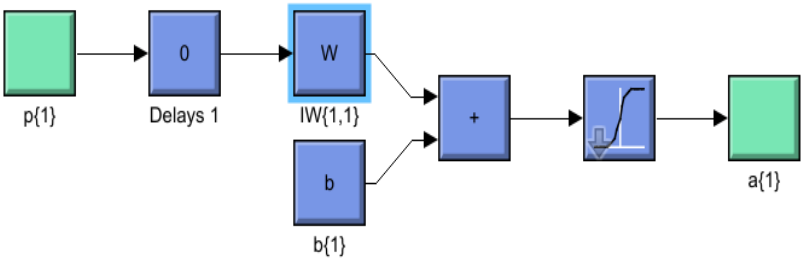

Figure 6: Detailed view of the layer with activation function

During training, the ANN learns to map input data to the corresponding output data by adjusting its internal parameters (weights and biases) through an iterative process. The goal is to minimize the difference between the predicted outputs and the actual outputs in the training data [Figure 7].

Training parameters to consider include:

- Learning rate: Controls the size of the weight updates during training.
- Number of epochs: The number of times the entire training dataset is passed through the network during training.
- Mini-batch size: The number of data samples used in each iteration of the training process.

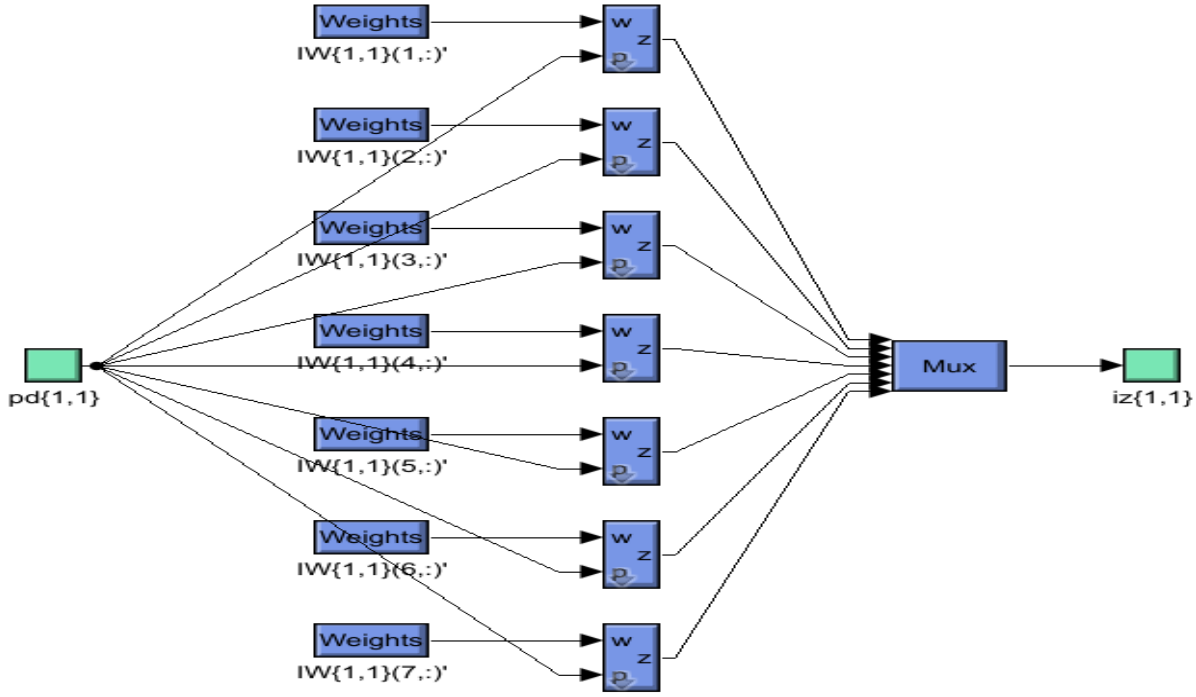

Figure 7: Weight adjustment while training the ANN

While testing ANN, the results give suppression of the higher frequency components which are present in the next chapter.

III.RESULTS AND DISCUSSION

The MATLAB 2018a is used for the simulation. Figure 8(a) shows the graph of frequency vs power. The graph shows the spread frequency spectrum. The same simulation is run and tested by using the fuzzy controller. The result of the simulation using a Fuzzy controller is shown in Figure 8(b). Finally, the result of the simulation by using ANN as a controller is shown in Figure 8(c).

Figure 8 clearly shows that the result of using ANN as a controller gives the most suppressed version of the higher frequencies.

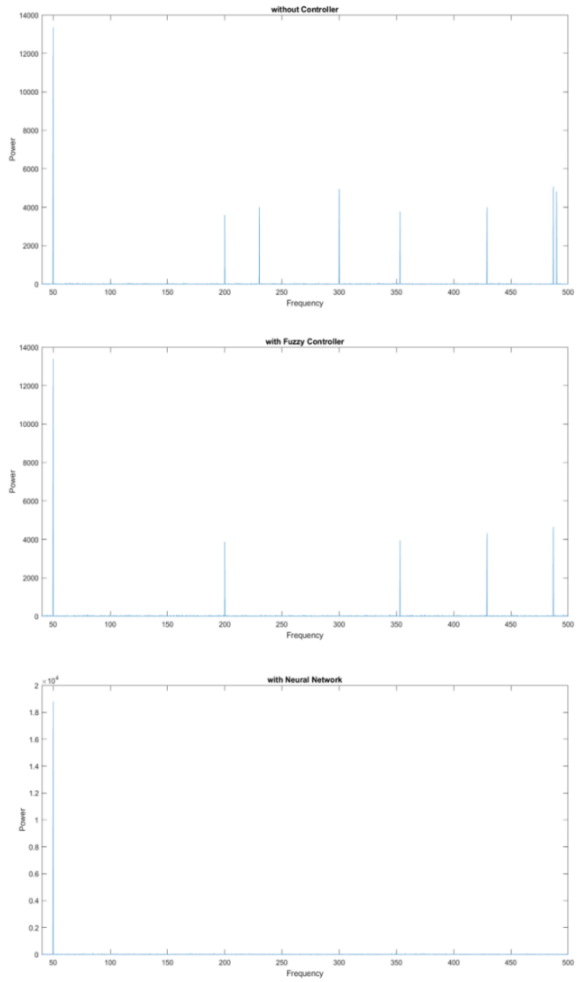

Figure 8: Frequency components present in the output (a). without controller action, (b). with Fuzzy controller, (c). with ANN as a controller

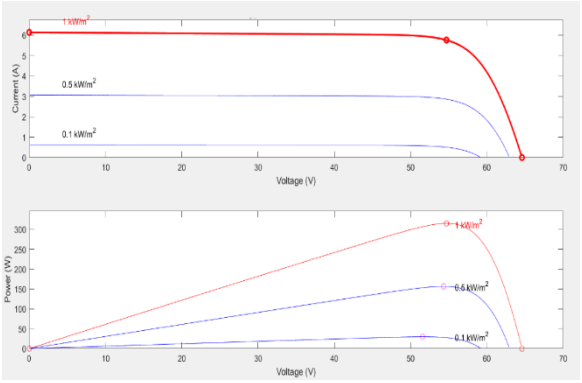

Figure 9: Graph of solar panel with Voltage vs. current and Voltage vs. Power

Figure 9(a) illustrates the relationship between the voltage (V) and current (I) output of a solar panel under various operating conditions and figure 9(b) illustrates the relationship between the voltage (V) and power (P) output of a solar panel under various operating conditions. By analysing these graphs, it becomes easy to determine the optimal operating conditions for solar panels and design MPPT algorithms to track the MPP efficiently. Additionally, these graphs provide valuable insights into the performance characteristics of solar panels under different environmental conditions and can aid in system optimization and design.

Figure 10 gives the time vs amplitude graph of the resultant waveform after mitigation of the higher frequencies using ANN. The waveforms shown in Figure 6 are more likely towards the ideal waveforms.

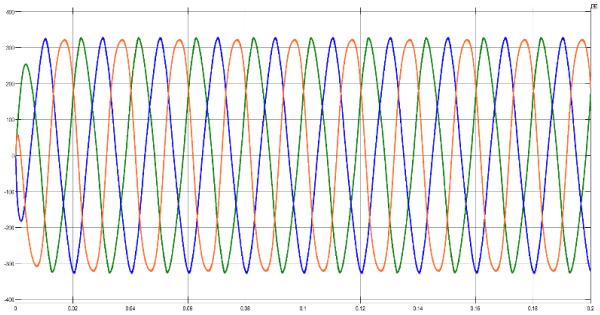

Figure 10: Time vs amplitude waveform after mitigation of the higher frequencies using ANN

The use of ANN for the mitigation of higher frequencies gives more reliable results. Also, the time required [19] for the mitigation of the higher frequencies is much less.

IV. CONCLUSION

This paper provides a comprehensive overview of the role of ANNs in high-frequency EMI mitigation, emphasizing their theoretical foundations, practical implementation aspects, and potential for future advancements. By leveraging the capabilities of ANNs, we can address the evolving challenges of high-frequency interference in modern electronic systems, paving the way for more reliable and resilient technologies in the era of ubiquitous connectivity. The results are well compared with the Fuzzy controller. It is proven that the result using ANN for mitigation of the higher frequency components are better and more reliable.

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Advanced Prototyping and Fabrication of Ergonomically Optimized Kitchen Chair

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ABSTRACT
This paper on "Advanced Prototyping and Fabrication of Ergonomically Optimized Kitchen Chair" aims to revolutionize the design and manufacturing processes involved in creating ergonomic seating solutions for kitchen environments. The primary objective is to develop a chair that not only meets the functional requirements of a kitchen setting but also prioritizes user comfort and well-being through advanced prototyping techniques. This paper commenced with an in-depth analysis of ergonomic principles, taking into consideration the unique demands of kitchen activities. Preliminary user feedback has been collected to refine the design further. Additionally, the utilization of advanced fabrication technologies has been pivotal in achieving precise and reproducible results. Moving forward, the project will focus on the optimization of materials, integration of smart technologies, and the enhancement of production efficiency. The ultimate goal is to deliver a cutting-edge kitchen chair that not only meets the functional requirements of a kitchen environment but also sets new standards in ergonomic design and user satisfaction.

Keywords: Prototype, Ergonomics, Fabrication, Kitchen Chair

I. INTRODUCTION

The "Advanced Prototyping and Fabrication of Ergonomically Optimized Kitchen Chair" is a transformative designed to revolutionize the way women experience and excel in the culinary realm. In recognition of the pivotal role that women play in household cooking responsibilities, this paper introduces an ergonomically designed chair infused with innovative features to empower women in the kitchen. This ground breaking chair aims to enhance comfort, efficiency, and convenience during culinary tasks. This paper provides a concise overview of the design elements, and potential impact, offering a glimpse into how this innovative kitchen chair can positively influence the lives of women by creating a more inclusive, efficient, and enjoyable cooking experience.

Women frequently face ergonomic challenges in the kitchen, where they spend significant time preparing meals. The lack of suitable seating options results in discomfort, poor posture, and even physical strain during cooking as well as the traditional kitchen setups often lack ergonomic considerations, leading to discomfort and

physical strain for women while performing culinary tasks. This paper is to address these challenges by designing an innovative kitchen chair that prioritizes comfort, efficiency, and empowerment, ensuring that women can enjoy cooking without experiencing physical discomfort or limitations.

The innovative kitchen chair for women empowerment in culinary tasks is highly relevant in today's context for several reasons:

- Health and Well-being: Cooking is an essential daily task, but it can also lead to physical strain and discomfort, particularly for those who spend extended periods in the kitchen. This innovative chair aims to improve the health and well-being of women by providing ergonomic support and reducing the risk of musculoskeletal issues.
- Efficiency and Productivity: A well-designed kitchen chair with innovative features can enhance the efficiency and productivity of cooking tasks. This can lead to better meal preparation and ultimately save time for women, allowing them to pursue other interests or activities.
- Independence and Empowerment: By providing women with a tool that makes cooking more accessible and enjoyable, this paper promotes their independence and self-reliance in the kitchen. It encourages them to take charge of their culinary skills and creativity.
- Enhanced Comfort: Adjustable height, swivel functionality, padded seating, and backrest ensure optimal comfort during cooking.
- Entertainment: The integrated FM radio system adds a new dimension to the cooking experience, allowing users to enjoy music or stay informed while preparing meals.
- Efficiency: Attachments for cooking tools, adjustable work surface, and built-in storage compartments improve efficiency and organization in the kitchen.
- Safety: The adjustable LED light enhances visibility during cooking tasks, reducing the risk of accidents etc.

II. LITERATURE REVIEW

S. A. Abdulkadir et al., “Design of an ergonomic chair with headrest and armrest using anthropometric data”, this paper focused on the design of chair, using anthropometric data of students taken in relax state of standing and sitting posture. The application of anthropometry and ergonomics in chair design contributes in improving human efficiency in performance; minimize hazards, lower back pain and musculoskeletal disorders. Improper use of anthropometric data application can result to chronic back pain, injuries and illness due to occupational health related problems [1].

R.A.R.C. Gopura et al., “Design of an Ergonomically Efficient Chair”, This paper tell about Ergonomically designed chairs are important for long time seated workers to increase their productivity and also to reduce low back injuries due to use of poorly designed chairs in ergonomic aspects. In addition, ergonomically designed chairs increase the seating comfort ability of the chair users. Most of the chairs designed for the long time seated workers are not considered the full ergonomic aspects. In this paper, we discuss a design of an ergonomically efficient chair for the long time seated workers to increase their productivity and also to reduce low back injuries [2].

Ismail Wilson Taifa et al., “Anthropometric measurements for ergonomic design of students’ furniture in India”, this paper presents anthropometric measurements regarding engineering students in India. Health survey (ergonomic assessment) was carried out to know the health status of all students who have been using poorly

designed furniture. The data were measured with the help of various tools. After data collection and analysis, authors came up with exhaustive dimensions for designing adjustable classrooms furniture. Therefore, an implementation of these data will help to create comfort ability, safety, well-being, suitability, reduce musculoskeletal disorders, and improve performance of students in terms of attentiveness [3].

III. RESEARCH GAP

Many ergonomic kitchen chairs on the market are designed with a one-size-fits-all approach, which may not take into account the specific needs and challenges faced by women in culinary tasks. This research aims to bridge the gap by developing a chair tailored to women's requirements. Existing research on ergonomic kitchen furniture often lacks in-depth studies specifically focused on women. This paper seeks to address this gap by conducting comprehensive ergonomic assessments, considering factors such as body size, posture, and physical comfort unique to women. Also, while some kitchen chairs offer ergonomic features, they do not integrate technology elements such as integrated FM radios as we are using it in our work that could further enhance the cooking experience.

IV. PROJECT OBJECTIVES

Promoting women's independence and confidence in the kitchen and creating a chair design that promotes proper posture, reduces physical strain, and accommodates a range of cooking activities.
Facilitating ease of movement within the kitchen, allowing women to access various cooking areas effortlessly, enabling them to enjoy cooking without physical discomfort.

V. METHODOLOGY

Research and data collection on women's needs in the kitchen Collaborations with designers and ergonomics experts. 3D Models, prototypes and evaluations Materials and Sustainability and manufacturing and cost analysis User feedback and iterative design improvements User testing and Feedback.

Data collection based on women’s needs and requirement

⇩

Selection of Materials for manufacturing and fabrication

⇩

Designing the prototype 3D model in a CAD

⇩

Fabrication actual prototype model of a chair

⇩

Testing of a model and taking a feedback for iterative design improvement

⇩

Final prototype model for use

Figure 1: Methodology Flow chart

VI. SURVEY DETAILS

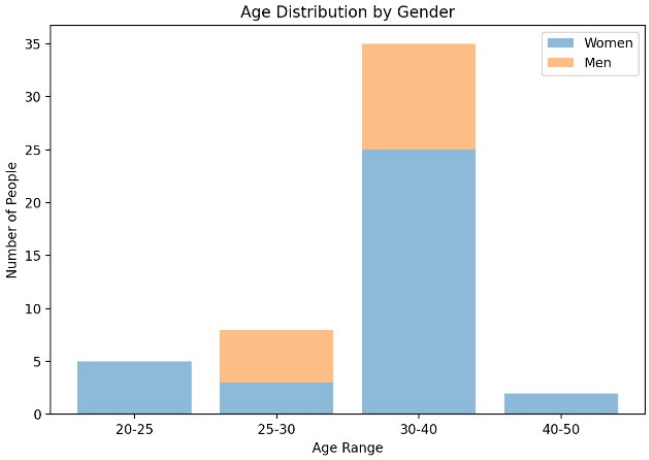

Figure 2: Graph age range vs Number of people

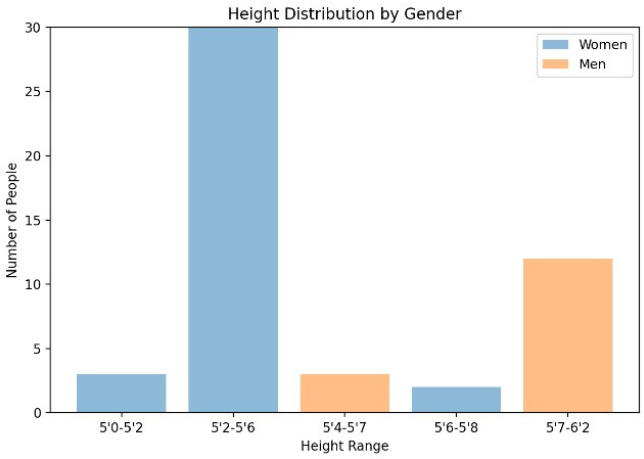

Figure 3: Graph Height range vs Number of people

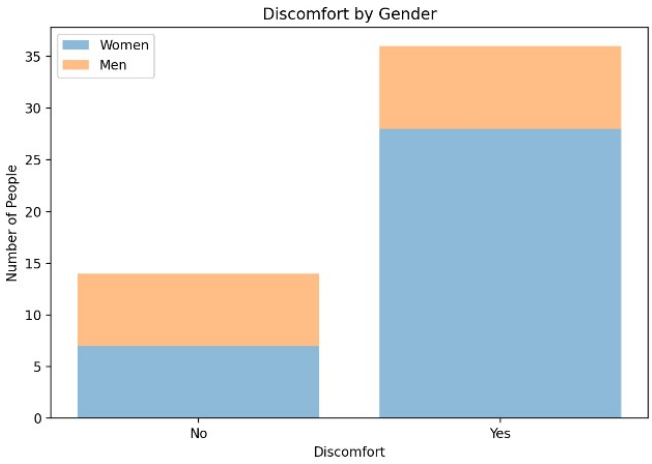

Figure 4: Graph Discomfort vs Number of people

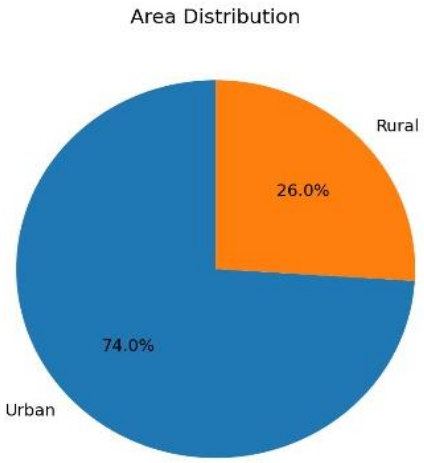

Figure 5: Graph Discomfort vs Number of people

VII. CHAIR MODEL

Figure 6: Fabricated Chair model

VIII. CONCLUSION

Furniture design associated to technical norms and to ergonomics collaborates to the relations of these products usability through manufacture optimization and products usage facility. Furniture design may place on the user's motions; the bodies' capacity to function in cramped or awkward quarters is bondless. This is due to that, majority of people in India has a culture of sitting in awkward posture for long time at a floor or any furniture provided. In long run such habit has a great chance of causing to some ergonomic problems including MSDs, an anthropometric application for the kitchen chair should consider at the time of furniture designs for the

Household woman's can enhance good designs depending on what is much preferable at the particular place. This will be much helpful for the health status of woman's in the long run.

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Design and Development of Electric Vehicle for Controller

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ABSTRACT
In this paper, we designing and developing controller and converter for the electric vehicles. In the electric vehicle battery is used as the energy source, by using of this battery operating electric motor. If we connect this battery direct to motor without any control device then it causes some unwanted problems in EV's. Because of the output voltage of battery is not suitable to operating Electric vehicles. Which means without any control mechanism the output voltage cannot be controlled and it will give divergence in output voltage in terms of error signal. Its result battery output power will reduce and therefore the performance of electric vehicle is go down in terms of power torque to drive vehicle. So in electric vehicle use of control mechanism is mandatoryto control the output voltage of battery and that canachieve proper power and torque by a proper feedback control system. But price of the EV's are to much high higher the electric vehicle because of battery, motor and EV Controller.
Keywords: - Sensors, Motor, Microcontroller.

I. INTRODUCTION

Transportation is very important in for the development of a country. it enables the movement of people, goods and services. Which helps to growth of various sectors of economy. Road transportation is primary mode of transportation it consumes 88% sector of total transportation. To that transportation IC engine vehicles are used. Controller is used in EV's to control various actions of motor. A controller is a device that controls the speed, torque, direction, and power of an electric motor that drives an EV. It also enables the regenerative braking, which recovers someof the energy lost during braking. Converter is also important part of EV it decrees or increase the voltage level according to required voltage rating. In EV different component are used which operate at low voltage rating and battery output voltage is high it will possible to damage components. Therefore converter is used in EV's. But the cost of EV's is higher than IC engine vehicles because of cost of battery, motor and controller. In this paper we are representing the design and the development of EV controller and controller at cheaper cost and low weight.

➢ Electrical Vehicle

Electric vehicles are classified in to four main types:
Electric vehicles are classified based on the type of power source they use and the degree of electrification they have. There are four main types of electric vehicles:

- Battery electric vehicles (BEVs): These are fully powered by electricity and have no internal combustion engine or fuel tank. They rely on a large battery pack that can be charged by plugging into an external source of electricity.
- Plug-in hybrid electric vehicles (PHEVs): These use both an internal combustion engine and a battery-powered electric motor. The battery can be charged by plugging into an external source of electricity or by the engine. PHEVs can switch between electric and hybrid modes depending on the driving conditions.
- Hybrid electric vehicles (HEVs): These also use both an internal combustion engine and a battery-powered electric motor, but the battery cannot be charged externally. The engine is used to drive the vehicle and to charge the battery when it is low HEVs are more efficient than conventional vehicles, but less efficient than PHEVs or BEVs.
- Fuel cell electric vehicles (FCEVs): These use a fuel cell to generate electricity from hydrogen and oxygen. The only emission from FCEVs is water vapor. FCEVs have a high driving range and can be refueled quickly, but they are expensive and require a hydrogen infrastructure.

II. LITERATURE SURVEY

A. Paper 1: "A Study on Recent DC-DC Converters" Sidharth Sabyasachi, Mousumi Biswal's.

This paper presents a study on recent developments in dc-dc converters. All the converters are derived based on the two basic converters such as buck converter and boost converter. The aims of developing the converters are high efficiency and high gain with fast response. Research work has been grown dramatically to provide the service to the mankind.

B. Paper 2: "Methods of Fast Analysis of DC–DC"- Górecki, P.; Górecki, K.

The paper discusses the methods of fast analysis of DC– DC converters dedicated to computer programs. Literature methods of such an analysis are presented, which deter mination of the characteristics of the considered converters in the steady state and in the transient states.

C. Paper 3: "DC-DC Converters for Electric Vehicles"- Joeri Van Mierlo ,Monzer Al Sakka,Hamid Gualous.

DC-DC converters can be used to interface the elements in the electric power train by boosting or chopping the voltage levels Thus, in this chapter, a comparative study on three DC/DC converters topologies (Conventional step-up dc-dc converter, interleaved 4-channels step-up dc-dc converter with independent inductors and Full-Bridge stepup dc-dc converter) is carried out. The modeling and the control of each topology are presented.

D. Paper 4: "Controller Design for Electric Motor Derived Vehicle"- Degu Mena, Nitin Kumar Saxena *.

In this paper, proportional and integral based controller is designed for controlling the output voltage of battery. A PI based controller is designed and implemented for this electric motor derived vehicle in the present paper. Paper demonstrates how the results improve in presence of controller circuit for this electric motor derived vehicle.

➢ **Motor Controller**

In most of EV's BLDC motor is used a BLDC motor controller is a device that controls the speed and direction of a BLDC motor. A BLDC motor is a type of electric motor that does not have any brushes or commutators to transfer electricity to the spinning part. Instead, it uses magnets and coils to create motion.

The BLDC motor controller switches the electricity on and off in the windings in a specific sequence. This sequence makesthe magnetic field of the stator change its direction and strength. The changing magnetic field attracts and repels the magnets on the rotor, making it spin. The controller can also Adjust the amount of electricity in the windings to change the speed and torque of the motor.

The BLDC motor controller has some advantages over a brushed DC motor controller. It is more efficient, reliable, and durable because it does not have any mechanical parts that wear out sparks. It also produce less noise and heat.

III.PROPOSED SYSTEM

A. Problem Statement:

➢ Control of Motor Speed:

The speed of an electric vehicle (EV) is controlled by the vehicle's controller, which operates between the batteries and the motor. The controller simply regulate DC current flow for DC motors. The accelerator pedal sends a signal to the controller which adjusts the vehicle's speed by changing the frequency of the motor. Modern controllers adjust speed and acceleration by an electronic process called pulse width modulation.

This createsrotating magnetic fields that are always just ahead or just behind the poles of the motor, depending on the direction of motion. The controller also needs to synchronize the timing of the electrical currents with the position of the motor, which can be measured by sensors or estimated by algorithms.

➢ Control of Battery Voltage

The battery voltage in an electric vehicle (EV) is controlled by a battery management system (BMS), which is a device that monitors and regulates the state of the battery pack.

B. Block Diagram:

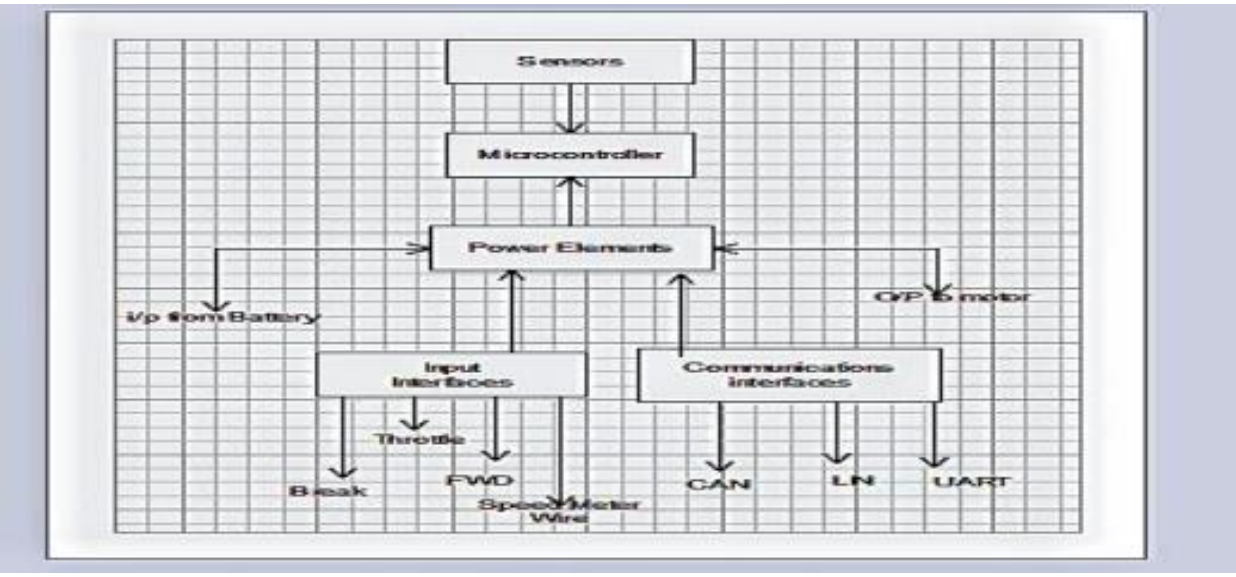

Fig 2: Block Diagram of Controller

C. Hardware Requirement:

- Microprocessors
- CAN
- Motor speed sensor
- Battrey voltage sensor
- Throttle position sensor
- Breaking Sensor
- DC to DC Converter

D. Fundamental Steps for System

➢ System Requirements Analysis:

Define the electrical specifications of the electric vehicle system, including voltage levels, power ratings, efficiency targets, etc.

Identify the control and conversion requirements such as motor control, battery charging, power factor correction, etc.

➢ System Modeling and Simulation:

Develop mathematical models for individual components like motors, batteries, power electronics, etc., using circuit theory and electromechanical principles. Simulate the models using software tools like MATLAB/Simulink, PLECS, or LTspice to analyze the behavior of the system under different operating conditions.

➢ Control Algorithm Design :

Design control algorithms for motor drives, battery management systems, and power converters. Choose appropriate control techniques such as PI control, predictive control, or sliding mode control based on system requirements and performance criteria. Implement algorithms for tasks like torque control, speed regulation, current limiting, etc.

➢ Converter Topology Selection and Design:

Select suitable power converter topologies such as voltage source inverters(VSI), current source inverters(CSI), or buck-boost converters based on the application requirements. Design the converter circuits considering factors like efficiency, voltage/current ratings, switching frequency, and component stresses. Optimize the design for features like soft switching, high-frequency operation, and compactness.

➢ Gate Drive and Protection Circuit Design:

Design gate drive circuits to properly control the switching of power semiconductor devices (e.g., MOSFETs, IGBTs) in the converters. Implement protection features like overcurrent protection, overvoltage protection, and thermal protection to safeguard the converter and connected components.

➢ Implementation and Hardware Integration:

Implement the control algorithms and converter designs using microcontrollers, digital signal processors (DSPs), or FPGA-based platforms. Develop hardware interfaces for sensors, actuators, and communication buses to enable real time control and monitoring. Integrate the control and converter hardware into the electric vehicle's powertrain system.

➢ Testing and Validation:

Conduct laboratory tests to verify the functionality, stability, and performance of the controller and converter under various operating conditions. Perform hardware-in-the loop (HIL) simulations to validate the real-time

behavior of the system. Ensure compliance with safety standards and regulations for electric vehicle components.

- Deployment and Maintenance:

Deploy the controller and converter systems in electric vehicles for field testing and real-world operation. Monitor system performance and reliability through diagnostics and data logging. Provide firmware updates and maintenance as needed to address issues and incorporate improvements.

IV. RESULT

- Input Location

Fig 3: Input Page

Fig 4: Output Page

V. RESULT DISCUSSION

- Protection Mechanisms. Discuss how the Performance Evaluation:

Assess the performance of the controller and converter in terms of motor drive efficiency, battery charging efficiency, and overall system responsiveness. Discuss how well the control algorithms achieve desired objectives such as torque control, speed regulation, and battery management. Present experimental data or simulation results to illustrate the system's dynamic response under different operating conditions (e.g., acceleration, deceleration, steady-state driving).

- Efficiency Analysis:

Analyze the efficiency of power conversion processes within the system, including losses in the converter components (e.g., switching losses, conduction losses). Compare the efficiency of different converter topologies and control strategies to identify areas for optimization. Discuss the impact of efficiency improvements on the electric vehicles overall energy consumption and driving range.

- Stability and Robustness:

Evaluate the stability and robustness of the control algorithms under various disturbances and uncertainties. Discuss the effectiveness of control strategies in maintaining system stability during transient events such as sudden load changes or voltage fluctuations. Present results from sensitivity analysis to assess the system's tolerance to parameter variations and external disturbances. Address the safety features implemented in the controller and converter design, such as fault detection, isolation, and system complies with relevant safety standards and regulations for electric vehicle components. Present reliability assessments, including mean time between failures (MTBF) calculations or failure mode and effects analysis (FMEA), to demonstrate the system's reliability in real-world applications.

- Comparison with Requirements:

Compare the achieved results with the initial design requirements and specifications. Discuss any deviations from the original requirements and the corresponding implications on system performance and functionality. Highlight areas where the system exceeds or falls short of the specified targets and provide recommendations for future improvements. Future Directions and Improvements Identify potential areas for further optimization and enhancement in the controller and converter design.

Discuss future research directions, such as exploring advanced control algorithms, optimizing power converter topologies, or integrating additional functionalities (e.g., vehicle-to-grid capabilities). Propose strategies foraddressing emerging challenges in electric vehicle technology, such as increasing power density, improvingenergy efficiency, and enhancing system integration.

VI. CONCLUSION

In conclusion, the designing and development of EV controller and converter for electric vehicles is a challenging task that require the information about various component. The EV controller is responsible for controlling the speed, torque, direction, and power of the electric motor. It also support various modes of operations. The electric vehicle controller is a vital component for electric vehicles, as it regulates the speed and torque of the motor according to the driver's demand and the vehicle's operating conditions.

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Hybrid Hydro Power Generation with Archimedes Screw Turbine: A Study

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ABSTRACT

A huge number of traditional watermills mainly in the Western Himalayan region of India (approximately 500,000), have the capacity to harness a total of 2500 MW/hour or 40 million units with the aggregate earning of Rs 1200 million per hour. But this potential is almost completely unexplored in the region. The adoption of the Archimedes Screw Turbine in the European countries at an extensive level. It is time for this region in India to efficiently utilize its water

resources to generate electricity for sustaining the growing population of the region as well as the country as a whole. As electricity plays an important role in our lives it is very important to see new feasibilities to generate electricity.

The benefits of using the Archimedes screw turbine have been highlighted by various researchers including and it is evident that at low head and low flow rate conditions, these turbines work most efficiently. Though, it will be of great importance if all the parameters of the Archimedes Screw Turbine and their effect on efficiency are determined. Here in this research efforts have been made to identify various internal and external parameters of the screw turbine that can affect the efficiency. The best configuration of parameters and screw configuration are to be proposed for the implementation at traditional mills for electricity generation.

Keywords: Archimedes Screw Turbine, Small Hydro Power, Hybrid power generation

I. INTRODUCTION

Micro-hydro power plants have a capacity of 1 MW or less. Micro-hydro generating systems have different environmental impact profiles than larger scale hydro generating plants. The screw turbine is typically covered in an inclined trough and is free to rotate along the axial length. When used as a pump, the lower end of the screw is placed in water and mechanically rotated. As the turbine rotates, the turbine rotates in the axial length of the screw to a higher elevation.

Water is introduced to the top of the screw and allowed to flow through the screw from high to low elevation. As the water transverses the screw, the formed water buckets create a difference in pressure on the opposite

sides of the helical planed surfaces. Because of the shape of the plane surfaces, a component of this pressure differential force always acts in a direction normal to the central cylindrical shaft causing the screw to rotate. Connecting a generator to the screw shaft, the mechanical rotation can be converted to electrical power. While Screw type turbine technology dates back to antiquity, their use as generators is relatively new. Solar panel and battery used for charging with storage the electrical power for long time.

II. LITERATURE REVIEW

Prof. Sagar P. Thombare and et al., (2017) they presented the intention of any hydroelectric generating station is to convert potential energy associated with the water in a watercourse passing the station into electrical energy. Landustrie has broad experience in the field of screw pumps and screw pump installations. For nearly 100 years Micro-hydro power plants has designed, manufactured, supplied, erected and maintained many types of screw pump configurations. Since the early eighties Micro-hydro power plants has had available a fully automated screw pump selection program which is used to select the optimum screw pump for a particular application. The program is based on a large number of tests, with an equal number of variables; in the Micro-hydro power plants test facility.

Erinofiardi, A. and et al., (2017) they discussed the potential energy from fluid flow of small rivers or irrigations could be extracted become electricity by using screw turbine. This turbine is promising because the advantages of ultra-low head and fish friendly. Experimental performance of screw turbine for ultra-low head hydro resource is presented in this paper. The screw turbine with an outside diameter of 142 mm and the water flowrate of 1.2 l/s with the head of 0.25 m, can produce maximum power 1.4 W with 49% efficiency at 22o angle of inclination.

This turbine has one blade screw and screw turbine experiment apparatus is made by using locally available materials. The screw turbine has shown good potential to be used for low head micro hydro-electric installations. This paper reports on a performance analysis based on the experimental data collected from different performance tests carried out on some inclination angle position of screw turbine prototype.

Erinofiardi, (2014) presented the design a prototype of screw turbine for power generation. Using principles of velocity vector, the governing equations have been identified for an ideal case of force acting on blade. The paper also describes the conception of a screw turbine rotor for remote area electricity production. The research is done by calculating based on theoretical way and compared with experimental results. Output power can be generated by this small size of turbine is 0.236 watt theoretically and 0.098 watt experimentally. Various losses in the system are discussed, which is also demonstrated that the experimental power outputs and theoretical predictions has a discrepancy. However, it has a great potential to be used for remote area to generated power by using low head water source as this research is developed.

Shashank L., et al., (2021) studied the screw rotary engine rotor for remote space electricity production. The analysis is finished by examining theoretical calculation to experimental results. The performance of Archimedes water turbines that has completely different blade numbers that square measure evaluated to get correct blade configuration. Varied losses within the system square measure mentioned, showing that the experimental power outputs and theoretical predictions have variations. The micro-hydro power station supported by Archimedes Screw could be a form of renewable energy power station that additionally operates at low prices. It needs no reservoir to power the rotary engine. The water can run straight through the rotary engine and into the stream or stream to use it for the opposite functions. This features the lowest

environmental impact on the native scheme.

Dornal Navin Vijay, et al., (2020) studied the India has more than 600 rivers. It is difficult to construct dams on any type of river. The farmer's residency is on the basis of river. By power derived from the potential energy and running water production of electrical power through the use of the gravitational force and electricity generated is called as hydroelectricity. Therefore the hydro-power plant is used in this type of conditions. Hydro-power plant has an important source which deals with the water flow. Hydro screw is suitable for a low head discharged which does not guide to draft a tube. Geometrical dimension of one screw blade is of the angle of 500 .the turbine slope variable are 200, 300 and 400. According to experimental data, the turbine's maximum efficiency is 83%. This has an important property in which the inclination of angle is increased which results in the large amount of the flowing water and this power plant is environment friendly. This power plant was used for small rivers.

Rizki Nurilyas Ahmad, et al., (2022) presented the utilization of renewable energy sources is a necessity to reduce the consumption of fossil energy sources. On the end of 2021, it was reported that world was experiencing an energy crisis, so the use of renewable energy sources is being something urgent. Renewable energy power generation can be done in large scale to small scale even on household level. Electrical energy independence can be achieved, one way by utilizing available energy sources surrounding house.

Several energy sources that can be utilized around the house including water, wind, sunlight etc. Water as one of energy sources can also be obtained from the water flow in household plumbing systems. In this research, analysis of the output characteristics of generator was carried out from mini generator connected to screw turbine with in-pipe water flow as the energy source. Design and measurement have been done on the prototype to see the output characteristic of generator. Measurement on prototype have shown results to produce 1.56 watt and 9.6 volt at maximum water discharge 0.317 l/s, these results are quite low considering power measured at the turbine reaches about 7.45 watt. With further research, another more efficient and proper configuration can be obtained.

Cristian Purece and Lilica Corlan, (2021) presented the Hydraulic energy is one of the most important sources of renewable energy today. It is also a complementary source to other renewable energy sources, being the only one that offers an important nonpolluting storage capacity (through pump storage facilities). Another essential quality of hydraulic

energy is its ability to regulate the energy system to allow the integration of other sources, in which the process of generating energy depends on factors that cannot be controlled (sun, wind, etc.).

However, hydropower plants can damage ecosystems, especially by affecting fish within their turbines. Usually, fish cannot pass unharmed through most of the turbines. The main exceptions generally include some low head (below 8 m) turbines, such as the Very Low Head (VLH) turbine and the screw turbine, but lately strategies have also been developed for high head hydropower plants such as: fish passage facilities and fish friendly turbines such as Alden turbine, Minimal Gap Runner turbine (MGR). However, this article only deals with screw-type turbines, lowhead fishfriendly turbines and how to implement them in order to obtain sustainable green energy.

Pallav Gogoi, and Mousam Handique et al., (2018) presented them with growing population of India, the demand for energy consumption is increasing. For an overall development of a region, especially remote areas, electricity is of prime importance. Production of electricity in large scale can further lead to various effects like environmental pollution, climate change and it is also costly. Thus the need of a socio-economic energy conversion to electricity is of prime importance for a sustainable development. India have a huge potential in

the Hydro to generate 2,50,000 MW.

An Archimedes Screw Turbine that was earlier used as pump can give a very good solution in harnessing water potential. It rotates as water flows through it, rotating the generator's prime mover connected to it. Archimedes Screw turbines operate at low head of 0.8m to 10 m and relatively lower flow rate than the other turbines and more cost effective and are highly efficient. The AST is quite a new form of electricity generation practice which has been implemented in different countries along with India. Thus the electrification scenario in rural areas can be improved specially where there is a continuous flow of a river or canal by the installation of the low cost socio economic AST.

Kamal Kashyap and et al., (2020) presented the abundant sources of low head water streams in the Western Himalayan region create huge potential in terms of micro-hydro power generation capability, and the existing Gharats (Traditional Watermills) that were used previously for grinding flour provides an already built plant for the electricity generation.

The Archimedes screw turbine is being explored all around the world as one of the best candidates for efficient electricity generation at low head and low flow rate sites. But there is a lack of research in identifying the best screw configuration for achieving maximum output power and efficiency at such low head and low flow rate sites.

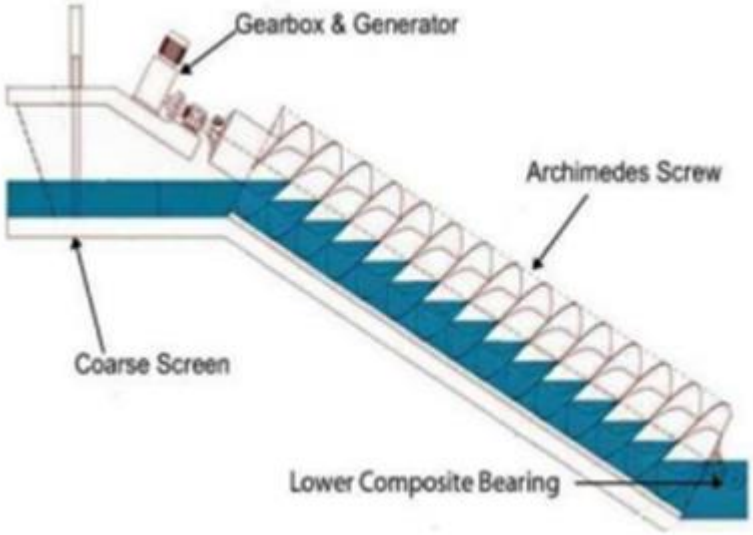
The experimental analysis conducted here reveals that the screw angle ranges from 20o to 25o with flow rate below 1.5 L/s increased the efficiency of the Archimedes Screw Turbine to around 90%. For better performance and to reduce the overflow losses the RPM of the turbine kept constant. The experimental analysis showed that Archimedes Screw Turbine can produce a humungous amount of power when implemented at 500,000 traditional water mills and easily support the adverse power requirement of the country in a cost-effective manner.

Danish Pinjari and et al., (2021) presented the due to their excellent efficiency (more than 80% in some installations), low cost, and little environmental effect, Archimedes screw generators (ASGs) are becoming more extensively used at low head hydro sites in Europe. ASGs have the most potential at low head sites as compared to other generation technologies (less than about 5 m). The performance of an Archimedes screw used as a generator is determined by a variety of factors, including the screw's inner and outer diameters, slope, screw pitch, and a number of flights, as well as intake and outlet conditions, site head, and flow. Despite the Archimedes screw's extensive history, English literature contains very little on the dynamics of these devices when utilized for power generation.

To support the creation and validation of ASG design tools, laboratory testing of miniature Archimedes screws (about 1 W mechanical power) was done. The link between torque, rotation speed, and power is investigated in this work using experimental results. Although separate efficiency peaks were discovered, the laboratory screw maintained reasonable efficiency throughout a wide variety of operating circumstances.

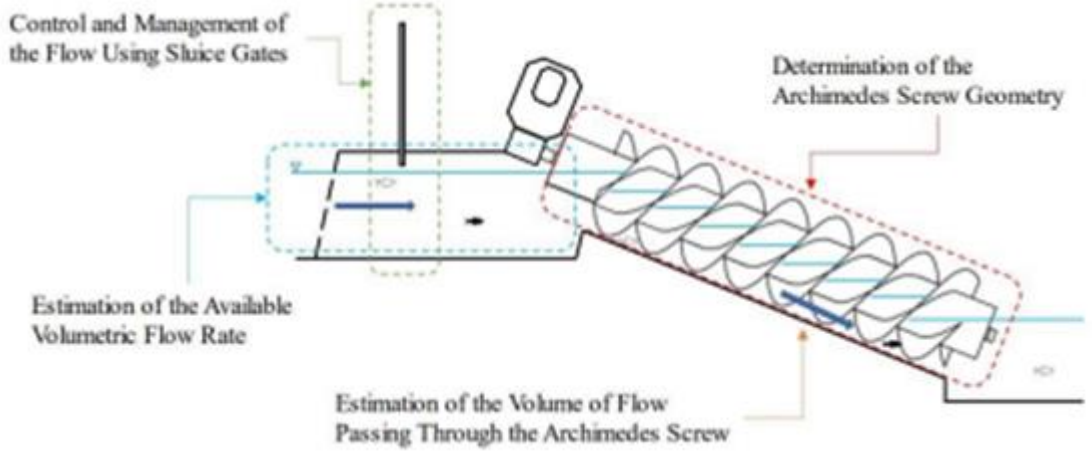
The source of changes in power output induced by modifying the water level at the screw's outlet was primarily attributed to the corresponding variation in the head, as well as dynamic restriction of screw rotation speed, which created comparable limits in volume flow through the screw. The test results were qualitatively similar with data from a prototype ASG erected by Green bug Energy in southern Ontario, Canada, as well as data from recent laboratory testing and commercial installations in Europe

III.MODEL DIAGRAM



IV. WORKING

The screw turbine was known for the low pressure turbine. It consists of screw shaped bucket arrangement which rotates when water pressure was applied on them. This
are inclined at particular angle to maintain the water pressure needed for rotation Generator is designed in such a way that the speed of the turbine generates power. It is coupled with turbine with gear drives which maintain the speed of the generator in circular manner. It rotated at constant of rated RPM which generally for this turbine is 10-20 revolution per minute. These generators are designed for most expensive as compared to conventional one.



V. ADVANTAGES

- Highest possible efficiency under any possible condition
- Self-regulating to changing water flow Simple and small installation
- Easy implementation in existing situations
- Entirely fish friendly

- Open and robust construction
- Ultra long life time of at least 30 years Insensitive to clogging
- Operates completely without fine screen
- Low maintenance costs 24/7 energy supply

VI. APPLICATIONS

- Rivers
- Cooling water outlets from power stations
- Industrial process water (for example Project or steel mills)
- Water treatment inlets (Municipal and Industry)
- Water treatment outfalls (Municipal and Industry)
- Replacement of waterwheels and other types of generators

VII. FUTURE WORK

To get optimum parameter design, it needs to be done more research in other angle of trough and blade, and also addition on number of blade and influenced of length of blade screw.

VIII. CONCLUSION

The Micro hydropower based on Archimedean turbine is an eco-friendly, fish friendly & there is no requirement of deforestation as well as people displacement and other harassments. In these types of plant there are no requirements of big dam, high Discharge, high Head & penstock etc. The efficiency of plant does not vary with load, but Power output & Speed of this plant vary with discharge at same Head condition. Hence this type Micro hydropower based on Archimedean turbine plant is most suitable hydro power plant in the present as well as future.

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The Application of Waste Masks in Making the Pavement Blocks

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ABSTRACT
In Covid 19 we used masks to protect our self from viral infection. But now a days the people uses masks daily to avoid contamination and protect themselves from the disease and dust. As a mask can't be reused so, it generates a waste. To reduce this waste generated from the used masks we attempted to use them in concrete paver block as one of the ingredient at 20% of concrete. The results of study shows that the strength of the block is considerable and this material can be used as ingredient in paver making.

Keywords:

I. INTRODUCTION

The history of concrete paving blocks can be traced back to the 19thcentury, when paving stones were utilized in European countries for constructing roads, serving as footpaths and tracks for steel-wheeled vehicles. Interlocking Concrete Block Pavement (ICBP) is an environmentally friendly and labor-intensive paving method that is widely employed in many nations to address specific paving challenges. In previous studies it has been found that the use of masks at 16% the strength of paver blocks is so good [1]. Paver block paving is adaptable, visually appealing, practical, and cost-efficient, requiring minimal to no maintenance if properly manufactured and installed.Innovative materials from the recycling of waste materials help in addressing the scarcity of natural resources and provide alternative methods for environmental conservation. The masks used in this study are collected from the nearby area. According to WHO has 89 million masks are needed per month. As the result it affects activities of living things. Hence it necessary to dispose of this discarded face mask properly as per the regulation. By considering all this parameters we used this material in paver blocks.

Various methods used in preparation of the pavement blocks are as follows:
Firstly the masks are collected from various places as like hospitals etc. with proper care by using safety shoes hand gloves and masks. The collected masks were kept pack 72 hours and then it left for 1 hour in sanitization to disinfect. The shredding ids then carried put to cut them in small pieces so that it can be mixed with concrete. The proportion of mask material used in this study is 20% of by volume of concrete, the cement-sand proportion used in this study is 1:2. The mix is poured in the moulds and vibrated for the proper compaction. The strength of blocks for seven, fourteen and twenty eight days are tabulated in table 1.

Before the preparation of paver blocks the various tests are performed on the materials. Such as silt content of sand, fineness of cement gradation of sand etc. and material with the good properties are selected.

TABLE I RESULTS OF COMPRESSIVE STRENGTH.

Sr.no	Timeof curing (days)	Weight of Blocks	Load on Block	Compressive strength	Average
1	7	4.120	399.2	19.96	20.51
2		4.075	411.4	20.57	
3		4.093	420.0	21.00	
4	14	4.166	565.6	28.28	28.02
5		4.148	573.1	28.65	
6		4.000	542.5	27.12	
7	28	4.270	630.9	31.54	32.09
8		4.154	656.7	32.83	
9		4.196	638.4	31.92	

II. ABOUT COMPRESSIVE STRENGTH OF PAVER BLOCKS MADE UP OF WASTE MASKS.

The compressive strength of paver blocks incorporating used face masks as part of their composition has been a subject of recent research, driven by the need to manage the increasing waste generated by disposable masks during the COVID-19 pandemic. Studies have demonstrated that when face masks are properly shredded and integrated into concrete mixtures, they can potentially enhance the compressive strength of the resulting paver blocks. This improvement is attributed to the fibrous nature of the masks, which can act as a reinforcement material within the concrete matrix, distributing stress more effectively and increasing the overall durability. However, the extent of this strength enhancement depends on the proportion of mask material used and the method of incorporation. Optimizing these parameters is crucial, as excessive amounts can lead to decreased workability and potential weakening of the concrete. Overall, while the addition of face masks shows promise in improving compressive strength and contributing to sustainable construction practices, further research is needed to establish standardized guidelines and ensure the long-term performance of these innovative paver blocks.

TABLE III COMPARISON OF COMPRESSIVE STRENGTH OF STANDARD PAVEMENT BLOCKS AND PAVER BLOCK WITH 20% MASK MATERIAL.

Sr.no	Days	Standard paver Blocks	Pavement blocks with mask material
1	7 days	22 MPA	20.51 MPA
2	14 Days	31 MPA	28.02 MPA
3	28 Days	35 MPA	32.09 MPA

The strength of the blocks by using mask material is compared with the regular paver blocks and results are shown in table 2.

Studies have shown that paver blocks made with a 20% percentage of face masks can still achieve acceptable compressive strength, though typically lower than that of conventional paver blocks. For instance, blocks with

face mask content might exhibit compressive strengths in the range of 20 to 35 MPa. While this is generally sufficient for many paving applications, it represents a trade-off between sustainability and structural performance. The reduction in compressive strength is attributed to the different material properties of the face masks, which can affect the bonding and compaction within the concrete mix.

The other tests performed on the paver blocks.

- Water Absorption: The water absorption of paver block after 24 hours kept in water is 6.87%. The percentage of water absorption is less and is does not affect on strength and durability.
- Corner test: The corner test of paver blocks is a method used to assess the quality and durability of the blocks by evaluating their ability to withstand impact and resist breaking or chipping.The paver blocks also pass this testwithout any breaking and chipping at the corner.
- Drop Test:The paver blocks drops from predetermined height which is 600mm to 1200mm from the hard surface. The paver block drop multiple time to see any cracks, damages, and breaking developed. The paver blocks pass this test without getting any cracks, damages and Breaking.

III.CONCLUSION

Pavement blocks made from face masks represent a promising innovation in recycling and sustainable construction. While they offer significant environmental benefits by repurposing waste materials and potentially reducing the carbon footprint, they require thorough testing and validation to ensure they meet the durability, strength, and safety standards of traditional pavement blocks. If proven viable, they could complement traditional methods and contribute to more sustainable construction practices.

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Straddle Drilling For Blank of Planetary Gearbox

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ABSTRACT
In the current global landscape, there is a notable shift towards advanced machining capabilities. This innovative machine excels in simultaneous chamfering without relying on extensive automation. Industries are prioritizing the elimination of jerky movements and reducing vibrations to enhance productivity. This cutting-edge model surpasses manual labor through its mechanical prowess in specific fields. Unlike conventional chamfering machines limited to one hole at a time, this technology can efficiently chamfer multiple holes simultaneously, catering to the demands of mass production and ensuring high efficiency and productivity levels across industrial sectors.

Keywords: Automation, Chamfering, Chamfer tool, SPM

I. INTRODUCTION

This project centres on the development of a straddle drilling and die grinding machine for planetary gearbox blanks. Chamfering, an operation crucial for blending sharp corners into smooth edges or eliminating burrs post-drilling, is traditionally carried out manually on lathe machines, consuming significant time and effort. Our college workshop identified the challenge of sequential chamfering, where one side of holes is chamfered first, followed by the other side, leading to time inefficiencies. The straddle drilling machine tackles this issue by simultaneously chamfering opposite sides of the blank with two die grinder machines, ensuring a streamlined process. This machine combines wire cutting and straddle drilling operations to remove burrs from planetary gearbox blanks efficiently. The V-Block, a hardened steel workpiece holder with a 120-degree channel forming a V shape, rotates 45 degrees to create automatic grooves, enhancing chamfer accuracy and saving time. This project optimizes chamfering for planetary gearbox blanks, enhancing productivity and precision in manufacturing operations.

Figure1:V-Block

A toggle clamp is a tool that used to locate component accurately or parts in position. Typically but not exclusively as part of production process. The primary feature of toggle clamp is to provide grip or hold the workpiece between two different components. In our project, this toggle clamp used to hold the gear blank tightly from top side during the chamfering operation.

Figure2:Toggle Clamp

Chamfering tools are used for grinding centre holes, positioning holes, grinding holes, or deburring and rounding the edges after side surface machining. This chamfering tool is attached to machine such as drill press, lathe, machining centre, etc. This chamfering tool is made up of carbide which is very hard. In our project we have used two chamfering tools which are attached at the end of the die grinding machines. This tool removes the burrs from blank of planetary gear box.

Figure3:Chamfering Tool

Die grinding machine is simple but powerful tool that is traditionally used to grind the metal. This tool is very versatile and can be used to grind almost any material. It is used to polish or smooth rough edges and it has lot of power as well as speed. This die grinding tool is used to remove the rust, auto work, polishing stainless steel, wood carving, finish nonmetal surface.

Figure4:Die Grinding Machine

In this project the metal plate is used to support the whole assembly. It is M.S. metal sheet. All the components are mounted on it such as v-block, die grinder machine, toggle clamp, gear blank, etc. It is base plate which also reduces the vibrations generated during the chamfering operation.

II. METHODOLOGY

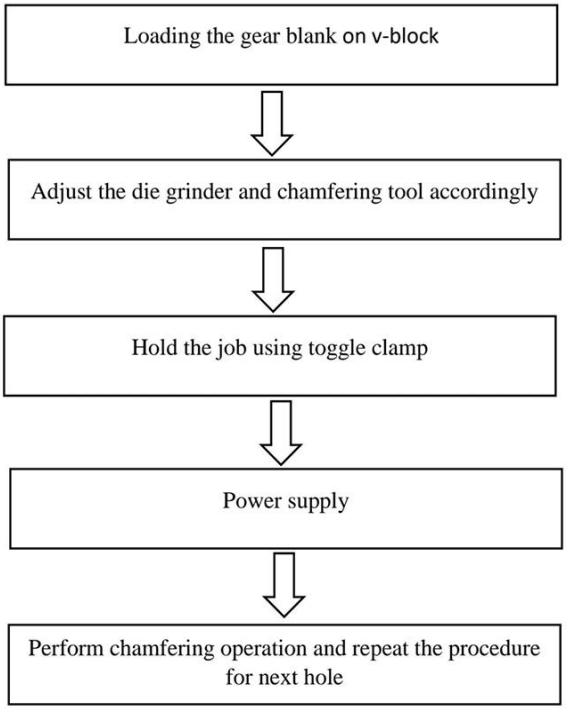

Figure5:Block Diagram

III.WORKING STEPS

The working steps used in this project are discussed below:

- Accurately load the job on v-block and then fix it with the help of toggle clamp.
- Once position of gear blank is fixed then adjust the position of die grinders so that tool accurately chamfer the hole.
- Switch on power supply.
- After giving power supply to die grinder it starts rotating. As the chamfering tool attached at the end of die grinder they also starts rotating.
- This chamfering tool removes the burrs around the holes on gear blank.
- The gear blank has 82 PCD, hence this machine is specifically designed to perform the chamfering operation at 82 PCD.
- When the gear blank gets chamfered unload it and repeat the procedure for next one.

IV. MODEL DRAWING

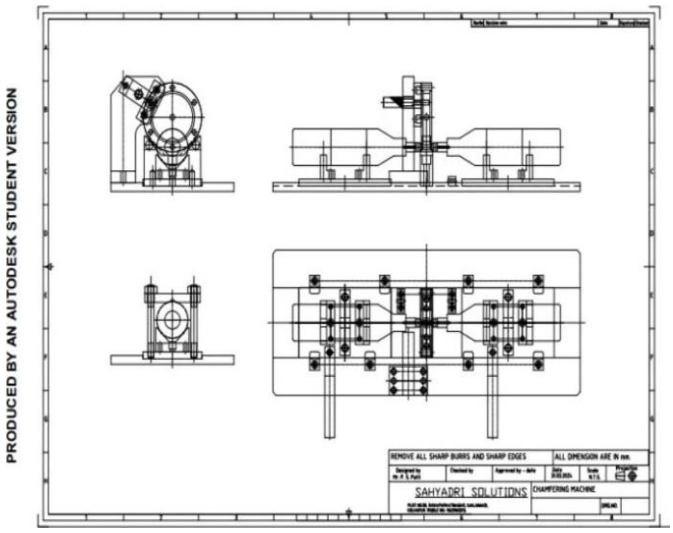

Figure6:Model Drawing by Using AutoCAD Software.

V. BENEFITS

- Automatic chamfering:This machine creates automatic chamfering at 82 PCD.
- Save Time: Simultaneously holes get chamfered from both sides hence it consumes less time than conventional machines.
- Quality: As accuracy of chamfer increases it automatically increases the quality of product.
- Productivity: From mass production point of view this machine is beneficial. Reduce.
- Fatigue: As it performs the operation automatically it reduce the fatigue of labours which occurred due to repeated action.
- Accuracy: During chamfering operation there is no human involvement hence it reduces the human errors and increases accuracy.

VI. FUTURE SCOPE

- Current machine is specifically designed for blank of 82 PCD, in future it can be modified for performing chamfering operation on different PCD of gear blank.
- The chamfering machine can be redesigned as per requirement of industry or customer.
- By adding control panels it can make as fully automatic machine.
- Job feeding mechanism can be added as well as job carryout mechanism.

VII. CONCLUSION

This model of straddle drilling machine used to remove the burrs on gear blank from both sides simultaneously. This project can conclude that the operation performing this machine will overcome the disadvantages of conventional machine and will provide us high rate manufacturing with less time consumption and less consumption of man power.

VIII. ACKNOWLEDGEMENT

We are deeply thankful to the R&D Centre of the Mechanical department at SPVP's S.B.Patil for graciously providing the essential data on straddle drilling for blank of planetary gearbox, which played a crucial role in our research for the straddle drilling for blank of planetary gearbox project. Furthermore, we sincerely appreciate the invaluable support extended to us by SVERI's COE, Pandharpur, throughout our research journey.

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A Study of LoRaWAN Network Technology

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ABSTRACT

IoT is gaining high popularity in today's world. Embedded systems have become a major part of our lives. People are able to control, monitor, and do a lot more from remote distance. This is done by connecting various objects reducing physical distance. IoT is the connectivity of various objects with network connectivity [1]. LoRaWAN (Long Range Wide Area Network) is a type of wireless communication technology designed for long-range communication between devices, typically in IoT (Internet of Things) applications. In this technology a data-link layer with long range, low power, and low bit rate, appeared as a promising solution for IoT in which, end-devices use Lora to communicate with gateways through a single hop[2]. This article provides an impartial and fair overview of LoRaWAN. emerged as an alternative cost-effective communication technology for the IoT market. LoRaWAN is an open LPWAN standard developed by LoRa Alliance and has key features i.e., low energy consumption, long- range communication, built in security, GPS- free positioning. In this paper, we will introduceLoRaWAN technology, the state of art studies in the literature and provide open opportunities.

Keywords: IOT, LoRaWAN, Long-Range, Cost-Effective Communication

I. INTRODUCTION

LoRaWAN, short for Long Range Wide Area Network, is a wireless communication protocol designed for long-range communication between low-power devices. It operates on unlicensed radio frequencies and is particularly suitable for Internet of Things (IoT) applications where low data rates, long battery life, and long-distance communication are essential .achieve ranges of several kilometers in urban environments and even greater distances in rural areas, making it ideal for applications such as smart agriculture, smart cities, asset tracking, and environmental monitoring. At its core, LoRaWAN technology utilizes the LoRa modulation technique, which enables devices to transmit small packets of data over long distances with minimal power consumption. One of the key features of LoRaWAN is its star-of-stars network architecture, where individual sensor nodes communicate with gateways that act as intermediaries between the devices and the central network server. This architecture allows for efficient use of radio spectrum and scalability, as thousands of devices can be connected to a single gateway. Additionally, LoRaWAN networks typically operate in the sub-

gigahertz ISM bands, such as 868 MHz in Europe and 915 MHz in North America, which offer better propagation characteristics compared to higher frequency bands, resulting in improved signal penetration and Coverage LoRaWAN technology provides several advantages over other wireless IoT connectivity options, including its long-range capability, low power consumption, scalability, and suitability for battery operated devices. As a result, it has gained significant traction in various IoT applications and continues to be adopted across industries worldwide.

II. LITERATURE SURVEY

LoRa or LPWA is a very recent technology that has been evolved. In 2013 or before that, the term did not even exist. Now the technology has developed and is being promoted and used worldwide because of its various technical advantages. This technology compliments various other technologies such as cellular network. As recently as in 2013 nobody thoughtthat such a technology would exist. The LoRa technology is preferred due to various advantages such as the battery lifetime, the long range, the security, robustness to interferences and more. The technology is a package in itself [1]. A LoRaWAN gateway, covering a range of tens of kilometers and able to serve up to thousands of end-devices, must be carefully dimensioned to meet the requirements of each use case [2].

This paper elaborated an analysis about LoRaWAN protocol based on its architecture, battery lifetime, network capacity, device classes and security. It was observed that this protocol showed an advantage of about 3 to 5-fold when compared with other LPWAN technologies regarding power consumption for long range communications. Moreover, LoRaWAN networks can be deployed with a minimal amount of infrastructure and with the achieved capacity [3]. Compared to other existing IoT connectivity technologies such as cellular, Wi-Fi, and Bluetooth Low Energy (BLE), LoRaWAN offers distinct advantages in terms of range, power consumption, scalability, and cost-effectiveness. It excels in scenarios where long-range communication, low power operation, and support for large numbers of devices are crucial factors. However, it's essential to recognize that no single IoT connectivity technology is universally superior; the choice depends on specific application requirements, including range, data rate, power constraints, and deployment scale. Nonetheless, LoRaWAN's versatility and performance have positioned it as a leading technology in the rapidly expanding IoT ecosystem, driving innovation and enabling diverse applications to thrive in various industries actions One of the challenges in deploying IoT applications is the cost of building and operating the communication infrastructure. This paper studies the feasibility of building a low-cost IoT network based on LoRa, a leading Low-Power Wide-Area Network (LPWAN) technology, using off-the-shelf components and open source software [4]. For efficient data transmission in long-range IoT services, this paper proposes a congestion classifier using logistic regression and modified adaptive data rate control. The proposed scheme controls the data rate according to the congestion estimation. Through extensive analysis, we show the proposed scheme's efficiency in data transmission [5].

III.COMPARISION OF LORAWAN NETWORK TECHNOLGY WITH OTHER TECHNOLOGY

A. LoRaWAN: LoRaWANoffers exceptional long-range communication capabilities, typically ranging from several kilometers in urban environments to tens of kilometers in rural areas. This makes it ideal for applications requiring communication over large distances. LoRaWAN devices are designed for low power

operation, enabling long battery life for battery-operated IoT devices. They consume minimal power during both transmission and reception, making them suitable for applications requiring extended deployment periods without frequent battery replace.LoRaWAN typically offers low to moderate data rates, ranging from a few bytes to several kilobytes per second. While sufficient for many IoT applications such as sensor data monitoring and control, it may not be suitable for applications requiring high bandwidth data transmission or real-time communication. LoRaWAN typically employs a star-of-stars topology, where individual devices communicate with gateway devices that act as intermediaries between the devices and the central network server. This architecture allows for efficient use of radio spectrum and scalability

B. Cellular: Cellular technologies such as 3G, 4G, and 5G provide coverage over wide geographic areas but generally offer shorter ranges compared to LoRaWAN, especially in rural or remote areas. However, they have better coverage in densely populated urban areas. Cellular devices consume more power compared to LoRaWAN devices, especially during data transmission. While advancements in cellular technology have improved power efficiency, cellular devices still require more power, which can impact battery life, particularly for battery-operated IoT devices

C. Local Area Network LANs: such as Wi Fi or Ethernet, are intended for short-range communication within a confined area, typically within a building or a limited outdoor space. The range of a LAN is usually limited to a few hundred meters, although it can be extended with additional networking equipment like repeaters or access points LANs often use a star or mesh topology, where devices connect directly to a central network device like a router or switch. In a mesh topology, devices can also communicate with each other, offering redundancy and flexibility in network architecture.

Devices connected to a LAN, especially those using Wi-Fi, typically consume more power compared to LoRaWAN devices. This is especially true during data transmission, which can impact battery life for battery operated devices or require devices to be connected to a power source. LANs rely on existing networking infrastructure such as routers, switches, and access points. Wi-Fi networks, for example, leverage wireless access points connected to a wired network backbone. Ethernet networks use wired connections for data transmission, typically employing switches and routers to manage network traffic

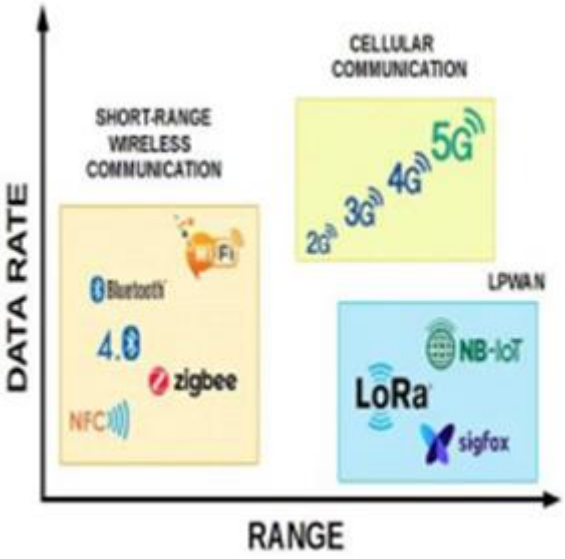

Fig 2: Comparison Chart of LoRaWAN with other existing technology

D. Z -Wave: Z-Wave is optimized for short to medium-range communication, typically covering distances up to 30 meters indoors. While this range can be extended with repeaters, Z-Wave is primarily

intended for use within a single building or home. Z-Wave utilizes a mesh network topology, where devices communicate directly with each other and can act as repeaters to extend the network's range. This mesh architecture provides redundancy and reliability in communication within a localized area. Z-Wave devices also typically have low power consumption, making them suitable for battery-operated devices and energy-efficient applications.The power consumption may vary depending on the specific device and its usage patterns. It provides higher data rates compared to LoRaWAN, making it suitable real-time communication, such as home automation and smart home devices. Z-Wave's higher data rates enable faster response times and support for more complex commands and interactions. It is a proprietary wireless communication protocol developed and maintained by Silicon Labs. While Z-Wave devices are interoperable within the Z-Wave ecosystem, interoperability with devices from other protocols may require additional gateways or bridges.

E. IEEE 802.15.4: IEEE 802.15.4 is more suitable for shorter-range communications, often within tens to hundreds of meters. LoRaWAN provides lower data rates compared to IEEE 802.15.4. This is suitable for applications that require intermittent, low rate data transmission over long distances. It is designed for low-power operation. IEEE 802.15.4 supports various network topologies, including star, mesh, and cluster tree, offering more flexibility in network design IEEE 802.15.4 can operate in various frequency bands, including 2.4 GHz and sub GHz bands. These technology offer security features, but the implementation and strength of security mechanisms can vary as compared to LoRaWAN. IEEE 802.15.4 is an IEEE standard that specifies the physical and media access control (MAC) layers for low-rate wireless personal area networks (LR WPANs)

F. LTE-M: LTE-M is designed to provide better coverage in underground and indoor environments, typically reaching up to a few hundred meters. LTE-M provides higher data rates compared to LoRaWAN. LTE-M can support data rates up to 1 Mbps. LTE-M can be more power-hungry, especially when operating at higher data rates. LTE-M leverages existing LTE infrastructure, making it easier and more cost-effective to deploy for mobile network operators. LTE-M leverages existing LTE infrastructure, making it easier and more cost-effective to deploy for mobile network operators. LTE-M offers lower latency compared to LoRaWAN.

G. NB-IoT: NB-IoT is designed to provide coverage up to a few hundred meters to a few kilometers, depending on the deployment. NB-IoT can support data rates up to 250 kbps NB-IoT devices can also achieve long battery life, but the power consumption can vary depending on the use case and network conditions. NB-IoT leverages existing cellular infrastructure, making it easier and more cost-effective to deploy for mobile network operators. NB-IoT offers lower latency compared to LoRaWAN. NB-IoT is expensive compared to LoRaWAN.

Sigfox: Sigfox coverage can vary but is generally in the range of a few kilometers.

Sigfox provides lower data rates compared to LoRaWAN.Sigfox designed for applications that require small amounts of data to be transmitted infrequently. Sigfox devices can also achieve long battery life, but the power consumption can vary depending on the use case and network conditions. Sigfox operates its own global network infrastructure, making it easier for users to deploy devices in multiple regions without having to manage different network providers.The cost of deploying and operating a Sigfox network can vary depending on the region and the scale of the deployment.

Attribute	Bluetooth® Low Energy Technology	Wi-Fi	Z-Wave	IEEE 802.15.4 (Zigbee, Thread)	LTE-M	NB-IoT	Sigfox	LoRaWAN
Range								
Throughput								
Power Consumption	Low	Medium	Low	Low	Medium	Low	Low	Low
Ongoing Cost	One-time	One-time	One-time	One-time	Recurring	Recurring	Recurring	One-time
Module Cost								
Topology	P2P, Star, Mesh, Broadcast	Star, Mesh	Mesh	Mesh	Star	Star	Star	Star
Shipments in 2019 (millions)								

Fig 2: Comparison Table of LoRaWAN with other existing technology

IV. ARCHITECTURE

A. End Devices (Nodes): These are the devices at the edge of the network that collect data from sensors or perform specific tasks. End devices in a LoRaWAN network are typically battery-powered and designed for low-power operation. They use the LoRa modulation scheme to transmit data to gateways.

Gateways: Gateways act as intermediaries between end devices and the network server.

They receive LoRa-modulated signals from end devices, demodulate them, and forward the data to the network server using standard IP connections such as Ethernet, Wi-Fi, or cellular networks. Gateways are usually deployed in a star-of-stars topology, with each gateway serving multiple end devices within its coverage area.

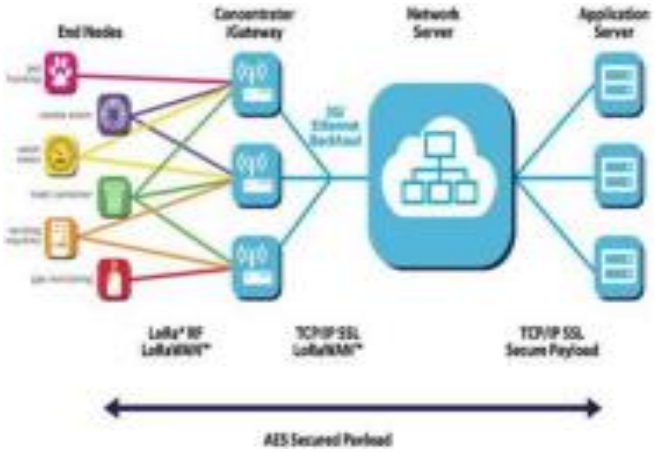

Fig 3: A typical LoRaWAN network architecture

B. Network server: The network server is a central component of the LoRaWAN architecture responsible for managing the communication between end devices and application servers. It performs several key functions

Authentication: The network server authenticates end devices before allowing them to join the network.

Encryption: It manages the encryption keys used to secure communication between end devices and the network Routing: The network server determines the optimal path for data to reach its destination, taking into account factors such as network congestion and signal strength.

Quality of Services: It manages the QoS requirements of different applications, ensuring that data is delivered reliably and with minimal latency.

C. Join Server (Optional): In some LoRaWAN deployments, a join server is used to manage the process of securely adding new end devices to the network. The join server generates and distributes the necessary keys for secure communication between the new end device and the network server

D. Application Server: The application server processes data received from end devices and implements specific applications or services based on that data. It can also send commands or messages back to the end devices. The application server is responsible for interfacing with external systems or services, such as cloud platforms or data analytics tools, to further process and analyzes the data collected from end devices.

V. CHALLENGES SOLVED BY LoRaWAN

In this Section, we concentrate on the challenges and obstacles faces the wireless sensor network (WSN) in general and the IoT specifically. Then, how can the revolution of LoRaWAN technology dissolve all of them. Challenges and Limitations faced WSN Wireless sensor networks (WSN) field faced some challenges and limitations are

1. Many difficulties when participating a great number of sensors.
2. Appearance of low efficiency and other issues due to the overcrowded state of Radio Frequency (RF) environment.
3. The nonexistence of the mathematical models that help in simulating a huge numberof nodes in WSN.
4. The current simulators used for WSN are limited and inadequate for scalability concerns.

VI. CONCLUSION

LoRa or LPWA is a very recent technology thathas been evolved. In 2013 or before that, the term did not even exist. Various LPWAN technologies are currently contending to gain an edge over the competition and provide the massive connectivity that will be required by the world in which everyday objects are expected to be connected through wireless network in order to communicate with each other. A possible solution for this problem is to increase the density of LoRaWAN gateways. However it can lead to the inter network interference. LPWA Networks have become a de facto communication standard for IoT since,power consumption, coverage are key features. Being an open platform LoRaWAN has become an important protocol among the LPWA Networks. LoRaWAN best fits scenarios where data transmissions are rare (a few packets in a day) and the size of the payload is around 10– 50 bytes. Smart city, smart grids, smart farming, and remote monitoring systems are the areas of the example where LoRaWAN could be best beneficial. At the cost of low data rates, LPWAN technologies supply long-range, low- power, and low-cost communication. At the end, a set of challenges that still need to be addressed in LoRaWAN is detailed, together with possible approaches on how to tackle those challenges. Finally, the paper summarizes the complete analysis, presenting a SWOT analysis of LoRaWAN. LoRa technology also offers high security. It is expected that by 2024 3.6 billion LPWA connections will be established.

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Photovoltaic Grid Interconnected System

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ABSTRACT
The renewable energy is the very much important source of the energy. So, use of solar energy is increasing day by day. Though there are many advantages of this system but some problems are occurred with this system like varying output of solar array, use of costly batteries. This paper gives solution for directly energizing of ac load throughout Photovoltaic Solar Array during the daytime by applying so called variable voltage tracking system (VVT). The main function of VVT is to maintain the average output chopped voltage at fixed value irrespective of solar radiation rate, in turn the chopped voltage is converted into ac voltage suitable for grid-connected loads. This solution is realized by integrating both complementary buck-boost chopper and dc to ac converter. The ac-grid contributes to the load in two cases, first when there is a power shortage during the daytime due to weak irradiation rates, and second during the night time. According to the condition of the load these two supplies are adjusted or determined ie. Either solar or the grid.
This solution excludes the use of battery bank which is the main obstacle in massive use of solar energy due to their weight, short life time, maintenance and cost. Matlab/Simulink is used to simulate the proposed model, where the obtained simulation results confirm and justify the proposed approach for further study and looking for optimized solutions for cost reduction and energy savings.
Keywords: Photovoltaic Solar Array, Photovoltaic Solar Array, chopped voltage, ac-grid

I. INTRODUCTION

The Conventional sources of energy are rapidly depleting. Moreover, the cost of energy is rising and therefore photovoltaic system is a promising alternative. They are abundant, pollution free, distributed throughout the earth and recyclable. The hindrance factor is it's high installation cost and low conversion efficiency. Therefore, our aim is to increase the efficiency and power output of the system. It is also required that constant voltage be supplied to the load irrespective of the variation in solar irradiance and temperature. PV arrays consist of parallel and series combination of PV cells that are used to generate electrical power depending upon the atmospheric conditions (e.g solar irradiation and temperature). So it is necessary to couple the PV array with a boost converter. Moreover, our system is designed in such a way that with variation in load, the change in input voltage and power fed into the converter follows the open circuit characteristics of the PV array. Our system can be used to supply constant stepped up voltage to dc loads.
Renewable energy sources also called non-conventional type of energy are the sources which are continuously replenished by natural processes. Such as, solar energy, bio-energy - bio-fuels grown sustainably, wind energy and hydropower etc., are some of the examples of renewable energy sources. A renewable energy

system convert the energy found in sunlight, falling-water, wind, sea-waves, geothermal heat, or biomass into a form, which we can use in the form of heat or electricity. The majority of the renewable energy comes either directly or indirectly from sun and wind and can never be fatigued, and therefore they are called renewable However, the majority of the world's energy sources came from conventional sources-fossil fuels such as coal, natural gases and oil. These fuels are often term non-renewable energy sources. Though, the available amount of these fuels are extremely large, but due to decrease in level of fossil fuel and oil level day by day after a few years it will end. Hence renewable energy source demand increases as it is environmentally friendly and pollution free which reduces the greenhouse effect.

II. PRINCIPLE OF OPERATION

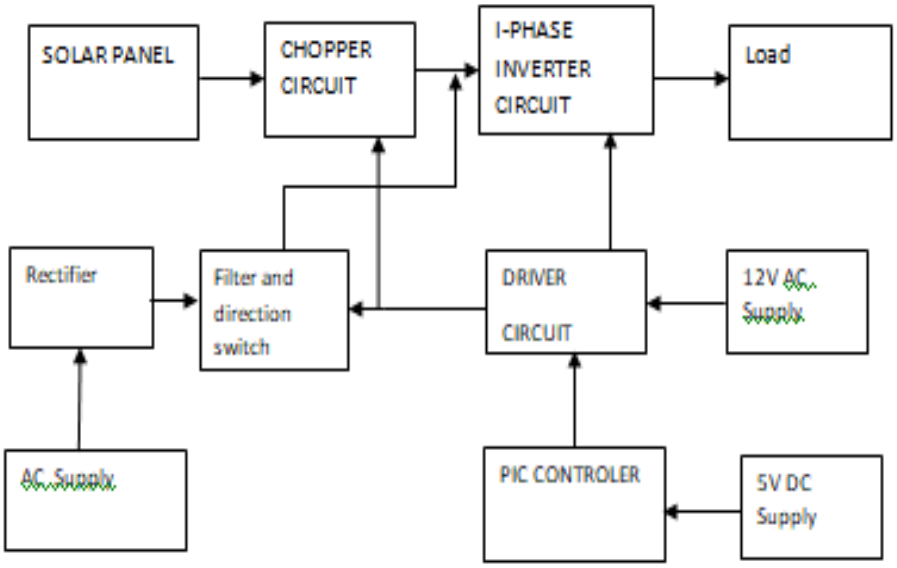

Figure1:Simple Block Diagram

A. Solar Panel

It basically converts solar energy into the electrical energy. These panels are made from the semiconductors materials such as silicon. When light energy strikes the solar cell, electrons are knocked loose from the atoms in the semiconductor material. If load is connected by using the conductors current is flown through circuit.

B. Chopper Circuit

Regulating the output voltage according to reference or grid voltage can be realized by modifying the conventional boost chopper into double chopper circuit with buck converter called "Complementary buck-boost converter".

C. Inverter

The single phase inverter is used for converting the dc into the ac. The load is connected to the inverter through the filter.

D. Variable Voltage Tracking Module

The VVT generates switching pulses according to the required output voltage level in order to maintain Vout at fixed value.

E. Controller

The PIC microcontroller is used which is used to make switching signals.

III.HARDWARE DESIGN

A. Buck-boost converter

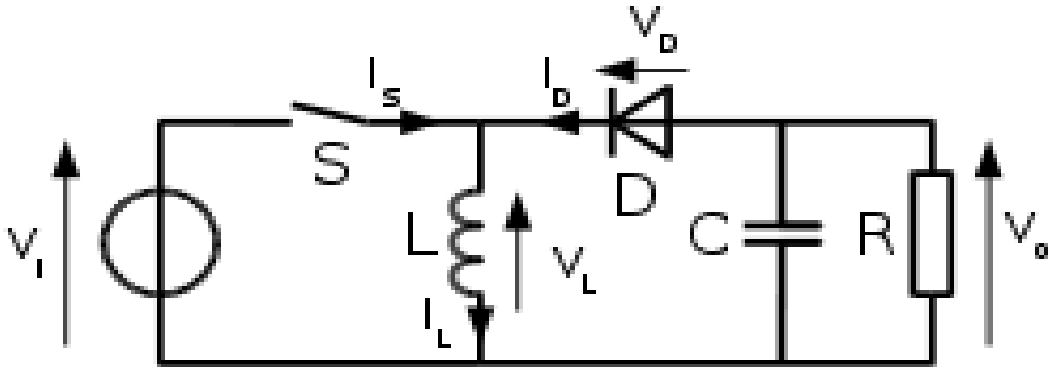

Figure2:Simple buck-boost converter

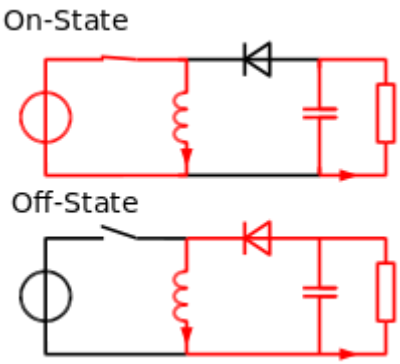

Figure3:Working of buck-boost converter

The basic principle of the buck–boost converter is fairly simple (see figure 3):

While in the On-state, the input voltage source is directly connected to the inductor (L). This results in accumulating energy in L. In this stage, the capacitor supplies energy to the output load. While in the Off-state, the inductor is connected to the output load and capacitor, so energy is transferred from L to C and R.

Compared to the buck and boost converters, the characteristics of the buck–boost converter are mainly:

- polarity of the output voltage is opposite to that of the input;
- the output voltage can vary continuously from 0 to (for an ideal converter). The output voltage ranges for a buck and a boost converter are respectively to 0 and .

Like the buck and boost converters, the operation of the buck-boost is best understood in terms of the inductor's "reluctance" to allow rapid change in current. From the initial state in which nothing is charged and the switch is open, the current through the inductor is zero. When the switch is first closed, the blocking diode prevents current from flowing into the right hand side of the circuit, so it must all flow through the inductor. However, since the inductor doesn't like rapid current change, it will initially keep the current low by dropping most of the voltage provided by the source. Over time, the inductor will allow the current to slowly increase by decreasing its voltage drop. Also during this time, the inductor will store energy in the form of a magnetic field.

B. Driver Circuit

The driver circuit is used to amplify the pulses. It consists of three main components they are:

- Optocoupler
- Amplifier

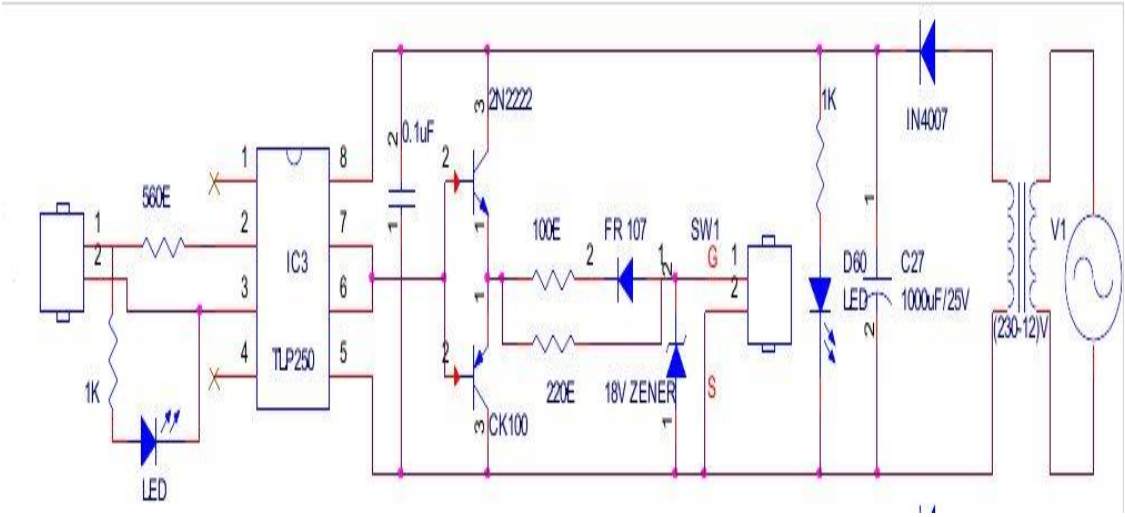

Figure4:Driver Circuit for MOSFET

C. Optocoupler

There are many situations where signals and data need to be transferred from one subsystem to another within a piece of electronics equipment, or from one piece of equipment to another, without making a direct ohmic electrical connection. Often this is because the source and destination are (or may be at times) at very different voltage levels, like a microprocessor, which is operating from 5V DC but being used to control a MOSFET that is switching at a higher voltage. In such situations the link between the two must be an isolated one, to protect the microprocessor from over voltage damage.

Optocouplers typically come in a small 6-pin or 8-pin IC package, but are essentially a combination of two distinct devices: an optical transmitter, typically a gallium arsenide LED (light-emitting diode) and an optical receiver such as a phototransistor or light-triggered diac. The two are separated by a transparent barrier which blocks any electrical current flow between the two, but does allow the passage of light. The basic idea is shown in Fig.1, along with the usual circuit symbol for an optocoupler. Usually the electrical connections to the LED section are brought out to the pins on one side of the package and those for the phototransistor or diac to the other side, to physically separate them as much as possible. This usually allows optocouplers to withstand voltages of anywhere between 500V and 7500V between input and output. Optocouplers are essentially, digital

or switching devices, so they're best for transferring either on-off control signals or digital data. Analog signals can be transferred by means of frequency or pulse-width modulation.

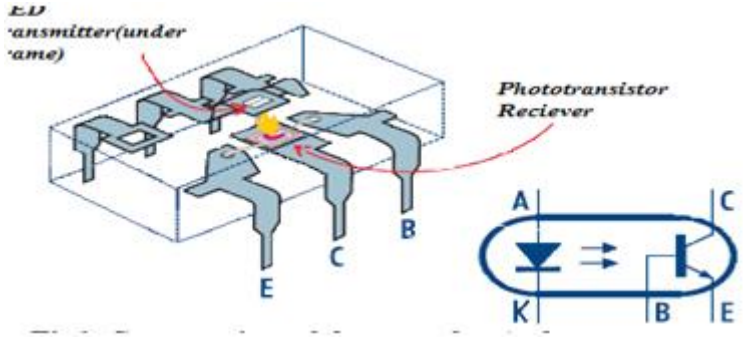

Figure5:Optocoupler CLP250

In our project the optocoupler is used in the driver circuit. They are used to isolate the voltage between the main circuit and microcontroller circuit. The pulse is provided to the MOSFET switch using a microcontroller circuit; this circuit produces a waveform of 5V DC. This pulse is supplied to MOSFET switch which is supplied by 12V AC as the source and destination voltage is different they have to be isolated, which is done using optocoupler.

In our project we use transistor in driver circuit. the transistor is used to amplify the signal pulse coming from the microcontroller circuit .Here we use two main types of transistor namelyCK100. These two transistors are present in the driver circuit which is connected in a Darlington pair circuit.

The 2N2222, often referred to as the 'quad two' transistor, is a small, common NPN BJT transistor used for general purpose low-power amplifying or switching applications. It is designed for low to medium current, low power, medium voltage, and can operate at moderately high speeds. It was originally made in the TO-18 metal can as shown in the picture, but is more commonly available now in the cheaper TO-92 packaging, where it is known as the PN2222 or P2N2222.

IV. OVERVIEW OF CONTROLLER

Microchip, the second largest 8-bit microcontroller supplier in the world, (Motorola is ranked No: 1) is the manufacturer of the PIC microcontroller and a number of other embedded control solutions. Check out the following links for an overview of the history of Microchip and PIC microcontrollers.

Microchip offers four families of PIC microcontrollers, each designed to address the needs of different designers.

- Base-Line: 12-bit Instruction Word length
- Mid-Range: 14-bit Instruction Word length
- High-End: 16-bit Instruction Word length
- Enhanced: 16-bit Instruction Word length

PIC microcontrollers have a data memory bus of 8-bit and a program memory bus of 12, 14 or 16 bit length depending on the family. All PIC microcontrollers have a mix of different on-chip peripherals like A/D converters, Comparators, weak pull-ups, PWM modules, UARTs, Timers, SPI, I2C, USB, LCD, and CAN etc.

PIC microcontrollers come in various sizes, from the 6-pin smallest microcontroller in the world to the high pin count, high memory devices. But from a student's/hobbyist's perspective the 16F series of PICs are the most ideal to start with and out of them the PIC16F84 seems to be the most popular microcontroller. Although the

PIC16F84 and the PIC16F84A (later silicon revision of the PIC16F84) have been replaced by the higher spec, lower priced PIC16F628 and the PIC16F628A,

The most popular, fastest and the easiest to build programmer is the Parallel David Tait PIC programmer which is commonly known as the father of all PIC programmers. Although David Tait no longer provides support for his design there there are a number of variants of his design available on the internet. The P16PRO40 by Bojan Dobaj or the PLMS OziPICer and others are all variants of the original David Tait Design.

Some people use another very popular programmer known as the JDM programmer because it works on the serial port and requires no external power supply whereas all variants of the David Tait programmer work connect to the parallel port of a PC and require an external power supply. But one thing I would want to say here is that the simplicity of the JDM programmer comes at a cost of unreliability.

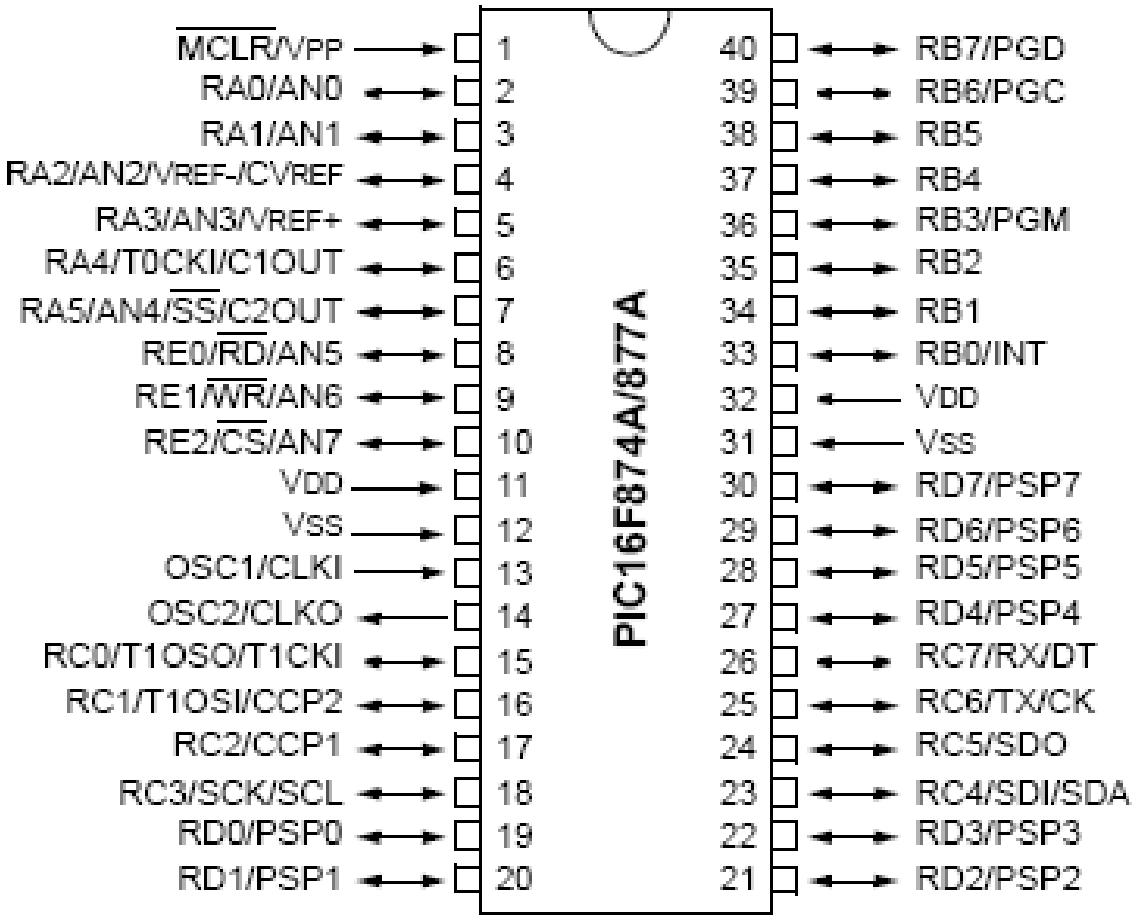

Figure6:Pin diagram of PIC16F877A

1. Continuous output of system with respect to radiation and temperature
2. Reduces overall initial cost of project
3. Use of VVT
4. Energy losses are reduced.
5. Operating cost reduced.
6. Maintenance costs of machines are reduced.
7. Plant or organization Efficiency improved.

- This system cannot be used in the remote places.
- At each house for small scale purpose.
- At many industries.

Well applicable for Smart grid system.UPS, Battery charging unit.

V. CONCLUSION

The project we have undertaken has helped us to gain a better knowledge on various aspects related to our course of study as well as practical knowledge of electronic equipment's and communication. We became familiar with software analysis, designing, implementation, testing and maintenance concerned with our project. In this project, we have implemented the photovoltaic grid interconnected system which can enhances the efficiency of the overall system. As well as we have implemented the new technique ie. VVT to enhance the performance of the solar cell.

Brief Data Of Prototype

Regulator Power Supply

Step : 5 V Regulator Power Supply design:

Step1: Regulator IC:-

If the 5V O/P voltage required so choose IC7805

Step2: I/P Voltage required:-

Vin = VD + VO

The Drop out voltage of 7805 is 2.5V

Thus, Vin = 2.5 + 5

= 7.5V

Select Vin = 7.5V

Step3: Selection of Rectifier & filter Capacitor:-

Now, filter Capacitance. The voltage required at I/P of 7805 = 7.5V

Consider di = Idc = 500mA & dt = charging & discharging time of Capacitor = T.

Lets, mains frequency = 50Hz.

Thus, dt = T = 0.02 = 20mSec.

So, Vc = 25V

Choose Capacitor with 100uF/25V.

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Design and Assembly of Tracking System for Helmet

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ABSTRACT

A smart helmet is a wearable device that has attracted attention in various fields, especially in applied sciences, where extensive studies have been conducted in the past decade. In this study, the current status and trends of smart helmet research were systematically reviewed. The results showed that the number of smart helmet applications reported in literature has been increasing rapidly since 2018. The applications have focused mostly on ensuring the safety of motorcyclists. A single board-based modular concept unit, such as the Arduino board, and sensor for monitoring human health have been used the most for developing smart helmets. Approximately 85% of smart helmets have been developed to date using wireless communication technology to transmit data obtained from smart helmets to other smart devices or cloud servers. The use of vehicles increases in the proportion of the population.

Due to the traffic congestion, the accidents are also increasing day by day. This causes the loss of life due to the delay in the arrival of ambulances to the accident spot or from the accident spot to the hospital. So, it is necessary to take the accident victim to the hospital as soon as possible. In case of an accident it will send a message through GSM. The distinctive utility of the project is fall detection; if the rider falls down from the bike or got into an accident it sends a message.

I. INTRODUCTION

A. Causes of Accident

Due to employment, the usage of vehicles like cars, bikes have increased, because of this reason the accidents can happen due to over speed. People are going under risk because of their over speed, due to unavailability of advanced techniques, the rate of accidents can't be decreased. To reduce the accident rate in the country this paper introduces a solution. Automatic accident detection and alert systems are introduced. From the survey we can know that in India 4 people die every hour because they do not wear helmets[1]. In 2017, more than 48,746 two-wheeler users died in road accidents and are now increasing day by day. Hence there is a need for a smart helmet system which provides safety and security to the two-wheeler rider.In today's era, especially in the young generation, the craze of motorbikes is really remarkable. As the bikers in our country are increasing, the road mishaps are also increasing day by day, due to which many deaths occur, most of them are caused by the negligence in wearing helmet.

B. Prevention of Accident

We can also notice that many laws and regulations are posed by the government in order to avoid these accidents. Accidents can be defined as the unplanned event or the mistake that may occur resulting in injury and sometimes it also leads to death.

The accidents in case of two wheelers are more compared to other vehicles. This may be avoided by wearing helmets[2][3]So there is a need to make à protection system in a helmet for the safety of bike riders. The smart helmet that is made is fitted with different sensors responsible for detection[4][5]. The smart helmet that is made is fitted with different sensors responsible for detection. There are two main units in this project. Each unit uses a microcontroller.

II. OBJECTIVES

a) To determine location of accident and track through GPS system.
   1) Detecting latitude and longitudinal positions.
   2) To locate vehicle's location and transfer information to monitoring station.

b) To communicate with family members and emergency services.
   1) Emergency warnings are given.
   2) Prevent fatalities and injuries

c) To prepare a smart product which is economical.
   1) Collision detection is possible.
   2) The product is having minimum cost.

III.METHODOLOGY

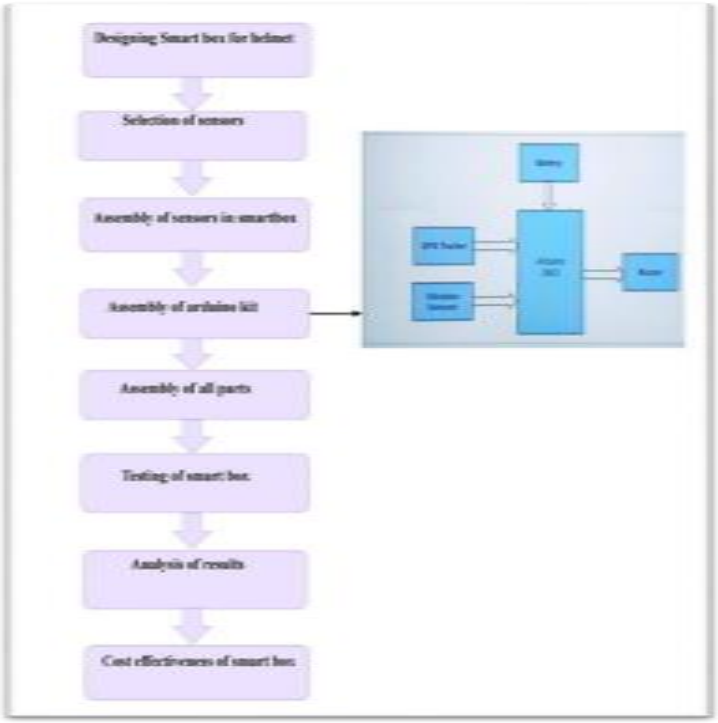

Fig . 1 . Methodology

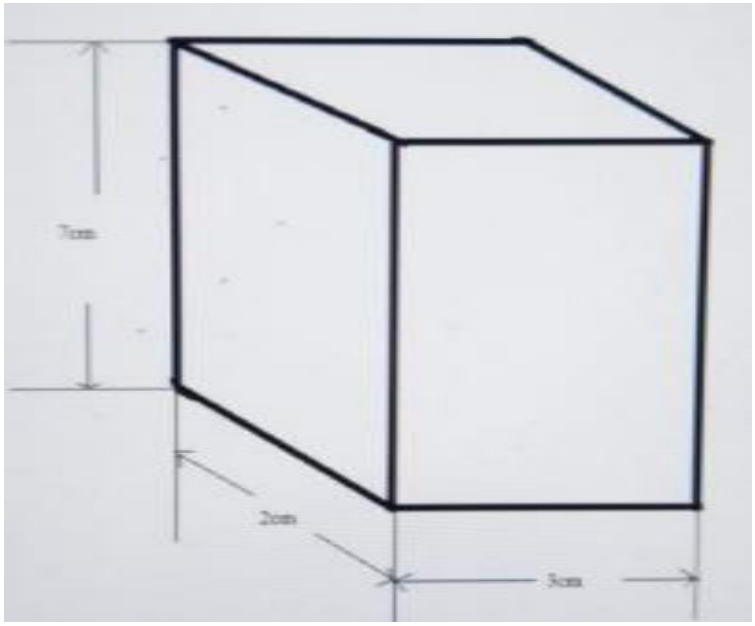

Fig . 2 . Smart Box

A. Smart Box

It is a compact box where we can place the Arduino along with the other connected components. It increases flexibility to the design and also it is safe to use for all the components to fit in it.This is as shown in Fig.

B. Working of smart helmet

The smart helmet is an Automatic vehicle accident detection and messaging system.The accident can be sensed by a vibration system. The solar panels absorb the sunlight radiations and then convert it into electrical energy using photovoltaic effects which are fitted at the outer side of the helmet. This energy is then transferred to the battery which stores this electrical energy and power ups all the components fitted inside the helmet.

The information of crash or accident is then detected via vibration sensors.Using arduino the mobile number can be saved in SIM the messages when the accidents occurs.

Tracking the rider location gets more easy when some accident occurs.The arduino then converts this signal into information which is carried out to the GPS.The GPS then tracks the location and SMS is sent to the registered mobile numbers from the SIM card [6][7].

The buzzer is used to indicate that the battery is charged or discharged and also acts as a system to detect and transfer signals from the arduino.

IV. RESULTS

We have done autocad drawing on AutoCad software with proper fitting of all the components with required Dimensionsa

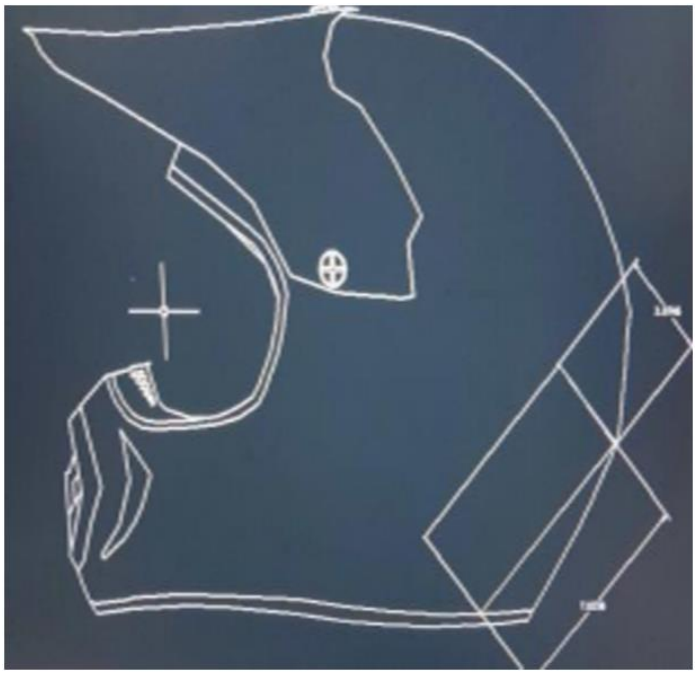

Fig . 3 . Smart Box inside helmet

A. Vibration Sensors

This is SW-420 NC Type Vibration Sensor Module Vibration Switch for Arduino When the module is not vibrating, the vibration switch has been set to low output state output, the green indicator light is closed [8].The product vibrates, vibration switches momentary disconnect, output high drove, the green light does not light up [9].

Fig. 4 . Vibration Sensors

B. Passive buzzer

It can produce a range of sound tones depending on the input frequency, i.e it can generate tones between 1.5 to 2.5 kHz by switching it on and off at different frequencies either using delays or PWM.

C. Battery

This is a NiMH rechargeable battery of capacity 700 Milliamp Hours of 1.5V 1000 Milliamp Hours.Its main function is to supply power to all the components including arduino,hence they will work properly [10][11].

Fig. 5. Battery

D. GSM MODULE

GSM is a global system for mobile communication and is used to send messages to pre-programmed numbers. The modulation technique used is GSMK. The protocol used by the GSM modem for setup and control is based on the Hayes AT-Command set. AT is the abbreviation of Attention. GMAT commands are extension commands.

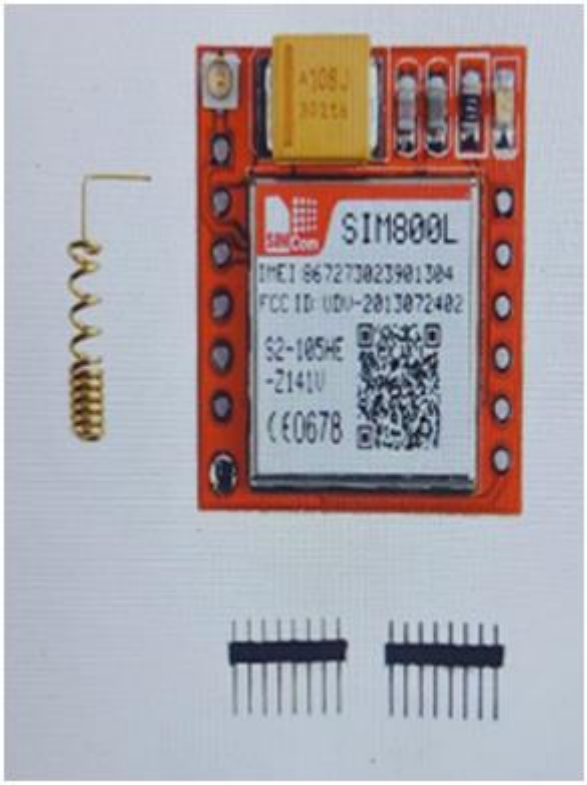

Fig .6 .GSM Module

V. LITERATURE REVIEW

1) B. Choi et al.[1] has used the wearable sensing devices (e.g.GPS and physiological sensors) can open a new door toward occupational safety and health management in physically demanding and hazardous construction (e.g., tracking worker's locations in dangerous working areas and monitoring of worker's physiological status).

2) Wright & Keith[2] have integrated electronics and computers into clothing and other accessories that can be worn comfortably on the body. wearable devices include glasses, watches, headbands, and jewelry have the largest impact in the areas of health, medicine, and fitness. Librarians are also exploring wearable technology's potential for enhancing services and expanding outreach to their organizations.
3) C. Wang et al.[3] have discovered that Stair falls on construction sites are leading causes of fatal injuries, and the dangers for workers are greater because they usually carry heavy loads. The purpose of this study was to detect near fall incidence during stair descent and analyze the changes in terms of classifying the weight-shifting patterns in the head and the feet during stair descent and also helpful in detecting near falls of workers on construction sites.
4) M. V. A. Patel et al.[4] have used a Proper Switch Mounted in helmet the two-wheeler would not start without helmet so safety of rider is assured and if accident has occurred our system will give information to the ambulance about the accident, so they can take certain measures to save the life of the person who meet with an accident.This is done by using GPS and GSM module.
5) Muthiah & Sathiendran[5] have used Intelligent Safety Helmet for motorcyclists to increase the rate of road safety among motorcyclists.Here, we focus on intelligent headlamps that react according to the rider's facial movement. It makes use of an accelerometer and other sensors to direct small electric motors built into the headlight casing to turn the headlights accordingly.
6) P. Ahuja K. Bhavsar[6] developed a thought proposed model that comes from social responsibility towards the society. Lack of immediate First Aid and Emergency medical services during accidents are the prime cause of death in the majority of cases of accidents. This thought of taking responsibility for society resulted in our proposed model “Microcontroller based smart helmet using GSM & GPRS”.
7) T. Eldemerdash et al.[7] developed a accident detection system that communicates the accelerometer values to the processor which continuously monitors for variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing a cloud based service. The vehicle location is obtained by making use of the global positioning system. The system promises a reliable and quick delivery of information relating to the accident in real time.
8) P. Parameshwari et al.[8] said that in developing nation like India, with advancement in the transportation technology and rise in the total number of vehicles, road accidents increases rapidly.So the microcontroller controls the function of relay and thus the ignition. The system also enables detection of an accident at any place and reports about the accident to predefined numbers with the GSM module.
9) J. R. Biswas et al.[9] have proposed a solution to minimize the after effects of a motorcycle accident and also try to create a culture of helping someone in need anonymously. The Raspberry Pi detects accidents and its intensity.The alert generated contains the helmet’s owner’s name, location of accident and region-wise intensity of force measure for analytics. The alert is sent within 20 seconds, so if a person is conscious, the alert can be stopped using a PIN number.
10) A.R. Budiman et al.[10] said that the role of a helmet as a head protector must be worn by motorcycle riders and make sure the strap is perfectly locked. So from the test's results, the smart helmet system in this study has an average response time of 1.4 seconds in the helmet use and strap lock detection system and 0.3 seconds in speed and shock detection system. In addition, the average difference of speed calculation between smart helmets and GPS is 3.3 km/hour.
11) A. Suman et al.[11] have an aim that to propose a cost effective and user-friendly protection system for the rider's safety as accidents are a major problem in today's scenario. So the aim of this work is to

propose a cost effective and user-friendly protection system for the rider's safety. Its main objective is to reduce injuries caused to riders of two wheelers during road accidents and provide swift delivery of help and medical care.

VI. CONCLUSIONS

Nowadays, most cases of accidents are caused by motorbikes. The severity of those accidents is increased because of the absence of helmets or by the usage of alcoholic drinks. In our project, we have a tendency to develop an electronic intelligent helmet system that efficiently checks the wearing of helmets and drunken driving. By implementing this system a safe 2-wheeler journey is possible which would decrease the head injuries throughout accidents caused by the absence of a helmet and additionally reduce the accident rate due to drunken driving.

The designed system is highly useful to avoid accidents which happen around the night time. It provides more than 70% safety for two-wheelers. It is a fact that the implementation of the system will increase the cost of vehicles but it is better to have some percent safety rather than having no percentage of safety. This system could be further enhanced with future technologies to provide further safety and security to vehicle systems.

So based on this research we can conclude that safety of the rider is ensured as a protection and as a emergency system after the accident.

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A Review on the Hydraulic Conductivity of Geosynthetic Clay Liner

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ABSTRACT

In landfill design, the containment of solid and liquid contaminant is essential. Leachate is produced from the liquid squeezed out of the waste itself (primary leachate) and by water that infiltrates into the landfill and that percolates through the waste (secondary leachate). This liquid can become a health hazard if it enters into the groundwater system. Liners are placed beneath leachate collection systems to avoid leachate from seeping into the soil underneath the landfill. The liner system is the single most important element of alandfill.Geosynthetic clay liners (GCLs), usually containing bentonite clay, are widely used as bottom liners and final covers for landfills. However currently used GCLs suffer problems of slope stability due to low shear strength. A shearing failure involving a Geosynthetic Clay Liner can occur at three possible locations: (1) The external interface between the top of the GCL and the overlying material (Soil or geosynthetic); (2) internally within the GCL;and (3) the external interface between the bottom of the GCL and the underlying material. MSW Landfills undergo settlement during and after their active life. This settlement is caused by the gradual decomposition and consolidation of the waste mass. It is essential that the landfill cover system be capable of sustaining the anticipated differential settlement of the waste mass.

Keywords: Landfill, Geosynthetic Clay Liners (GCL), Slope stability, Differential Settlement, Municipal Solid Waste (MSW).

I. INTRODUCTION

Waste is commonly referred as material with no consumer value after abandonment. According to World Health Organization, (WHO) the term ‘solid waste’ is applied to unwanted and discarded materials from houses, street sweepings, commercial and agricultural operations arising out of mass activities. Waste maybehandled or disposed in three ways: burial, incineration, or reusing/recycling (Qian et al. 2002). An Engineered landfill is a controlled method ofwaste disposal to reduce the environmental and health impacts of waste. The main

function of a landfill design is to contain the liquid and gas pollutants from contaminating the surrounding areas and their proper disposal. (Qian, X., Gray, D. H, and Koerner, R. M.,2001).

Leachate is the contaminated liquid generated in landfills, which consists of solutes from the solid waste dissolved in liquid either squeezed from the waste itself or water that infiltrates into the landfill and percolates through the waste (Qian et al. 2002, Yesillerand Shackelford 2010). Escape of leachate from the landfill can cause environmental hazard. Hence, it is of primary importance that the landfills have an effective hydraulic barrier to prevent movement of leachate into the environment and ensure their proper collection and disposal.

Most municipal solid waste landfills, are composed of seven systems (R M. Koerner., 2001)

a. Bottom and lateral side linerssystem
b. Leachate collection and removalsystem
c. Gas collection and controlsystem
d. Final coversystem
e. Storm water managementsystem
f. Groundwater monitoringsystem
g. Gas monitoringsystem

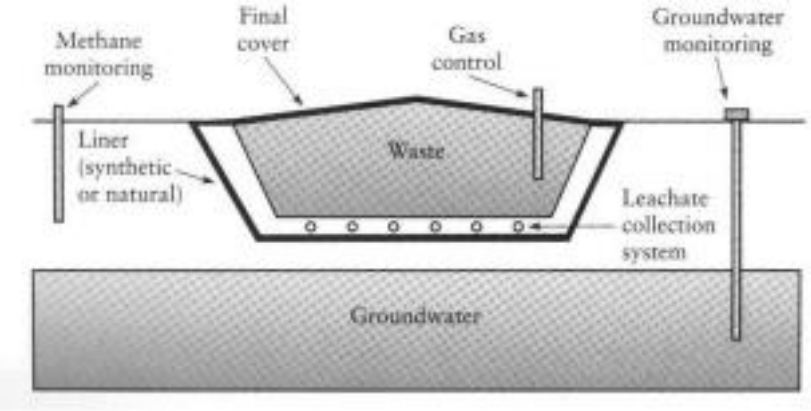

Fig.1:Schematic Diagram of a MSW Landfill Containment System

The above systems are used to ensure that pollutants generated in the landfill waste are efficiently contained and disposed. The waste in landfills may be placed in a variety of configurations. Some common geometrical configurations for waste placement are presented in Fig. 1

Area fills involve placing waste on areas with little to no excavation. This type of landfill is used in areas with high groundwater tables or where the terrain does not allow for excavation (Qian et al. 2002). Trench fills are series of deep and narrow trenches. Because of their geometry, trench fills are generally only used tocontain small quantitiesof waste compared to other types of landfills. Above and below ground fill is like a combination of the Area Fill and Trench Fill. The depthof the excavation generally depends on the depth of the groundwater table and natural clay layer. Canyon or valley hills consist of waste placed between hills or rolling terrain (Qian, X., Gray D. H. and Koerner R. M.2001).

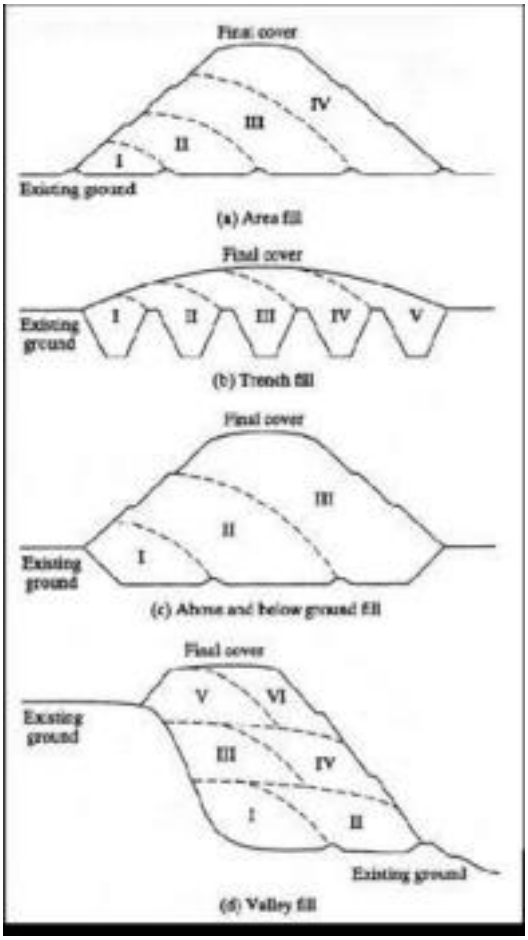

Fig. 2: Common Landfill Configurations (Qian et al. 2002)

Landfills are lined with systems that consist of alternating layers of low and highly permeable materials that perform barrier functions and drainage or filtration functions, respectively. The two basic types of liner systems are single and double liner systems. Single liner systems include a hydraulic barrier layer overlain by a high permeability layer called the leachate collection system. Double liner systems include two hydraulic barrier layers that are separated by a drainage layer, known as the leak detection system, and overlain by the leachate collectionsystem.

The barrier component of the liner system isthe component that performs containment functions and has two types: Single and Composite Liners. Single liners consist of a Geosynthetic clay liner (GCL), single compacted clay liner (CCL), or a Geomembrane (GM) (Environmental Protection Agency, USA). Single liners are sometimes used in landfills designed to hold construction and demolition debris (C&DD). Examples of single liners are presented in Fig. 3. (Kerry L. Hughes, Ann D. Christy, and Joe E. H.2005)

Composite liners consist of a paired GCL and GM or a paired CCL and GM. Composite -liners are required in municipal solid waste (MSW) landfills. Examples of composite liners are presented in Fig.4. Composite liners combine the advantages and eliminate the disadvantages of single liners. The GCL (or CCL) beneath thegeomembraneminimizes the impact of holes in the geomembrane byserving as a low permeability material that is relatively resistant to formation of holes or macro voids when hydrated (Joe et al.2005).

A doubleliner consists of either two single liners, two composite liners, or a single and a composite liner as shown in Fig.5. The upper (primary) liner usually functions to collect the leachate, while the lower (secondary) liner acts as a leak- detection system and backup to the primary liner. Double-liner systems are used in some municipal solid waste landfills and in all hazardous wastelandfills.

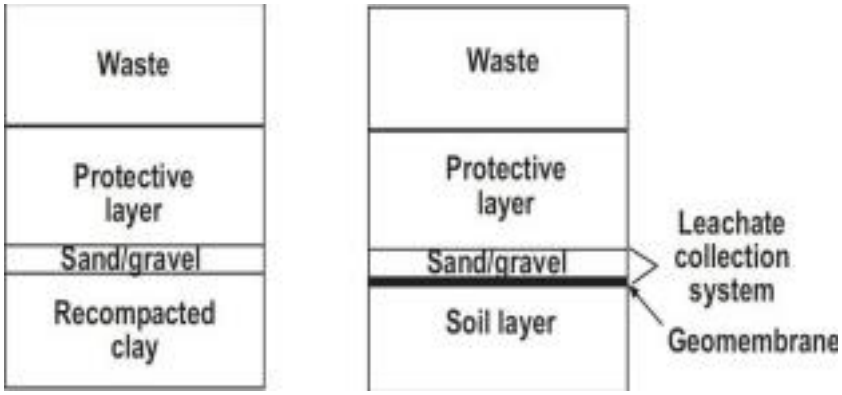

Fig. 3: Single Liner Systems (Kerry L. Hughes, Ann D. Christy, and Joe E. H. 2005)

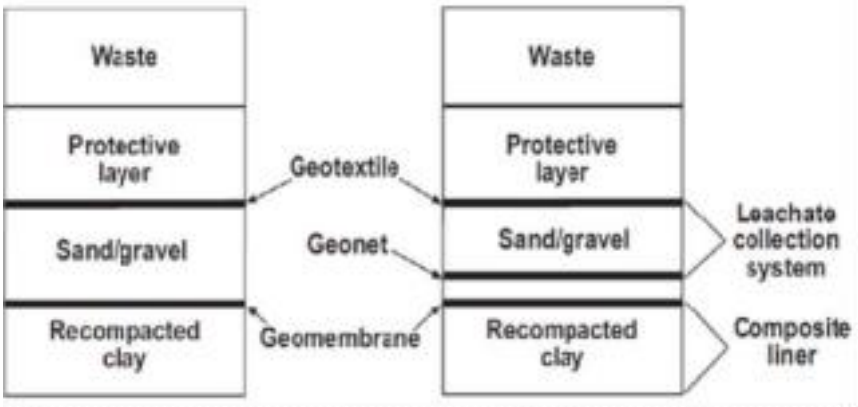

Fig. 4:Composite Liner Systems

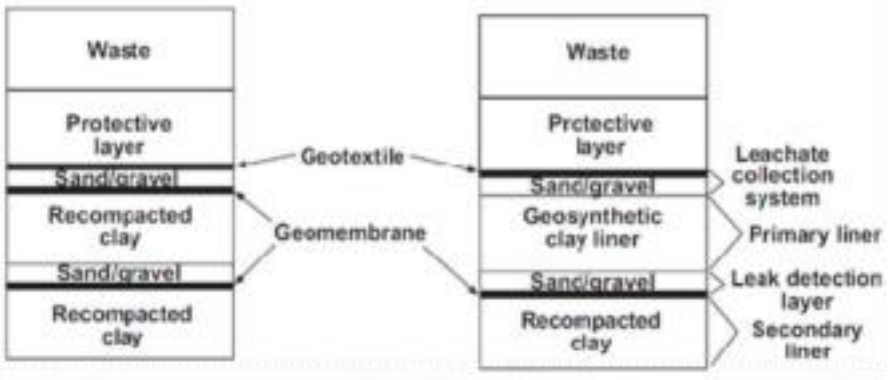

Fig. 5:Double Liner Systems

II. GEOSYNTHETICS USED IN A LANDFILL CONTAINMENT SYSTEM (OAC 3745-27-08,USEPA)

Geomembrane:

Geomembrane are also called flexible membrane liners. These liners are constructed from various plastic materials, including polyvinyl chloride (PVC) and high-densit y polyethylene (HDPE). The preferred material for use in MSW is HDPE. This material is strong, chemical resistant and is considered to be impervious. Therefore, HDPEminimizes the transfer ofleachate from the landfill totheenvironment.Thethicknessof

Geomembranes range from 0.75 to 3mm. HDPE Geomembrane must have a minimum thickness of 1.5 mm for use in MSWlandfills.

Geotextiles:

In landfill liners, Geotextiles are used to prevent the movement of small soil particles and refuse particles into the leachate collection system and to protect Geomembrane from punctures. These materials allow themovement of water but trap particles to reduce clogging in the leachate collectionsystem.

Geonet:

A Geonet is a plastic net-like drainage blanket which may be used in landfill liners in place of sand or gravel for the leachate collection system. Sand andgravel are usually used due to cost considerations, and because Geonets are more susceptible to clogging by small particles. This clogging would impair the performance of the leachate collection system. Geonets convey liquid more rapidly than sand andgravel.

Geogrid:

Geogrids are used in a landfill containment system to reinforce slopes beneath the waste as well as for veneer reinforcement of the cover soils above geomembranes (Zornberg et al.2001).

Geopipe:

A geopipe systemis used in the leachate collection layer to facilitate collection and rapid drainage of the leachate to a sump and removal system. Geopipes are also used in sidewall risers and manholes for removingleachate.

III.GEOSYNTHETIC CLAY LINERS (GCL)

GCLs were introduced to the waste containment area in the mid -1980s, represent a distinct difference and challenge to compacted clay liners (CCLs) (Koerner et al., 2002). ASTM D4439 - 11 defines a Geosynthetic Clay Liner as “a manufactured hydraulic barrier consisting of clay bonded to a layer or layers of Geosynthetic materials”. Essentially, most GCLs consist of a bentonite clay either calcium or sodium core held between two Geotextiles. The Geotextiles ma y be woven or nonwoven, depending on the desired strength characteristics. The GCLs currently available vary by type of geotextile, the inclusion of a geomembrane, the presence and type of reinforcement, and thegradation and type of the bentonite (Koerner1997).

3.1 Types and current uses of GCLs

The Geotextiles are held together by adhesive bonding (Fig. 6a, Fig.7a); needle punching (Fig. 6c, Fig.7b, c), or stitch bonding (Fig.6c). Some GCLs also contain a plastic film or geomembranecomponent,eitheradheredtoageotextile encased GCL (Fig.7) or bonded directly to bentonite clay by an adhesive (Fig.6b). The unreinforced GCLs include geotextile- encased, adhesive
bonded GCLs and geomembrane-supported, adhesive-bonded GCLs. Unreinforced GCLsare held together by chemical adhesives and, once hydrated, provide relatively low resistance to shear. The reinforced GCLs include both geotextile-encased, stitch- bonded GCLs and needle-punched GCLs. The integrated matrix of bentonite and needle-punched fibers provides high internal shear strength. The increase in internal strength achieved by stitch bonding the encapsulating Geotextiles together is veryconsiderable.

Peak shear strengths for the unreinforced GCL products were found to be similar to those for bentonite (i.e. verylow shear strength), which makes them prone to instability. This is the reason they are not usually recommended forslopes steeper than 10H: 1V(Frobel, 1996; Richardson, 1997). The reinforced GCLs shows

greater internal shear strength due to the presence of the fibers. However, itwas also shown that their behavior was governed by the fibers resistance against pull-out and tearing of the reinforcing fibers and the shear strength of the bentonite. It isworth noting that despite the fact that it was shown, in the laboratory, that internal failure could occur in reinforced GCLs, there are no known cases of slope failures, which can be attributed to internal shear failure of reinforced GCLs. Laboratory interface shear tests are normally conducted to evaluate interface friction between GCLs and soils or geosynthetics under operating conditions. As a result, a more extensive database is now available (Garcin et al., 1995; `Bressi et al., 1995; Feki et al., 1997; Gilbert et al., 1996; Von Maubeuge and Eberle, 1998; Eid et al., 1999; Triplett and Fox,2001).

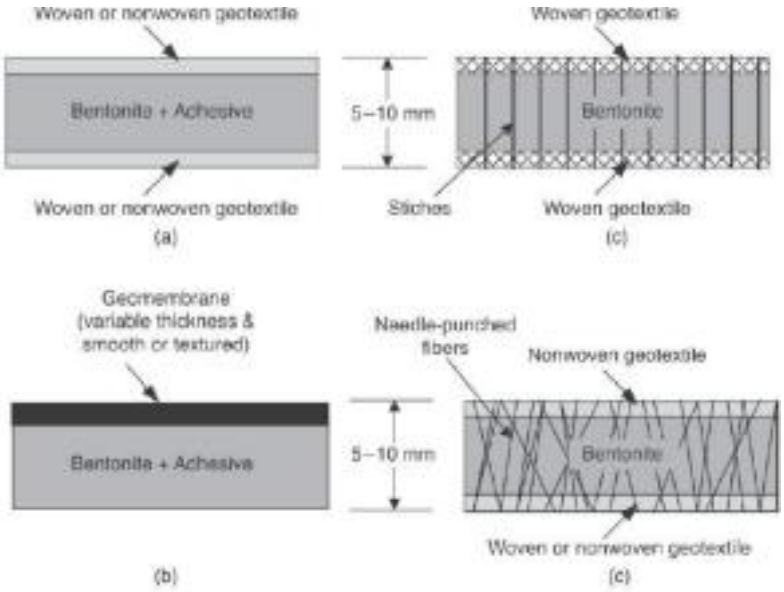

Fig. 6:Conventional GCLs available (Yesiller and Shackelford 2010)

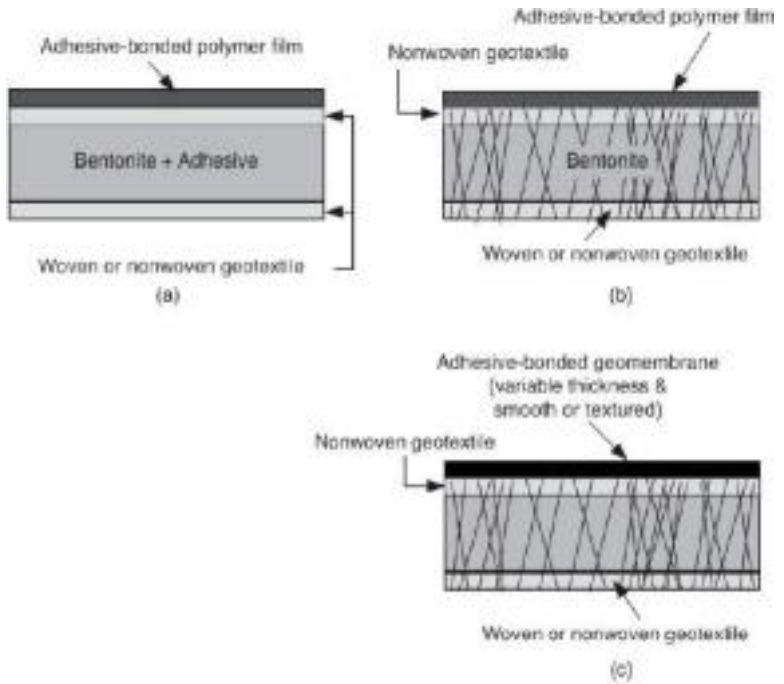

Fig.7:GM-Backed, GT Encased GCLs (Yesiller and Shackelford 2010)

3.2 Advantages and Disadvantages of GCL

The main advantages of GCLs are their low thickness and ease of installation. A GCLof approximately 5-10 mm thickness has comparable advective flux to a CCL of about 1 m thickness. The reduced thickness allows for greater economy, as the difference in thickness can be used as volume for waste placement in a landfill with a thinner barrier. GCLs are easy to install, as they are flexible and are manufactured in large rolls. GCLs can be installed by a small crew of workers unrolling the product from a large spool. This compares to transporting loads of clay to a landfill site and then compacting the clay in lifts with a sheep foot compactor and smoothing the surface of the clay with a heavy smooth drum roller, as would be required for a CCL (Koerner 2005, Wagner and Schnatmeyer 2002). Quality assurance is simpler for GCLthan for a CCL. GCLs are not vulnerable to desiccation damage during construction and may be less vulnerable after construction (USEPA, 1993). Because GCLs are lighter than CCLs, GCLs tend to cause less settlement of underlying waste in a final cover system. In addition, the GCL themselves can tolerate appreciably more differential settlementthan CCLs. Hydrated GCL is an effective gas barrier (A. Bouazza,2001).

Major disadvantages of GCLs are high levels of diffusive flux dueto the low thickness and sensitivity to temperature cycling, wet-dry cycling, and cationexchange.The sensitivity to temperature cycling, wet-dry cycling, and cation exchange factors has caused problems with GCL panels shrinking resulting to increasing hydraulic conductivity.(Thiel and Richardson 2005, Koerner 2005). GCLs with sodium bentonite are prone to ion exchange. Bentonite has low shear strength when hydrated and is susceptible to lateral squeezing under rapid changes in loading. A potential strength problem arises at interface with other materials (A.Bouazza, 2001).

IV. CATION EXCHANGE IN GCL

Permeants with lower ionic charge(NaCl solution) cause greater swelling because morewatermoleculesorcationsarerequiredtobesorbedtobalancethenegative charge of the clay particle. Exchange ofCa2+ for Na+ is thermodynamically favorable inclays (Benson et al. 2007). If a sodium bentonite is exposed to permeants with Ca2+ inthe pore water of the GCL, cation exchange will occur as one divalent cation will replace two sorbed monovalent cations, unless a far greater abundance of monovalent ions exist in the permeant fluid to offset the influence of the divalent cations (Benson et al. 2007). This process in turn will reduce the amount of swelling, which will increase the hydraulic conductivity of the GCL in a relativelyshort duration of time.

Multivalent cations(Ca+2, Mg+2) can be supplied from various sources. Most test data simulate the multivalent cations being supplied byleachate moving downward into the GCL. Multivalent cations can come from the soil underneath the GCL as well (Touze- Foltz et al. 2006). This is certainly a concern when placing GCLs above soils rich in calcium carbonate. Care needs to be takento ensure that sources of multivalent cations, both above and below the liner system, are accounted for whenever designing a GCL component.

4.1 Prehydration

Prehydrationof GCLs is a proposed technique to ensure that GCLs maintain low hydraulic conductivity when permeated with fluids containing multivalent cations. Prehydrationis the hydration of GCLs with water prior to the GCL being subjected tochemicals (Jo et al. 2004). Prehydration ensures that GCLs have undergone osmotic swelling before cation exchange can occur, which allows the permeability of the GCL to remainlow.

Some GCLs manufactured in Europe are prehydratedin the factory to improve hydraulic performance (Mazzieri 2011, Mazzieriand Pasqualini 2011). Prehydrationmaybe ineffective when wet dry c yclesare intense, as the benefits of osmotic swelling are lost if desiccation is severe (Mazzieri2011).

V. CHARACTERISTICS OF BENTONITE

The clay used in GCLs typically consists of bentonite. Bentonite is anaturally occurring clay mineral derived from chemical variation of volcanic ash (Mitchell 1993). Bentonite refers to any material that is composed mainly of montmorillonite (smectite) minerals and has properties and behavior similar to those ofmontmorillonite. Bentonites used in GCLs typically have montmorillonite contents ranging from 65 to 90% (Shackelford et al. 2000). Montmorillonite is a clay mineral characterized by a high cation exchange capacity, large specific surface area, high swelling potential and low hydraulic conductivity to water (Gleason et al. 1997). Montmorillonite isan alumino-silicate mineral with a 2:1 unit layer structure. Individual layers are about 1nm thick, but up to several orders of magnitude larger in the other directions (Grim, 1968; Mitchell,1993).

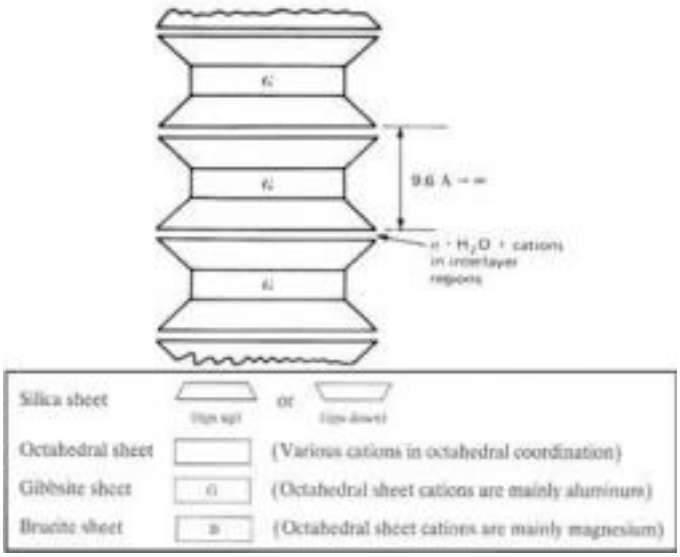

Fig. 8: Schematic of Montmorillonite Mineral (Mitchell and Soga 2005)

There are two major typesofbentonite: Sodium (Na) and Calcium (Ca). Bentonite iscategorized by the type of external cation that is adsorbed to the surface of the clay particle during bentonite processing or particle formation, thus sodium is adsorbed to sodium bentonite clay particles and calcium is adsorbed to calcium bentonite. Sodium Bentonite is used widely than Calcium Bentonite because of its superior swelling potential and its very low hydraulic conductivity (Alther 1982, 1987; Reschke and Haug 1991). Na bentonitecan swell to 8 to10 times their original volume. In contrast, Ca bentonite only swells to twice their original volume (Egloffstein 1995). Some researchers have suggested that calcium bentonitemay be more stable when exposed to chemical permeants. The properties of bentonite are greatly affected by interactions between its particles and the 13 surrounding pore fluid. The negative electrical charge on bentonite particles (Mitchell 1993) causes dissolved cations in thesurrounding pore water to be attracted to the surfaces of the clay. The layer of water and adsorbed ions that surrounds a clay particle is referred to as the electrical double layer or diffuse double layer (DDL) (Mitchell 1993; Shackelford1994).

Bentonite swells when it is hydrated with water and certain other permeants. The larger swell of Na-bentonite is reduced when higher valence cations such as Ca+2 replace Na+, effectively converting Na bentonite into

lower swelling capacity and higher hydraulic conductivity bentonite such as Ca bentonite. Two typesof swelling may occur in bentonite: the crystalline phase and the osmoticphase. Crystalline swelling occurs first as water molecules move into theinterlayer region of the diffuse double layer to hydrate the mineral surface and associated adsorbed cations.

Crystalline swelling causes the interlayer to separate by several water molecules and thus causes minor swelling (Scalia and Benson 2011). Osmotic swelling occurs when water molecules flow into the interlayer region because ofa cation concentration gradient between the interlayer portion and the free pore water in the bentonite clay (Scalia and Benson 2011). Osmotic swelling produces much superior swelling because itallows additional water to flow into the interlayer portion between particles, which has implications for the hydraulic conductivity of GCLs as well as dimensional stability. Osmotic swelling only occurs when the cations in the interlayer space of the diffuse double layer are predominantly monovalent such as Na+. When multivalent cations such as Ca+2, Mg +2 and Ba+2 are predominant, only crystalline swelling can occur (Scalia and Benson 2011). The reported values of specific gravity of the bentonite used in the literature ranges from 2.74 to 2.85 (Kenney et al. 1992, Mollins et al. 1996, Gleason et al. 1998, Sivapullaiah et al. 1999, Dixon et al. 1999). The highervalue of the specific gravity of the bentonite can be attributed to the higher percentage ofFe2O3. The characteristics of the bentonite such as mineralogical composition and the exchangeable cations affect the swelling and hydraulic conductivity of the bentonite (Alther,1986).

5.1 Index Properties

Gleason et al. (1997) conducted Atterberg tests on bentonite. Inorganic salt solutions with various concentrations of NaCl and CaCl2 were used as test liquids for the Atterberg tests. The relationship between the Liquid limit of both sodium and calcium bentonite and 0.25M CaCl2 was investigated by Gleason(1997).

The 0.25 M CaCl2 solution greatly reduced the swelling capacity ofsodium and calcium bentonite. However, the sodium bentonite underwent a much larger reduction in Liquid Limit compared to the calcium bentonite. Liquid limit tests have been used byseveral investigators as surrogate compatibility tests (Bowders et al. 1986; Sridharan et al. 1986; Bowdersand Daniel 1987; Daniel et al. 1988; Acarand Olivieri1989; Edil et al. 1991; Shackelford 1994; Gleason et al. 1997; Petrov and Rowe 1997; Lin and Benson 2000; Sridharan and Prakash 2000). Results ofthese studies generally have shown that an increase in cation valence and electrolyte concentration (inorganic chemical solutions) causes the LL to decrease and the hydraulic conductivity to increase, with greatereffects occurring for soils containing higher activity clays, such as sodium bentonite. Robert J.Petrov and R. Kerry Rowe (1997) showed that the Liquid Limit of a sodium bentonite from a GCL decreased from 530 to 96 as the sodium chloride concentration of the testing solution increased from 0 (water) to 2.0 M, and the hydraulic conductivity of the GCL increased from 10–9 to 10–6 cm/s for the same increase in NaCl concentration.

5.2 Swelling and Compressibility

Several researchers indicated that the increase in the chemical solution concentration shrinks the Diffuse Double Layer (DDL),resultinginaflocculationofthe clay particles and reduces the swelling of the clays (A lawaji, 1999; Kolstad et al., 2004a; Lee et al., 2005). Di Maio (1996) investigated volume changes of bentonite exposed to NaCl or CaCl2 solutions and towater.

The results of swell index tests on sodium bentonite from a GCL conducted by Shackelford et al. (2000) andJo et al. (2001) also showed that Free swell indexof the bentonite was responsive to the cation valence and

electrolyte concentration in a manner that was consistent with changes in the thickness of theadsorbedlayerof cations.It is also noticed that an increase in liquid concentration reduces the coefficient ofcompressibility of thebentonite.

5.3 Shear Strength

Sodium bentonite has the lowest shear strength when hydrated and many of the interfaces with GCLs also exhibit low strengths. Hydration of bentonite may affect the properties ofreinforced GCLs by stretching the reinforcement as the bentonite swells. The internal and interface strengths for a GCL will tend to reduce with increased swelling. Most of the studieshave demonstrated that bentonite from the GCLs may extrude into the GCL/GM interface resulting in a significant decrease in 15 interface shear strength. The bentonite extrusion from GCLs is dependent on many factors, including the type ofgeotextiles (woven and nonwoven), roughness of Geomembrane surface, type of hydration fluid, hydration condition of GCL, stress level applied, sequence of hydration and loading, loading rate, and shearing rate. Hewitt etal. (1997) and Koerner et al. (1998, 1998) found that extrusion occurred when the bentonite was hydrated and mobile. Bouazza (2002) and Triplett & Fox (2001) reported that bentonite was easilyextruded through a woven geotextiles/textured GM interface. The extrusion was less for nonwoven geotextiles interfaces and smooth GM interfaces.

Stark (1997) found that the amount of bentonite extrusion was related to the swell pressure of the bentonite in the GCL. Mark H. Gleason, David E. Daniel andGerald R. Eykholt(1997) performed consolidated drained direct shear tests on thin layers ofbentonite as per ASTM D3080. The samples were consolidated to the desired normal stress, the time and displacement to failure were estimated, and the samples were sheared at the calculated rate. The times to failure varied from days to weeks. Further details are provided by Gleason(1993).

The Mohr-Coulomb failure envelopes forthe consolidated-drained direct shear tests are shown in Fig. 9. For the range of normal stress (35-150 kPa) employed in this testing program, the shear strength of the calcium bentonite is approximately twice the shear strength of the Sodiumbentonite.

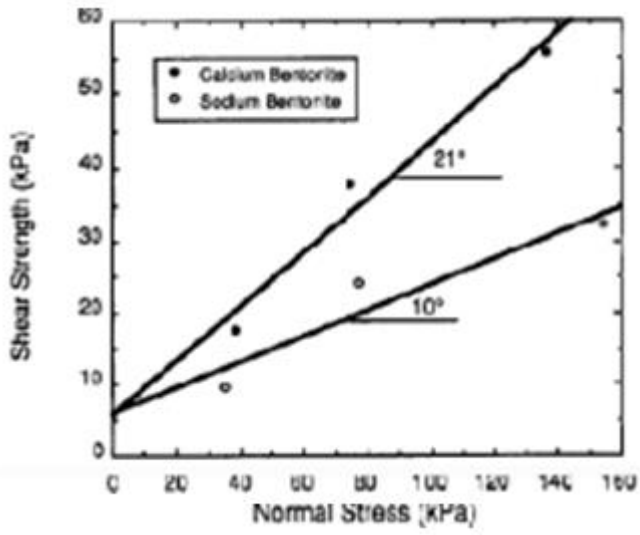

Fig.9:Results of Consolidated-Drained Direct Shear Tests on Bentonite (Gleason 1997) Ana Vukelic(2007) concluded that for tests carried out on prehydrated samples at lower shear rates, lower contact shear strengths were obtained and more extensive bentonite extrusion to the 16 contact area was observed. High-quality test data are available in the open literature for GCL internal shear strengths and geomembrane/GCL interface shear

strengths. Much less information is available on shear strength behavior forother common GCL interfaces (e.g. soil/GCL, drainage geocomposite/GCL), especially at high normal stress conditions (Chiu and Fox2004)

5.4 Hydraulic Conductivity

Lutz and Kemper (1958) investigated how salt solution concentration affected the hydraulic conductivity of sodium and calcium bentonites from Utah. The bentonites were permeated with Distilled water (DI), NaCl solutions (Na bentonite only), or CaCl2 solutions (Ca bentonite only). When permeated with 0.005 N solutions, the Na bentonite and Ca bentonite were approximately two times more permeable than to DI water. For 0.5 N solutions, the Na bentonite was 11 times more permeable than to DI water and the Ca bentonite was four times more permeable than to DI water. McNeal and Coleman (1966) investigated how the hydraulic conductivity of six soils with montmorillonite content ranging from 25 to 48% varied as the concentration of NaCl and CaCl2 in the permeant liquid increased. At low concentrations (<0.02 N), the hydraulic conductivity to NaCl was typically 20 times lower than to CaCl2. When the concentration exceeded 0.6 N, the soils had similar hydraulic conductivity regardless of whether they were permeated with a NaCl solution or a CaCl2 solution.

Alther et al. (1985) studied how valence and concentration of inorganic salt solutions affect the hydraulic conductivity of bentonite. Filter press tests were conducted on contaminant-resistant (polymerized) bentonite and untreated bentonite using 16 inorganic aqueous solutions. The hydraulic conductivity of the bentonite increased with increasing electrolyte concentration.

Gleason et al. (1997) investigated the properties of Na-bentonite and Ca-bentonite by conducting hydraulic conductivity tests on a thin bentonite layer simulating a GCL. The bentonite was permeated with tap water and 0.25 M CaCl2 solution at an effective stress of 35 kPa. Nabentonite permeated with 0.25 M CaCl2 solution had higher hydraulic conductivity (9x 10-7 cm/s) compared to Na-bentonite permeated with tap water (6x10-10 cm/s).

Petrov et al. (1997) investigated how increasing concentrations of NaCl solutions affected the hydraulic conductivity of a needle-punched GCL containing Sodium Bentonite. All tests were conducted in a fixed-ring permeameter with a vertical stress of 35 kPa. An increase in NaCl concentration resulted in an increase in the hydraulic conductivity, which is consistent with a reduction in the volume of bound water.

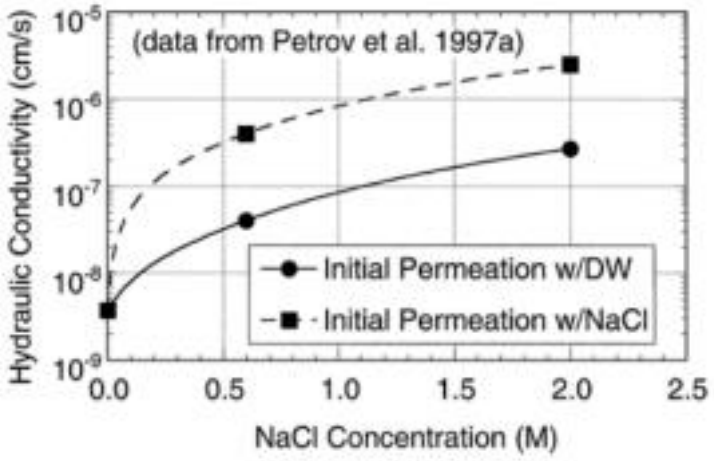

Fig. 10:Hydraulic conductivity of a Sodium Bentonite versus NaCl concentration for specimens initially permeated with distilled water (DW) and specimens permeated directly with NaCl solutions (Petrov 1997)

VI. CHARACTERISTICS OF SAND

Sand is a pervious material in nature. Hydraulic conductivity of sand ranges from 1 to 1×10 - 5 cm/s (Freeze and Cherry, 1979). The hydraulic conductivity of sand can be reduced if sand is mixed with a very impervious material such as bentonite. The table below gives a detailed description of different sands used by several researchers.

Table 1:Detailed description of different sands used

Researchers	Properties of Sand Used
1) Chalermyanont and Arrykul (2005)	Songkhla local sand The corresponding coefficient of uniformity (Cu) and coefficient of curvature (Cc) are 11.7 and 1.0, respectively. The sand is classified as SW-SM according to the Unified Soil Classification System (USCS)
2) Tay and Stewart (2000)	Sherburn Yellow Building Sand (Quartz Sand) Effective size (D10) = 212μm Specific Gravity = 2.68 Coefficient of uniformity, (Cu) = 2 Max. and Min. Void Ratio = 0.767 and 0.375
3) Mollins et al. (1995)	Knapton Quarry sand is a slightly silty fine angular quartz sand (containing some iron oxides and silicate minerals). Percentage fines = 7% Effective size (D10) = 0.07 mm Specific gravity = 2.67

6.1 Sand Bentonite Mixtures

Chapuis (1990) presented numerous results of laboratory permeability tests for soil-bentonite mixtures used as hydraulic containment liners. Sand-bentonite mixtures are comprised of two different soils with regard to grain size, chemical activity, permeability and strength, which when combined in optimum proportion, can form an outstanding seepage barrier that possess a low hydraulic conductivity and is dimensionally stable.

Sand-Bentonite mixtures are widely used as hydraulic barriers to prevent the movement of leachate from waste disposal facilities because sand-bentonite can combine relatively high strength and low compressibility with very low hydraulic conductivity. This is achieved by using a mixture that contains sufficient sand to ensure the stability of the mixture and enough bentonite to seal the voids between the sand particles. The mixture containing modest amounts of bentonite is fairly resistant to the effects of desiccation (Tay et al. 2001), and the bentonite in mixture has a high chemical buffering capacity (Yong, 1999). As the sand component in sand-bentonite mixtures decreases the shrinkage on drying, mixtures can meet the hydraulic conductivity criteria without suffering from shrinkage cracking (Dixon et al., 1985).

The hydraulic conductivity of a mixture is dependent on the fabric of bentonite in the sand-bentonite mixture which in turn is governed by conditions at the time of mixing of sand and bentonite. In mixtures containing up to 20% bentonite in dry weight, sand forms the loadsupporting framework and provides dimensional stability at

the macro level in the sand bentonite mixtures. The table below gives a detailed description of work carried out by researchers on sand-bentonite mixtures.

Table 2:Detailed description of work on sand-bentonite mixtures

Researchers	Materials Used	Properties of material	Properties studied
1.Mollins and Cousens (1996)	Fine silica sand Na-bentonite powder Sand-Bentonite mixtures- 5, 10 & 20% Bentonite by dry weight.	Silica Sand - SP according to USCS. Percentage fines = 7% Effective size , D10 = 0.07 mm Specific gravity = 2.67 Moisture content ~4.5%	1.Swelling behavior and hydraulic conductivity of Sodium-bentonite powder and mixtures. 2. The study concluded that hydraulic conductivity of a Sand-
		Na-montmorillonite Bentonite Powder Liquid limit = 407% Plastic limit = 48% Specific gravity = 2.76 Moisture content ~ 13.5%	Bentonite mixture is dependent on the bentonite content.
2.Agus SetyoMuntohar (2004)	Sodium Bentonite Powder, Kaolin and Fine Sand. The percentage of Sodium Bentonite by weight is varied between 5% and 100%.	Sand: Effective Size, D50 = 0.82 Percentage Sand = 71.5% Percentage Silt = 4.0% Percentage Clay = 0.0% Bentonite: Liquid Limit = 307.3% Plastic Limit = 45.4% Activity = 3.6 Kaolin: Liquid Limit = 72.3% Plastic Limit = 39.8%	1. Study of swelling and compressibility behavior of mixtures. 2. Study of deformation behavior of Bentonite mixed with different amount and types of non swelling soil such as (kaolin) and finer fractions (silt).
3.Arrykul and Chalermyanont (2006)	Local Songkhla Sand. Powdered Sodium Bentonite	Bentonite: Liquid limit = 487% Plasticity index = 450% Specific Gravity = 2.55	1. Compaction tests were carried out to find out the optimum water contents and maximum dry unit weight of sand-bentonite mixtures. 2. Based on the standard test results, a suitable sand-bentonite mixture that yields low hydraulic conductivity maintaining relatively high shear strength was suggested as liner in hydraulic containment applications.

4.Karunaratne et al. (2001)	Sodium bentonite and Kaolinite	Sodium Bentonite: Liquid limit = 465% Plasticity index = 424% Specific Gravity = 2.77 Kaolinite: Liquid limit = 74% Plasticity index = 40% Specific Gravity = 2.64	1. Study the geotechnical properties of bentonite: kaolinite mixtures when subjected to a variety of permeants.

VII. INDEX PROPERTIES

The consistency limits are useful indicatorsof clay behavior (Jefferson and Rogers, 1998). It should be pointed out that there has not been a general consensus regarding the effect of chemicals on the consistency limits of clays. Bowdersand Daniel (1987) advocated that many chemicals tend to reduce the thickness of the DDL, causing the soil skeleton to shrink and decrease in repulsive forces, thus promoting flocculation of clay particles, and to dehydrate interlayer zones of expandable clays, resulting in a reduction in liquidlimit.

G.P. Karunaratne, S.H. Chew, S.L. Lee, and A.N. Sinha (2001) carried out swell index tests and liquid limit tests with different permeants for bentonite, B:K = 50:50, and kaolinite. Fig.11 shows the variation of the liquid limit with bentonite percentage.

Fig.12 shows the variation of the swell index with bentonite percentage. The 0.25M calcium chloride permeant reduces the swell index significantly compared to distilledwater.

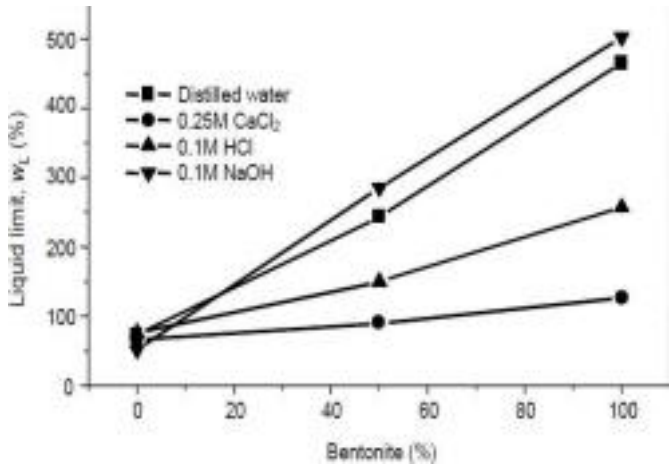

Fig. 11:Variation of the liquid limit, wL , with percentage of bentonite content (Lee 2001)

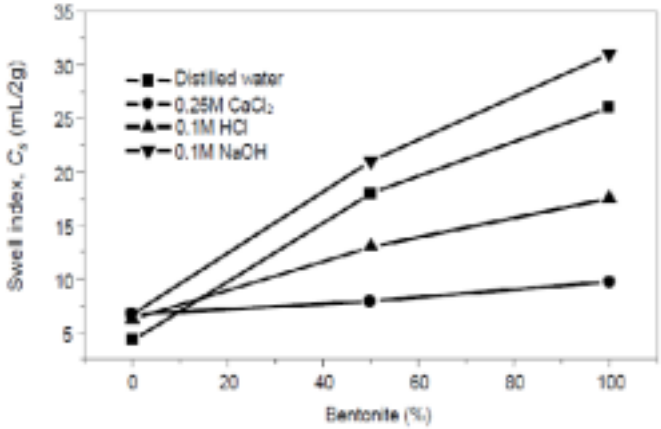

Fig. 12:Variation of the swell index with percentage of bentonite content (Chew 2001) A swelling test was developed to investigate the behavior of sodium bentonite powder and sand bentonite mixtures (5, 10 and 20% bentonite by dry weight) by Mollins, Stewart and Cousens. Dry samples of sodium bentonite and mixtures were placed in an oedometer ring, subjected to a vertical stress while the sample height was monitored until swelling ceased. Tests were performed at various vertical effective stresses, ranging from 1 to 450kPa.

Fig. 13 shows a linear relationship between the final void ratio of the clay, ec, and the logarithm of vertical effective stress, σv'. By maintaining homogeneity in compaction by tamping, vibration and static loading, it is found that the final void ratio is independent to sample preparation.

Fig. 14 shows plot of sand-bentonite mixtures with their final clay void ratio against the logarithm of vertical effective stress. At low effective stress levels the mixtures behave as clay and the externally applied stress is supported by the clay soil. When the externally applied stress exceeds a threshold value, the difference between the externally applied stress and the threshold value is supported largely by the sand, whose particles must now be in contact. The threshold value which causes a change in the mixture's behavior is found to be a function of the clay content. Graham et al. (1986) proposed a similar explanation of the mechanical behavior of sand-bentonitemixtures.

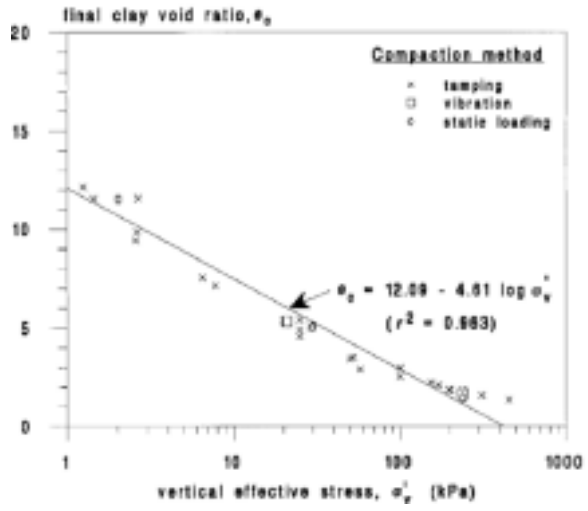

Fig. 13:Swelling of Bentonite powder with distilled water

Fig. 14:Final clay void ratioof sand-bentonite mixtures after swelling with distilled water The swelling mechanism of compacted bentonite clay can be illustrated by the model asgiven by

AgusSetyoMuntohar, 2004 in Fig. 15. The volume of swelling clay particles such as montmorillonite increaseby absorbing water into the interlayer portion of montmorillonite, andthe void in the compacted bentonite clay are filled by this volume. After water uptake, the compacted bentonite clay can swell at a constant vertical pressure as in the swelling deformation test. The volume of compacted clay increases as the volume of swelling clay particles increases until the swelling pressure of the clay particles equals the verticalpressure.

Fig. 15:The model of the swelling deformation of compacted bentonite clay 8. CompactionCharacteristics
Compaction tests were carried out by Chalermyanont and Arrykul (2006) to assess the optimum water contents and maximum dry unit weights of sand-bentonite mixtures which were determined using Standard Proctor compaction method (ASTM D698). The bentonite contents used varied between 0%, 3%, 5%, 7%, and 9% by dryweight.
The maximum dry unit weights and corresponding optimum water contents were obtained from the peak of compaction curves as shown in Fig. 16 As bentonite content increased, optimum water content (OMC) increased and maximum dry unit weight (MDD) decreased. As shown in Fig. 16, when the bentonite content varies from 0 to 9%, the maximum dry unit weight decreases from 19.47 to 18.56 kN/m3and the corresponding optimum water content of the compacted sand-bentonite mixtures increases from 9 to 12%. When bentonite is mixed with sand, more water is required in compaction in order to reach maximum dry unit weight (Holtz and Kovac1981).
Shariatmadari (2011) concluded that inorganic salt solution increases the maximum dry density and decrease the optimum water content of mixtures. Higher cation valance leads to higher increase in the maximum dry density and higher decrease in optimum water content. The decrease of the diffuse double layer's thickness is the source of thistrend.
Fig. 16:Compaction curves of sand-bentonite mixtures.

8.1 One-DimensionalConsolidation

One-dimensional consolidation tests were carried out by Karunaratne et al. (2001) on clay mixtures at the liquid limit with distilled water to determine the change of consolidation properties with the addition of increased amounts of bentonite. Specimens were consolidated in stainless steel circular containers (70 mm in diameter and 19 mm high). The loading procedure comprised the following stages: (i) a seating pressure of 12.5 kPa was applied; (ii) stage loading up to 100 kPa with a load increment ratio of one was applied; (iii) unloaded to 25 kPa; and (iv) reloaded up to 800 kPa with a load increment ratio of one. As the depth of most landfills are in the range of 30 to 80 m, 800 kPa is a reasonably high enough stress for the examination of consolidationproperties.

Fig. 17:The compression index and swell index, Cs , with percentage of bentonite content.
Fig. 18:Variation of the coefficient of consolidation, Cv, with pressure for Bentonite-kaolinite (B:K) mixtures using distilled water as the permeant.
Fig. 17 shows the increasing trend of Cc and Cs with increasing bentonite percentages. Fig. 18 shows the variation of Cv with pressure obtained from oedometers for different B:K ratios using distilled water as the permeant. The coefficient of consolidation, Cv increases with the increasing pressure for pure kaolinite and decreases for pure bentonite. For B:K = 50:50, the swell index, Cs , and compression index, Cc , were approximately 50% of those for pure bentonite. The results shows that the 50:50 B:Kmixture results in

coefficient of consolidation, Cvand hydraulic conductivity, k, values approximately the same as that of pure bentonite. Therefore, B:K= 50:50 is the thresh-old mixture ratio. G.P. Karunaratne et al. (2001) concluded that, for the 50:50 B:Kmixture all the hydraulic conductivity values were within the range of limits. This demonstrates that a liner packed with a 50:50 bentonite:kaolinite mixture could be a cost- effective lineroption.

VIII. HYDRAULIC CONDUCTIVITY

Factors affecting the hydraulic conductivity of sand-bentonite mixture

1) Percentage of Bentonite

The amount of bentonite in a sand-bentonite mixture ranges from 5 to 20% of the dry weight of Greater amounts of bentonite tend to form around the sand grains, and the mixture becomes plastic and consequently difficult to compact. Further, decrease in hydraulic conductivity becomes marginal, and will not be cost-effective liner option (Chapius, 1990).

Fig. 19:Hydraulic conductivity (m/s) of a sand-bentonite mixture as a function of percentage of bentonite versus dry density (Goran Sallfors 2002)

Fig. 20:Hydraulic conductivity and swell versus bentonite content of sand-bentonite mixtures. Relationship between hydraulic conductivity of sand-bentonite mixtures and percent bentonite content is shown in Fig.19andFig. 20 The hydraulic conductivity of sand-bentonite mixtures decreases with increasing bentonite content. For bentonite contents of 3 and 5%, the hydraulic conductivity of the mixtures decreases significantly to 5.13×10-8and5.15×10-9 cm/s, respectively.

2) Mixture andCompaction

A thorough mixture of the bentonite and the sand is important for reducing the scatter in the permeability. The most effective compaction is reached when the sand-bentonite mixture has a water content close to optimum or just above (about 2%) (Haug and Wong, 1992).

3) Type ofBentonite

Depending on the pore fluid, different types of bentonite behave differently, and it is therefore important to consider the chemical state of both the bentonite and the fluid when, determining the components of the mixture (Kenney et al., 1992).

4) Time ofPermeation

Time plays a very important role when it comes to the resulting hydraulic conductivity of a sand- bentonite mixture. The sand and bentonite are often mixed dry or at least in an unsaturated phase and then compacted at an optimum water content, resulting in a sample that is not fully saturated. The bentonite swells during uptake of water and, consequently, it will take a long time before the degree of saturation in the sample is homogeneous and low hydraulic conductivity is obtained due, to the low hydraulic conductivity of thebentonite.

Fig. 21:Ratio of inflow to outflow and hydraulic conductivity vs. time of sand with 3% bentonite mixture.

Hydraulic conductivity test results for mixture with 3% bentonite content as a function oftime are demonstrated in Fig. 22. Within the first two weeks, the hydraulic conductivity and rate ofinflow to rate of outflow ratio were fluctuated. After two weeks, these two values were reasonably constant which indicated that the constant flow was reached and reliable hydraulic conductivity had been achieved. For higher bentonite contents, the time to reach constant flow was longer. For a mixture with 9% bentonite, time required to reach constant flow was about 12 weeks

9.1 Measurement of Hydraulic Conductivity

Hydraulic conductivity tests have been performed at vertical effective stresses up to 450 kPa on Na bentonite powder and compacted sand-bentonite mixtures (5, 10 and 20% bentonite by weight) by Mollins and Cousens (1996). Three methods that were used to determine the hydraulic conductivity are asfollow:

Rowe cell constant head tests: Bentonite specimens were tamped into the Rowe cell as dry powder, whereas mixtures (with one exception) were compacted into thecell at optimum moisture content. All samples were confined by a vertical stress, vacuum de-aired, and allowed access to water. A back pressure of 300 kPa was used in all the Rowe cell tests to improve saturation. Two alternative methods were also used for measuring hydraulic conductivity. Standard compaction permeameter falling head tests and an indirect method where the hydraulic conductivity was calculated from consolidation data (Terzaghi, 1943), using the logarithmic method (Casagrande &Fadum,1940).

Falling head compaction permeameter was suitable for measuring the hydraulic conductivity of the sand and 5% bentonite mixture, whereas the method based on consolidation rate required significant, time dependent volume change and was, appropriate for specimens with higher claycontent.

Fig. 23 shows the hydraulic conductivity data measured bythree different methods on such a plot. The data for 100, 20 and 10% bentonite mixtures fall on a single straight line indicating that these mixtures are behaving as the same soil type (the pore-size term in the Kozeny-Carmen equation is the same). The Kozeny-Carmen equation (Bear, 1972) indicates that the relationship tends to linearity at large void ratios. Terzaghi & Peck (1967) suggest a linear relationship between the logarithm of hydraulic conductivity and the logarithm of void ratio for a particular soiltype.

Fig. 23:Hydraulic conductivity of sand-bentonite mixtures.

Chalermyanont and Arrykul (2006) performed hydraulic conductivity tests on compacted sand bentonite mixtures in rigid wall permeameter as shown schematically in Fig. 24. A rigid wall permeameter is a compaction-mold used in compaction test, made of stainless steel tube and mounted on top and bottom with stainless steel plates. A collar was mounted between the top plate and the permeameter in order to obtain 1- D flow through the specimen. The specimens were allowed to swell vertically at the upper end into the collar that was filled with distilled water which was boiled prior to use distilled water was permeated through the specimens from the top of permeameter via a Teflon tube that connected the top plate to the burette. The hydraulic gradient used was 10 to 15. The graduated cylinders were used to collect the effluents at the bottom of thespecimens.

Fig. 24:Rigid wall permeameter

G.P. Karunaratne et al (2001) measured the hydraulic conductivity after each consolidation stage using a falling head permeameter attached to the oedometer cells. A consolidation pressure of 35 kPa was used to facilitate comparison the studies of Ruhl and Daniel (1997), Gleason et al. (1997),andLentzetal.(1984),whoconsidered35kPaasasuitablevalue.

The measured hydraulic conductivity, k, versus pressure for different B:K ratios is shown in Fig. 25 The variation of k for B:K = 50:50 is nearly identical to that of pure bentonite.

Fig. 25:Variation of the measured hydraulic conductivity, k, with pressure for different bentonite:kaolinite (B:K) mixtures using distilled water as the permeant.

Fig. 26:Variation of hydraulic conductivity, k, using the falling head method (distilled water, 0.25M CaCl2 , 0.1M HCl, and 0.1M NaOH; consolidation pressure = 35 kPa).

The hydraulic conductivity values for kaolinite and B:K= 50:50 permeated with distilled water, an acid, and an alkaline environment are shown in Fig. 26. The calcium chloride permeant increased the hydraulic conductivity approximately 4.5 times for pure kaolinite, 16 times for Bentonite:Kaolinte = 50:50, and 34 times for pure bentonite. The hydraulic conductivity values measured using Rowe cells under constant head conditions and oedometers under falling head conditions are approximately comparable for Bentonite:Kaolinite = 50:50 andusingdistilled water as the permeant. Hence, for other permeants, which are likely to corrode the metal lining, the falling head method was used at the end of each consolidation pressure increment.

9.2 Hydraulic conductivity of Geosynthetic Clay Liners

Hydraulic conductivity to the actual permeant liquid is usually assessed by a ‘‘compatibility test’’ where the GCL is permeated with the liquid to be contained or a liquid simulating the anticipated liquid. There have been numerous studies that looked into the effect of pore liquid on the engineering properties of GCLs. Most of these investigations focused on the variation of hydraulic conductivity. For example, Schubert (1987), Shan and Daniel (1991), Daniel et al. (1993), and Ruhl and Daniel (1997) have permeated GCLs with various chemical solutions including real or syntheticleachate.

Fig. 27:Results for Hydraulic Conductivity of GCL versus Effective Confining Stress ResultsforHydraulicConductivityofGCLversusEffectiveConfiningStressareshownbyR S Thiel and K Criley in Fig. 27. The hydraulic conductivity of GCL is function of effective confining stress. As the confining pressure increased, the hydraulic conductivity of GCL increased.

The results of the tests conducted by Petrov and Rowe (1997) showed that for GCL specimensprehydrated with water, the hydraulic conductivity of the GCL increased by approximately1.5to2ordersofmagnitudeastheNaClconcentrationincreasedfrom0.01Mto2.0 M, with the increase in hydraulic conductivity being slightly greater for GCLs with higher void ratios. In contrast, for the GCL specimens prehydrated with NaCl solution, the hydraulic conductivity of the GCL increased approximately 2.5 to 3 orders of magnitude as the NaCl concentration increased from 0.1 M to 2.0M. Shackelford et al. (2000) discussed the factors and testing considerations affecting the hydraulic conductivity of GCLs permeated with inorganic liquids. Their test results showed thatinorganic liquids containing both high concentrations of monovalent cations and low concentrationsof divalent cations can cause significant increases in hydraulic conductivity provided the test is performed satisfactorily long to allow for exchange of adsorbed cations. Shan and Daniel (1991) and Daniel et al. (1993) found that the hydraulic conductivityof water- hydrated GCLs did not show a severe increase when permeated with a range of chemical solutions and organicliquids.

Fig. 28:Effect of Needle-Punching Fibers on Hydraulic Conductivity of GCLs Permeated with CaCl2 Solutions

Hydraulic conductivities of the thin specimens of granular bentonite and GCL specimens obtained by Ho Young Jo (2001) are shown in Fig. 28. The thin specimens of bentonite had essentially the same hydraulic conductivity as the GCL specimens when permeated with CaCl2 solutions. Thus, preferential flow along the needle-punching fibers was not responsible for the high hydraulic conductivity of the GCLs observed at higher concentrations (>0.1M).

Ruhl and Daniel (1997) concluded from their experiments that the most important factor that governs 34 GCLs’ ability to slow down permeation of chemical solutions is the hydrating liquid. When a GCL specimen had been hydrated with water prior to permeation of other liquids, the hydraulic conductivity of the GCL remained quite low (in the range of 10-11- 10-10 m/s). In addition, permeation of GCLs with real leachate resulted in lower hydraulic conductivity (10-12- 10-10m/s).

IX. DIFFERENTIAL SETTLEMENT

MSW Landfills undergo settlement during and after their active life. This settlementis caused by the gradual decomposition and consolidation of the waste mass. Differential settlement maybecharacterizedbythedistortionΔ/L,whichisdefinedasthesettlementΔ,overthe horizontal distance L. The average tensile strain caused by distortion can be computed. If tensile strains are large enough, the barrier layer may crack and lose its hydraulic conductivity. For this reason, it is essential that the landfill cover system be capable of sustaining the anticipated differential settlement of the waste mass.

Fig. 29:Definition of Distortion, Δ/L

Murphy and Gilbert (1987) concluded that settlement over short distances in landfill cover systems is more threatening to the performance of barrier than relatively uniform settlement over longer distances. The average tensile strain caused by distortion at failure increases with an increasing plasticity index and increasing clay content (Lozano and Aughenbaugh 1995). The tensile strain at failure is between 0.1 to 4% (Koerner1994).

Stone and Jessberger (1991) conducted centrifuge test to look into the responseof compacted kaolin and sand bentonite mixture to different settlement. Angular Distortionof up to 16 ° (Δ/L =0.287) were generated, the barriers were permeated as distortion was induced. Thecompacted Kaolin barrier without any surcharge failed at an angular distortion of 6 °(Δ/L=0.105). For sand bentonite mixture without surcharge, slight surface cracking occurred at angular distortion of 7.5 °.

Mark D.Lagatta and David E. Daniel investigated to quantify relationship between differential settlement and hydraulic conductivity of GCLs by performing test in steel tank and a water filled bladder was placed beneath the GCL to produce differential settlement. They concluded that GCLs are between CCLs and Geomembranes in terms of ability towithstand

tensile strains associated with differential settlement. Based on current knowledge, the general range of tensile strains that various can withstand appears to be asfollows:

i. Compacted Clay Liners : 0.1-4%
ii. Geosynthetic Clay Liners : 1-10%
iii. Geomembranes : 20-100%

10.1 Bentonite Migration inGCLs

Results of field observations and laboratory tests show that the thickness of bentonite in GCLs can decrease under a normal stress, especially around the zone of stress concentration, such as sump or wrinkles in an overlying geomembrane. In a liner system, this decrease in GCL thickness will result in an increase in hydraulic conductivity, regulatory non-compliance and a weak leachate attenuation capacity and decrease in containmenttime.

In a cover system, reduced thicknesses of bentonite cause an increase in infiltration or gas migration through the GCL. Another means for stress concentration development is local differential settlement caused by natural variations in foundation compressibility and shear strength. Suggestion to protect hydrated bentonite from stress concentrations are presented by (T M Stark, 1998), modifying the existing GCLs to include an internalstructure.

Migration of bentonite particles may be due to two mechanisms (J.P. Giroud and K.L. Soderman, 2000) · When bentonite is hydrated, it has very low shear strength and it is conceivable that the overburden stress (i.e. load applied on the GCL due to the weight of the overlying layers) may cause a certain amount of hydrated

bentonite to be extruded through geotextile openings. Evidence of this mechanism is provided by Fox et al.(1998).

· If there is a hole in the geomembrane overlying the GCL, the resulting flow of leachate through the hole in the geomembrane, then through the GCL and toward the Geonet, may dislocate some bentonite particles from the GCL and may carry some of these particles through geotextileopenings.

10.2 Comparison of Hydraulic Conductivity Behavior of GCL andCCL

The most commonly used landfill barriers are Compacted Clay Liners (CCL) and Geosynthetic Clay Liners (GCL) offering individual advantages and disadvantages. When used under the right circumstances all systems can achieve good results, however all sealing systems have certainlimitations.

Fig. 30:Hydraulic Conductivity of CCL versus Dielectric Constant (Fernandez & Quigley, 1985)

Fig. 30 indicates that the dielectric constant ofpermeants can have a important effect on hydraulic conductivity caused by the changes in the double layer thickness. Increases in hydraulic conductivity have been observed depending on the type of chemical solutions. Comparable comments were made by a number of investigators (Mesri& Olson, 1971; Fernandez & Quigley,1986).

Fig. 31. Plot of dielectric constant versus coefficient of Permeability ofGCL

Fig. 31 shows a very strong relationship between the coefficient of permeability and dielectric constant of the fluid. It is observed that the permeabilityof GCLtolow/non-polar fluidsisveryhighcomparedwiththepermeabilitytowaterorformamide,ahigh-polarityfluid.

The performance of a GCL, should be either equivalent to or exceed that of a CCL. The considerations of solute flux and breakthrough time, compatibility, and attenuation capacity favourCCLs. The hydraulic conductivities of GCLs and CCLs vary depending on the compressive stress. The measured hydraulic conductivities of hydrated GCLs in laboratory tests designed to simulate the compressive stress conditions in a landfill are typically in the range of 5×10^{-12}to5×10^{-11} m/s. These hydraulic conductivities are roughly 10 to 100 times lower than the hydraulic conductivities of CCLs which are typically between $1 \times 10^{-10}$and 1×10^{-9}m/s.

The hydraulic conductivity values given above are for the case when the liquid permeating the CCL or the GCL is water or a low-concentration leachate that does not affect the hydraulic conductivity of the CCL and the GCL. Examples of such leachates are given by Ruhl and Daniel (1997). GCLs are more capable to withstand freeze-thaw and wet-dry cycles, are not vulnerable to desiccation during construction, and can offer equivalent or lower rates of release of fluids and chemicals (Daniel,1994).

CCLs are more effective diffusion barriers than GCLs because diffusion through a CCL is only slightly faster than through a hydrated GCL and the thickness of a CCL is typically on the order of 100 times the thickness of a GCL. The attenuation in CCLs is more effective than inGCLs because the larger thickness of CCLs more than compensates for the greater absorption capability of bentonite in GCLs (Daniel1996).

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Hand Gesture Assistant

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ABSTRACT
Our project introduces a Hand Gesture Assistant (HGA) for laptops and PCs, catering to the demand for intuitive, hands-free interaction methods. By leveraging computer vision techniques and machine learning, the HGA interprets hand gestures captured by the device's camera, enabling users to control media, navigate applications, and execute commands without traditional input tools. Key features include real-time hand detection, gesture classification, and seamless integration with the user interface. This advancement in human-computer interaction enhances accessibility and convenience, especially for users with mobility challenges. The HGA's scalability opens doors for integration in entertainment, gaming, productivity, and accessibility applications, heralding a future of immersive, behavior-aligned technology.
Keywords: HGR,Computer vision,machinelearning

I. INTRODUCTION

In today's dynamic digital landscape, the need for intuitive human-computer interaction methods is evident. Our project aims to revolutionize laptop and PC interaction with a sophisticated Hand Gesture Assistant (HGA) that utilizes computer vision and machine learning. By capturing natural hand gestures through built-in cameras, the HGA enables effortless device control without traditional input devices. This advancement not only enhances accessibility but also redefines human-computer interaction, fostering creativity and productivity across gaming, entertainment, education, and work settings. The HGA represents a transformative technology that enriches lives by adapting technology seamlessly to human behaviour and transcending physical boundaries.

In today's rapidly evolving digital landscape, where technology plays an increasingly integral role in our daily lives, the demand for more intuitive and natural ways to interact with computers is ever-growing. Traditional input methods, such as keyboards and mice, while effective, can sometimes feel restrictive and disconnected from our natural behaviours. Recognizing this gap, our project sets out to redefine the user experience by introducing the Hand Gesture Assistant (HGA), a cutting-edge solution that harnesses the power of computer vision and machine learning.

The HGA represents a significant leap forward in human-computer interaction by allowing users to control their laptops and PCs using natural hand gestures captured by built-in cameras or webcams. This innovative approach eliminates the need for physical input devices, offering users a more seamless and intuitive way to navigate through digital interfaces. By enabling effortless device control through gestures, the HGA not only

enhances accessibility for individuals with disabilities but also enhances the overall user experience for everyone, regardless of their technical proficiency.

Moreover, the implications of the HGA extend far beyond mere convenience. By redefining the way we interact with technology, the HGA has the potential to foster creativity and productivity across a wide range of domains, including gaming, entertainment, education, and professional settings. From controlling multimedia content with a wave of the hand to seamlessly switching between applications with a flick of the wrist, the possibilities unlocked by the HGA are limitless. As technology continues to evolve, the HGA stands as a testament to our ongoing efforts to adapt and innovate, enriching lives and pushing the boundariesof what's possible in human-computer interaction.

II. LITERATURESURVEY

Hand gesture recognition has emerged as a significant area of research, particularly in the context of developing intuitive human-computer interaction systems. This literature survey delves into various studies and patents related to hand gesture recognition techniques, methods, and tools.

Patel and He(2018) [1] conducted a comprehensive survey on hand gesture recognition techniques, methods, and tools, providing insights into the advancements in this field. Their work serves as a foundational reference for understanding the landscape of hand gesture recognition technology.

The "HAND GESTURE RECOGNITION SYSTEM AND METHOD"[2] patent outlines a specific system and method for recognizing hand gestures, showcasing early efforts to formalize this technology. This patent serves as an early milestone in the development of hand gesture recognition systems. Similarly, another patent from 2003 (EP 0 849 697 B1)[3] contributes to the body of knowledge in hand gesture recognition. This patent likely introduces novel techniques or improvements in existing methods, adding to the pool of intellectual property in this domain.

Khan (2012) [4] conducted a literature review specifically focusing on hand gesture recognition, offering insights into the historical development, current trends, and future directions of this technology. This review is valuable for understanding the evolution of hand gesture recognition systems over time.

More recently, Oudah, Al-Naji, and Chahl (2020) [5] provided a review of hand gesture recognition techniques based on computer vision, highlighting the role of imaging technologies in enhancing gesture recognition accuracy and robustness. Their study offers updated perspectives on the subject, considering recent advancements in computer vision and machine learning.

Overall, the literature survey encompasses a range of research efforts spanning from early patents to contemporary studies, providing a comprehensive understanding of the evolution and current state of hand gesture recognition technology. These contributions serve as foundational knowledge for researchers aiming to develop hand gesture-based computer assistants and advance the field of human-computer interaction.

III.PROPOSEDSYSTEM

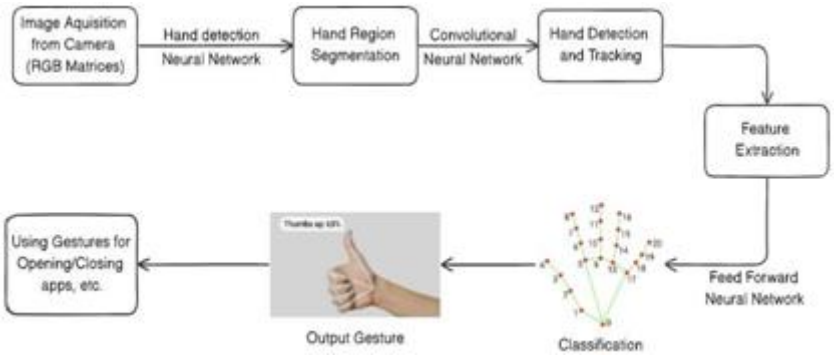

Figure1:Modelofthe Project

The design of a gesture recognition system involves integrating various components to create a robust and efficient system capable of accurately interpreting and responding to hand gestures. This system design encompasses hardware, software, algorithms, and user interfaces to provide seamless interaction between users and devices.

A. Hardware Components

The hardware components of a gesture recognition system typically include cameras or sensors for capturing visual input of hand gestures. These can range from RGB cameras or depth sensors to specialized motion-tracking devices like accelerometers or gyroscopes. The choice of hardware depends on factors such as the application requirements, desired accuracy, and environmental conditions.

B. Software Components

The software components of a gesture recognition system include algorithms and software libraries for processing, analyzing, and interpreting the captured data. This encompasses computer vision techniques for hand detection and tracking, machine learning algorithms for gesture recognition, and post-processing techniques for refining the output. Common software tools and libraries used in gesture recognition systems include Python, OpenCV, TensorFlow, MediaPipe and Numpy.

C. System Architecture

The system architecture of a gesture recognition system typically follows a modular design, with distinct components for data acquisition, processing, recognition, and user interaction. These components are interconnected through welldefined interfaces to facilitate communication and data flow between them. The system architecture may be designed to support scalability, flexibility, and modularity, allowing for easy integration of new features or improvements.

D. Data Flow

The data flow within a gesture recognition system follows a sequential process, starting with data acquisition from the sensors or cameras. The captured data is then pre-processed to enhance its quality and extract relevant features. Next, the preprocessed data is fed into the gesture detection and tracking algorithms to identify and track the movement of hands in the video stream. Once the hand movements are tracked, they are input into the

gesture recognition model, which classifies the gestures and generates corresponding commands or actions. Finally, the recognized gestures are executed, and feedback is provided to the user through a graphical user interface.

E. User Interface Design

The user interface design of a gesture recognition system plays a crucial role in facilitating interaction between users and the system. The user interface may include graphical elements such as icons, buttons, or visual feedback to indicate gesture recognition status and executed commands. It should be intuitive, responsive, and user-friendly to enhance the overall user experience. Integration and Testing: Integration and testing are essential phases in the development of a gesture recognition system. During integration, the individual components of the system are combined and tested together to ensure they function correctly and interact seamlessly. Testing involves validating the system's performance, accuracy, and reliability under various conditions and scenarios, including different hand gestures, lighting conditions, and user environments.

In summary, the system design of a gesture recognition system involves the integration of hardware, software, algorithms, and user interfaces to create a cohesive and efficient system capable of accurately interpreting and responding to hand gestures. By following a modular architecture, designing intuitive user interfaces, and conducting thorough testing, developers can create gesture recognition systems that meet the needs of users and applications across diverse domains

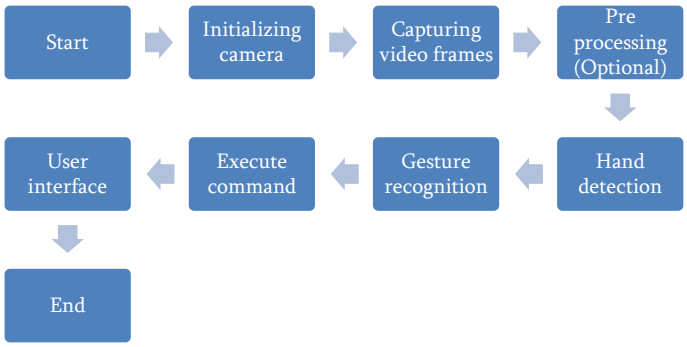

Figure2:Flow chart

The Image is captured from the camera and taken as an input in the form of RGB matrices. Pre-processing is done if needed. These matrices are passed through a hand detection neural network model to segment the palm part of hand from the whole image. After that it is passed through a convolutional neural network. The convolutional neural network also helps in extracting hand landmarks which serve as a crucial point of analysis. We use another neural network known as feed forward neural network in order to just get precision and accuracy in classification of those landmarks. Now we get the output gesture which can be used for opening/closing of the applications, switching between different applications, etc.

IV. GESTURE MANUAL

1) 'Open' Gesture	2) 'Close' Gesture
 Fig 10.3.1	 Fig 10.3.2
Used to open 'Whatsapp Web' on browser	Used to open 'Microsoft Excel'

3) 'Thumbs Up' Gesture	4) 'OK' Gesture
 Fig 10.3.3	 Fig 10.3.4
Used to open 'Microsoft Word'	Used to activate 'Mouse'

Note: The gestures used to open apps are to be opened by right hand. For closing the apps, use same gesture with left hand.

Figure3:Manual for gestures

5) 'Pointer' Gesture	6) 'Pointer Down' Gesture
 Fig 10.3.5	 Fig 10.3.6
Used to Increase system volume	Used to Decrease system volume

7) Gesture for Mouse	8) Gesture for left click
 Fig 10.3.7	 Fig 10.3.8
Used to navigate on screen using 'Mouse'	Used as left click of 'Mouse'

Figure4:Manual for gestures

V. RESULT

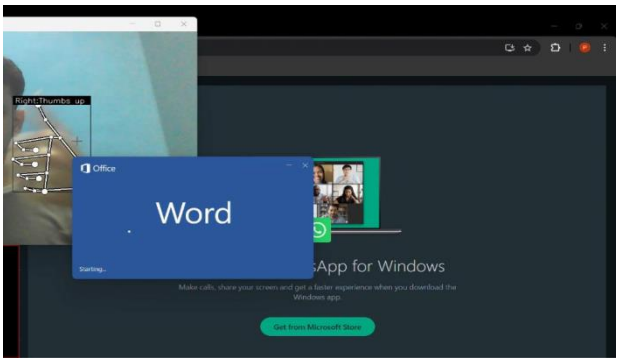

Figure5:Opening word using gesture

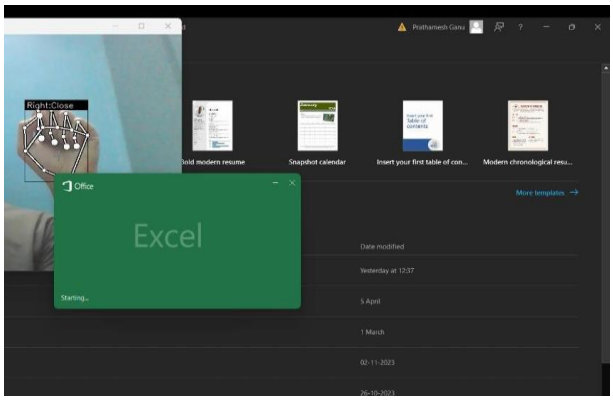

Figure6:Opening excel using hand gesture

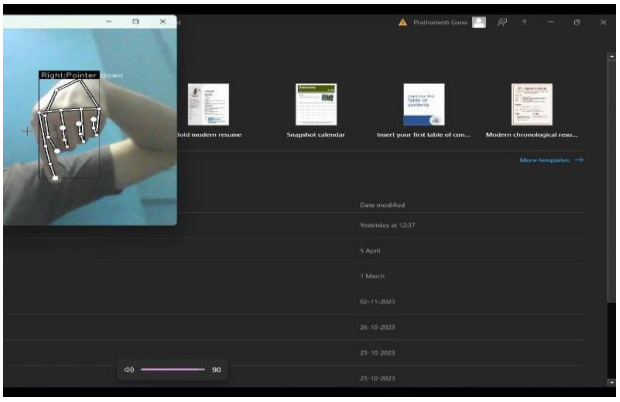

Figure7:Controlling volume

Gesture	Percentage of Success	Percentage of Failure
Open	100	0
Close	80	20
Thumbs Up	90	10
Pointer	90	10
Pointer Down	70	30
OK	90	10

Figure8:Success-failure ratio

VI. FUTURESCOPE

The Hand Gesture Assistant (HGA) marks just the beginning of a transformative journey in human-computer interaction, with vast potential for future advancements. Future development could focus on refining gesture recognition algorithms through advances in machine learning and computer vision, enhancing the HGA's ability to interpret a broader range of gestures accurately. Expanding the HGA's gesture vocabulary would allow users to perform a wider array of actions through intuitive hand gestures, requiring intuitive user interfaces for seamless adoption. Additionally, integrating the HGA into virtual reality (VR) and augmented reality (AR) environments could enable immersive interactions. Furthermore, the HGA could enhance collaborative computing by facilitating multiple users' interaction with shared displays using gesture-based controls, opening new possibilities for interactive presentations and group work. As human-computer interaction evolves, the HGA offers a more natural and immersive way to interact with devices, shaping the future of computing. Embracing innovation and collaboration, the HGA has the potential to redefine human-computer interaction and foster a more connected digital future.

VII. CONCLUSION

In human-computer interaction, innovative methods are crucial. Introducing a gesture-based system for laptops and PCs highlights potential and challenges in revolutionizing computing.

Advancing technology envisions users engaging seamlessly with devices through natural gestures. The Hand Gesture Assistant (HGA), interpreting and responding to gestures in real-time, signifies significant advancement, offering an intuitive, immersive, and accessible computing environment.

Acknowledging implementation challenges is essential, including technical limitations, privacy concerns, and compatibility issues. Developing inclusive technologies requires understanding diverse user needs. Through collaborative efforts, we integrate technology into daily life, empowering users. The Hand Gesture Assistant embodies human inventiveness, fostering a more interconnected, inclusive world.

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Design and Development of Connecting Rod by Using Analysis Software

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ABSTRACT
The connecting rod is a crucial component in internal combustion engines, converting the reciprocating motion of the piston into the rotational motion of the crankshaft. This study aims to analyze the structural integrity and performance of a connecting rod using ANSYS, a sophisticated engineering simulation software. The primary focus is on evaluating the stress distribution, Eigen value of buckling, deformation and factor of safety under static loading conditions. This study focuses on the structural analysis of an engine connecting rod using ANSYS software. The analysis includes defining boundary conditions, such as fixed support at the crankshaft end and applying axial loads at the piston pin end. Finite Element Analysis (FEA) is used to evaluate stress distribution, deformation and potential failure points under operating conditions. The study aims to optimize the design for improved strength and durability while minimizing weight. The results provide insights into material selection and geometric modifications to enhance the connecting rod's performance.

Keywords – Connecting rod, Analysis, Finite Element Analysis (FEA)

I. INTRODUCTION

A connecting rod also called a 'con rod', is the part of a piston engine which connects the piston to the crankshaft. Together with the crank, the connecting rod converts the reciprocating motion of the piston into the rotation of the crankshaft. The material used for the connecting rod it must be light and strong enough to withstand stress and twisting force. The connecting rod is made of nickel, high grade alloy steel, chrome and chrome vanadium steel [1]. For small engine the material used is aluminium & structural steel. The upper end of the connecting rod has a hole for the piston pin. The lower end of the connecting rod is split so that the connecting rod can be installed on the crankshaft. Connecting rods are expected to withstand significant cyclic and inertial loads that are elevated by directional changes at the end of each stroke [2].

Failure of rod bolts, incorrect tightening, or poor maintenance can all lead to connecting rod failure. Failures are typically observed in competitive driving events. Since connecting rods are made with a high level of safety in mind, these kinds of failures are rarely common [3]. There are two possible combinations for the connecting rod's cross-section. I-beam and H-beam or the two in combination. High power engines employ H-beams because they can handle a lot of stress and anxiety without flexing. I-beams are powerful, light, and able to

handle tremendous pressure. The study H-beam profile exhibits reduced von mises stresses up to 12.3% (average: 15.7%) and more stability, up to 43.1%, than the I-beam profile. However, because it is less expensive and easier to make, I-beam is utilised more frequently [4]. According to a study, the structural steel connecting rod has the highest maximum stress and the Al-alloy connecting rod has the highest maximum deformation.

Finite Element methods are used to determine the system's mechanical properties. The component's meshing mode is created by FEM, and it is subsequently examined. Mesh creation in 2D is rather simple, and enhancing its quality is a straightforward process. Since fatigue failure is more likely in automobiles, aircraft, and other machinery, precise design and production are also crucial to reducing this component as much as possible [5].

Failure of the buckled load In certain research publications, the connecting rod is also analysed under conditions of sudden piston locking, which results in a larger impact load on the connecting rod and is referred to as Hydro-lock failure (cause: excess fuel air mixture or water leakage into the cylinder).

The purpose of this effort is to determine the ideal connecting rod diameters that can withstand engine conditions for a daily driver's car. This connecting rod's dimension is computed using empirical formulas for safe design that have already been established. High strength alloy structural steel is used for the connecting rod. ANSYS software is used to analyse connecting rods by applying normal stress.

The goal is achieved since the simulation's findings demonstrate that the connecting rod is safe to use in the designated engine and has a respectable safety factor that will avert any accidents.

II. METHEDOLOGY

The connecting rod's geometry was modelled using CAD software and then Imported into ANSYS for analysis. Material properties, such as Young's modulus, Poisson's ratio and density were assigned based on commonly used materials like structural steel and aluminium alloys. Boundary conditions were applied to simulate the real-life constraints and loads experienced. During engine operation a finite element analysis (FEA) was performed to investigate the stress Concentration areas, total deformation and eigen value of buckling.

Conducting a connecting rod analysis using ANSYS software involves several steps to ensure a comprehensive and accurate simulation. Here’s a step-by-step methodology:

Step 1: Define the Problem and Objectives

Objective: To analyze the stress, strain and deformation of a connecting rod under static loading conditions.

Parameters: Material properties, geometric dimensions, boundary conditions, and loading conditions.

Step 2: Create or Import Geometry

CAD Model: Create the 3D model of the connecting rod using CAD software or import an existing CAD file into ANSYS. Ensure the model is clean with no errors in geometry. Simplify the model if necessary to reduce computational load without losing critical features.

Step 3: Define Material Properties

Material Selection: Assign the material properties to the connecting rod.

Step 4: Mesh the Geometry

Meshing: Discretize the geometry into finite elements. Use an appropriate element type (e.g., tetrahedral, hexahedral). Ensure mesh quality with an appropriate element size to capture stress concentrations.

Perform a mesh convergence study to determine the optimal mesh size.

Step 5: Apply Boundary Conditions and Loads

Boundary Conditions: At one end connecting rod is fixed and at pin end axial load or pressure is applied .

Apply fixed supports where the rod is attached to other components.

Step 6: Set Up the Analysis Type

Analysis Type: Choose the type of analysis to be performed. Static Structural Analysis: For determining stress and deformation under static loading.

Step 7: Solve the Problem

Solver Settings: Configure the solver settings and initiate the solution process. Monitor convergence criteria and solver progress.

III.FORCES AFFECTING THE CONNECTING ROD

The forces operating on the connecting rod are as follows:

(i) Gas pressure exerted on the piston.

(ii) Force from the reciprocating mass and the connecting rod's inertia.

(iii) Force generated by friction between the piston and its rings.

IV. CALCULATES FORCES

Force due to gas pressure Maximum force due to gas pressure, Fa = (π x d2 x Pe) / 4 = (3.14 x 1012 x 3.15) / 4 = 24,740N

V. RESULTS AND ANALYSIS

Result of buckling analysis by simulation of ansys software we get 5 numbers of modes in the form of total deformation. These 5 numbers of modes of deformation includes various forces this are tensile and compressive force, bending force, shear force, twisting force, etc.

By applying 40 pa axial load on the pin end of the con rod we get 5 modes of deformation and load multiplier under static loading condition. It shows minimum, maximum and average deformation of the connecting rod.

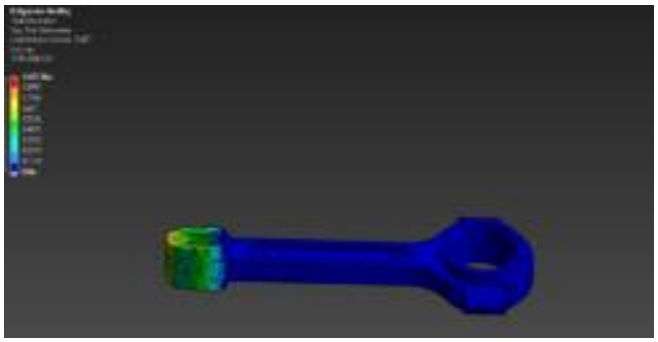

Fig. 1. Tensile force and deformation

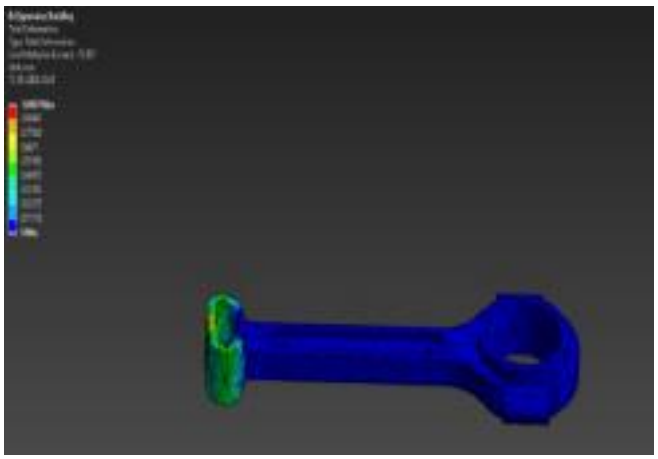

Fig. 2. Compressive force and its deformation

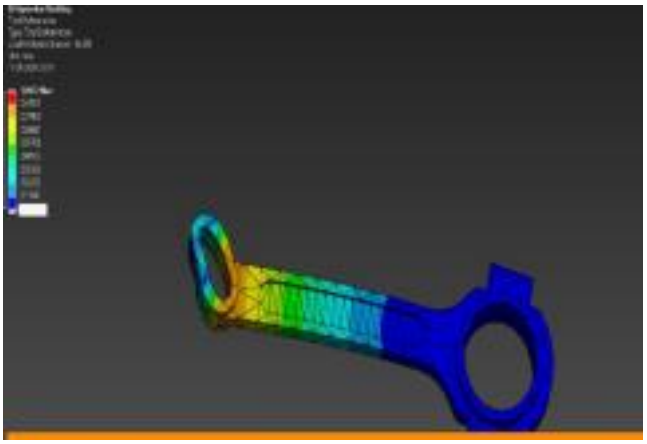

Fig. 3. Shear force and its deformation

The foundation of FEA is the domain's decomposition into a finite number of subdomains, or elements, for which the variational or weighted residual approach is used to generate the systematic approximation solutions.By breaking the domains up into pieces and describing the unknown field variable in terms of the presumptive approximation function within each element, FEA effectively simplifies the problem to one with a finite number of unknowns. These functions, which are also known as interpolation functions, are specified in terms of the field variable values at particular places, or nodes. Nodes are linked to neighbouring elements and are typically found at the edges of elements.

A Workbench programme called ANSYS Mechanical can carry out several engineering simulations, such as thermo electric, magnetostatic, thermal, vibration, and stress simulations. The model includes 20929 nodes and 11628 elements. A typical simulation consists of building up the model and the loads put to it, then solving for the model's reaction to the loads.

VI. RESULT AND DISCUSSION

From graph 6, it can be inferred that the most deformed material is aluminium 7075 T6, which is followed in order by aluminium 2024 T6, titanium, and carbon steel.Aluminium 7075 T6, titanium alloy, and carbon steel all have nearly equal von mises stresses, however aluminium 2025 T6 has the lowest von mises stresses.

Table 1 Comparison of values

Material	Max. Deform (mm)	Max. Von Mises Stress (Mpa)	Weight (Kg)	Min. Factor of Safety
Aluminium 2025-T6	0.39546	356.19	0.3759	0.9698
Aluminium 7085-T6	0.39931	357.8	0.37985	1.5000
Carbon steel :43CrMo4	0.1528	357.8	1.0366	1.5477
Ti-6Al-8v	0.26075	358.01	0.59307	2.4659

It can be observed that titanium has the greatest factor of safety, preceded by carbon steel, aluminium 7075 T6 and then aluminium 2024 T6.

VII. CONCLUSION

It is evident from the studies above that the best alloy to use for constructing connecting rods is titanium alloy. because it has the least amount of distortion and the highest Factor of Safety in relation to weight.

Despite having a lesser safety factor than titanium alloy, aluminium alloy 7075-T6 is the second choice for manufacturing since the connecting rod weighs significantly less than titanium alloy.

Additionally, it is evident that the aluminium alloy 2025-T6 is ineffective due to its low safety factor and potential for product failure. Furthermore, even though carbon steel has a higher safety factor, it is ineffective because it makes the product heavier.

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Real-Time Live Video Face Recognition Using Machine Learning

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ABSTRACT

Our proposed system leverages the advancements in computer vision and deep learning to accurately recognize and identify individuals in live video streams. By employing facial recognition techniques, the system can identify unique facial features and match them against pre-registered profiles in the database. The core functionality of the system involves capturing live video feeds from designated areas, such as classrooms or workplaces, and processing them in real-time using AI/ML algorithms. Upon detecting faces within the video stream, the system employs facial recognition algorithms to identify individuals and cross-reference them with the attendance database. This process enables seamless and automatic attendance tracking without the need for manual intervention.

Keywords: Convolutional Neural Networks (CNNs), Deep Feature Embeddings, Face Detection, Face Matching, Feature Extraction, High Accuracy, Instantaneous Results, Machine Learning Models, Real-time Systems, Robust Performance.

I. INTRODUCTION

Face recognition using machine literacy is a pioneering operation of artificial intelligence that has converted a variety of diligence, including security, surveillance, and biometrics. This fashion, which uses advanced algorithms and large datasets, allows for the automated identification and verification of persons grounded on face traits taken from photos or videotape frames. Machine literacy algorithms can reliably match faces to stored templates or databases by detecting individual facial milestones and patterns, allowing for flawless authentication and access operation. Face recognition's wide acceptance has far- reaching ramifications, ranging from perfecting security measures in public places to easing stoner identification on mobile bias and internet platforms. still, in addition to its implicit benefits, the technology presents ethical and sequestration enterprises over data protection, espionage, and algorithm bias. This preface lays the root for probing into the possibilities, problems, and societal ramifications of face recognition using machine literacy in moment's digital terrain. Facial recognition is presently a leading computer vision technology. Due of lighting, position, and facial expression, feting faces in computer vision is a veritably delicate task. Face recognition in live streaming or through videotape allows for the shadowing of target objects. It's a medium. operation that, simply put, recognizes a person from a live prisoner via camera or videotape frame. In this study, we proposed an

independent facial recognition system. This operation, which is grounded on face discovery, point birth, and identification algorithms, automatically detects the mortal face when the person in front of the camera recognizes him. We used the Haar waterfall classifier to fete mortal faces indeed if the camera continually recognizes the face in every frame. Security, surveillance, and biometrics have all been converted by the innovative use of artificial intelligence in face recognition through machine literacy. By using large datasets and complex algorithms, this technology allows people to be automatically linked and vindicated using face traits that are taken from filmland or vids. Machine literacy models grease flawless authentication and access control by directly matching faces against stored templates or databases through the analysis of unique facial characteristics and patterns. Face recognition is being extensively used, and this has ramifications for numerous different diligence. For illustration, it can ameliorate security in public areas and streamline stoner identification on mobile bias and websites. Alongside these possible advantages, data protection, espionage, and algorithm bias are some of the ethical and sequestration issues that the technology brings up. In moment's digital world, this preface lays the root for examining the eventuality, difficulties, and societal ramifications of face recognition through machine literacy. Put simply, it's an operation or system that can identify a person from a live image captured by a camera or videotape frame. We presented our study's independent facial recognition system. Grounded on face discovery, point birth, and identification algorithms, this program recognizes a person's face when they're in front of the camera and automatically detects theirs. In order to distinguish faces in mortal faces indeed when the camera detects them in every frame, we employed the Haar waterfall classifier.

II. LITERATURE SURVEY

Abdelrahamn Ashraf Mohamed[1], Marwan Mohamed Nagah in their work on real- time live video face recognition using machine knowledge, Mohamed and Nagah likely delve into the complications of face recognition systems, particularly fastening on the real- time aspect. Their disquisition may involve the development and evaluation of new algorithms or ways for fast and accurate face discovery and recognition in live video courses. They might explore the integration of machine knowledge models, analogous as convolutional neural networks (CNNs) or k- nearest neighbors (KNN), into real- time systems, aiming to optimize performance while minimizing computational exodus. also, they may probe the challenges and limitations associated with real- time face recognition, including issues related to scalability, insulation, and robustness in varying environmental conditions.

Md. Golam Sarwar[2], Ashim Dey, Annesha Das Sarwar, Dey, and Das presumably contribute to the literature on real- time live video face recognition using machine knowledge by exploring innovative approaches or advancements to being methodologies. Their disquisition might concentrate on perfecting the effectiveness and delicacy of face recognition algorithms in real- time scripts by addressing specific challenges analogous as occlusion, pose variation, or low lighting conditions. They may also probe the operation of deep knowledge ways, data addition strategies, or transfer knowledge to enhance the performance of real- time face recognition systems. likewise, their work might include empirical evaluations and relative analyses to assess the effectiveness of their proposed styles against state- of- the- art approaches.

Sudha Sharma [3], Mayank Bhatt Sharma and Bhatt's disquisition likely contributes to the literature on real-time live video face recognition using machine knowledge by exploring the operation of analogous systems in practical scripts or disciplines. Their work may involve the deployment and evaluation of real- time face

recognition systems in real- world settings analogous as surveillance, access control, or mortal- computer commerce. They might probe the usability, scalability, and performance of these systems in different surroundings and under different operation scripts. also, their disquisition may address practical considerations analogous as system integration, user interface design, and nonsupervisory compliance, aiming to grease the handover and deployment of real- time face recognition results in various operations.

Madhusmita Sahu[4], Rasmita ginger Sahu and ginger's disquisition likely contributes to the literature on real-time live video face recognition using machine knowledge by fastening on specific aspects or challenges within the field. Their work may involve in- depth analysis or trial to understand the bolstering factors impacting the performance and responsibility of real- time face recognition systems. They might explore motifs analogous as point selection, model optimization, or algorithmic impulses, aiming to uncover perceptivity that can inform the development of farther robust and indifferent face recognition results. also, their disquisition may involve probing the ethical implications and societal impacts of planting real- time face recognition systems, considering issues related to insulation, bias, and discrimination.

Fu, Limei [5], and Xinxin Shao Fu and Shao's disquisition likely contributes to the literature on real- time live video face recognition using machine knowledge by exploring new methodologies or advancements in the field. Their work may involve the development of innovative algorithms or ways for perfecting the performance, effectiveness, or versatility of real- time face recognition systems. They might probe arising trends analogous as multimodal conflation, numerous- shot knowledge, or inimical robustness, aiming to push the boundaries of what is attainable with real- time face recognition technology. also, their disquisition may include experimental evidences or benchmarking studies to demonstrate the effectiveness and superiority of their proposed approaches compared to being styles.

III.METHODOLOGY

The suggested machine literacy- grounded methodology for real- time live video tape face identification consists of several important factors. First, a live video tape feed is taken and reused to prize individual frames. also, a face discovery algorithm is used to detect and prize faces from each image. Next, point birth ways are used to capture the unique traits of each face. These features are also used in a machine literacy model, similar as a convolutional neural network (CNN), for training and bracket. Eventually, the trained model is employed to fete faces in real-time video tape feeds, allowing for quick and precise identification.

A. Creating Dataset Using Machine Learning

Creating a real- time dataset for live video face recognition using machine knowledge involves landing live video courses, lodging frames containing faces, labeling these frames with corresponding individualities, and continuously streamlining the dataset as new faces are encountered. This process generally involves planting facial discovery algorithms to identify and prize faces from each frame, followed by manual or automated labeling with unique identifiers. The dataset is also used to train machine knowledge models, analogous as convolutional neural networks (CNNs), for face recognition tasks. Regular updates and conservation ensure the dataset remains current and representative of the target population, enhancing the delicacy and responsibility of the face recognition system in real- world scripts.

B. Dataset

Creating a real- time dataset for live video face recognition using machine knowledge (ML) involves continuously landing facial data from streaming video feeds. This process integrates face discovery algorithms to descry faces in video frames, lodging facial features, and storing them in a dynamic dataset. As new faces are encountered, their features are added to the dataset, enabling the ML model to fete individualities in real- time. This dataset growth allows for continual knowledge and refinement of the model's recognition capabilities, making it suitable for various operations like surveillance and access control while addressing insulation and security enterprises.

IV. MODEL OVERVIEW

Real- time live video face recognition using machine knowledge (ML) involves the deployment of a model suitable of detecting and recognizing faces in streaming video feeds presently. This model generally consists of several connected factors, including face discovery algorithms, point birth ways, and a type or corresponding medium. firstly, the model identifies faces within each frame of the live video, using advanced computer vision styles. Following face discovery, facial features are pulled and represented in a high- dimensional space, constantly using deep knowledge architectures. ultimately, these features are compared against a database of known faces to determine the identity of individualities in real- time. The model continuously learns and adapts to new faces encountered during live video courses, enabling rapid-fire- fire and accurate face recognition for various operations analogous as security, surveillance, and substantiated user exploits.

A. Haar Cascade Algorithm

The Haar Cascade algorithm is a vital element of real- time live video face recognition using machine knowledge (ML). It operates by employing a hierarchical series of classifiers to descry faces within a video feed swiftly. This algorithm utilizes a set of pre- trained Haar- suchlike features and employs them to distinguish between facial and non- facial regions in an image. Through a process of slinging classifiers, the algorithm efficiently narrows down implicit face regions while minimizing computational resources. Once faces are detected, posterior ML ways, analogous as point birth and type, are constantly applied to fete and identify individualities. In real- time operations, the Haar Cascade algorithm offers a rapid-fire- fire and effective means of face discovery, enabling streamlined processing and analysis of live video feeds for various purposes like surveillance, access control, and substantiated relations.

B. K-Nearest Neighbour Classifiers

In real- time live videotape face recognition using machine literacy (ML), K- Nearest Neighbors (KNN) classifiers play a pivotal part. KNN is a simple yet important algorithm that operates by comparing the facial features uprooted from live videotape frames with those stored in a dataset. It works on the principle of propinquity, where the class of a new data point (in this case, a face) is determined by the classes of its nearest neighbours in the point space. KNN's capability to snappily classify data grounded on similarity makes it well-suited for real- time operations. In face recognition, KNN compares the features of the detected face with those of known faces in the dataset, opting the closest matches to determine the identity of the existent in the live videotape feed. This approach offers a flexible and effective result for face recognition in real- time scripts, supporting operations similar as surveillance, access control, and substantiated stoner gests.

C. Convolutional Neural Network

In real- time live video face recognition using machine knowledge (ML), Convolutional Neural Networks (CNNs) are fundamental for their capability to effectively prize discriminative features from facial images. CNNs impact hierarchical layers of learnable adulterants to automatically descry patterns and features within images. In face recognition, CNNs anatomize live video frames to prize facial features and learn complex representations that enable accurate identification of individualities. By training on large datasets of labelled facial images, CNNs can generalize well to unseen faces, making them suitable for real- time operations.

Their capability to exercise information in resemblant allows for effective conclusion, enabling rapid-fire- fire face recognition in live video courses. CNNs are considerably employed in various face recognition systems, including surveillance, access control, and substantiated user exploits, owing to their robustness and performance in real- time scripts.

V. MODEL EVALUATION AND PERFORMANCE METRICS

We use a variety of assessment criteria that are customized to the particular pretensions of our disquisition to estimate the effectiveness of our prophetic models. We use measures like mean squared error (MSE), mean absolute error (MAE), and R- squared (R2) to measure the perfection and delicacy of our prognostications for retrogression tasks like runs scored and overs sailed.

A. Mean Absolute Error (MAE)

The mean absolute error(MAE) measures the average divagation between the anticipated and factual values, offering important information about the average size of vaticination crimes.

B. Mean Squared Error (MSE)

MSE provides a thorough picture of the overall quantum of vaticination miscalculations by calculating the average squared difference between the factual and projected values.

C. Root Mean Squared Error (RMSE)

A measure of the standard divagation of the vaticination crimes, RMSE is attained by taking the square root of the MSE. This allows one to see how big the crimes are about the target variable's scale.

D. R- squared (R^2) Score

The R^2 value is the chance of the dependent variable's friction that can be prognosticated grounded on the independent variables, indicating the model's virtuousness of fit. bettered fit is indicated by values nearer 1.

VI. RESULTS

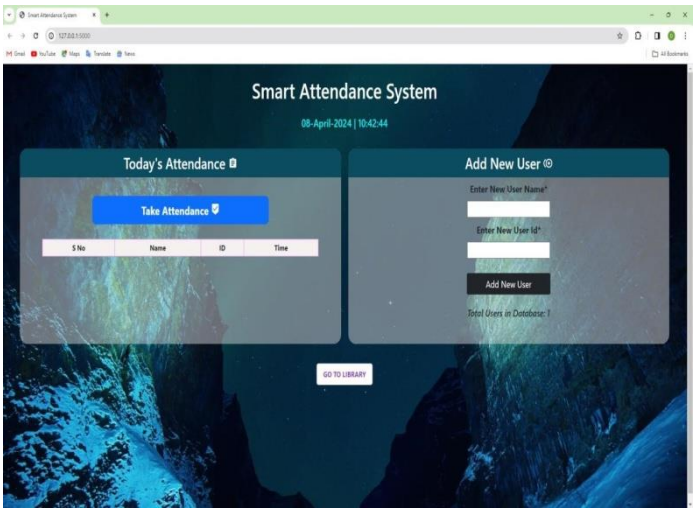

Figure1:Before Taking Attendance

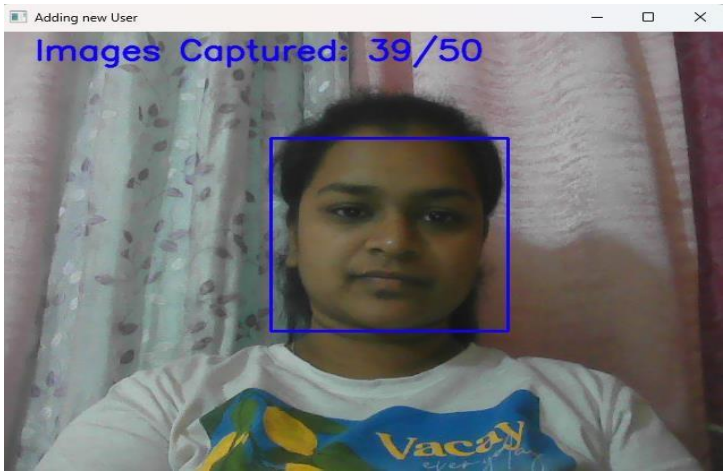

Figure2:Training Model

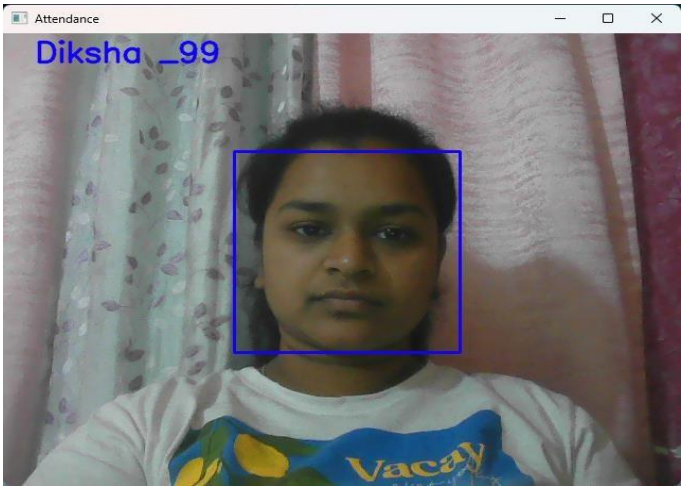

Figure3:Testing Model

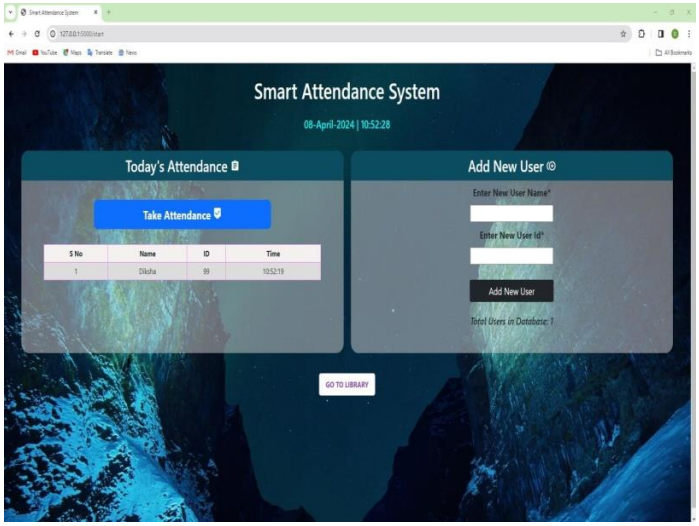

Figure4:After Taking Attendace

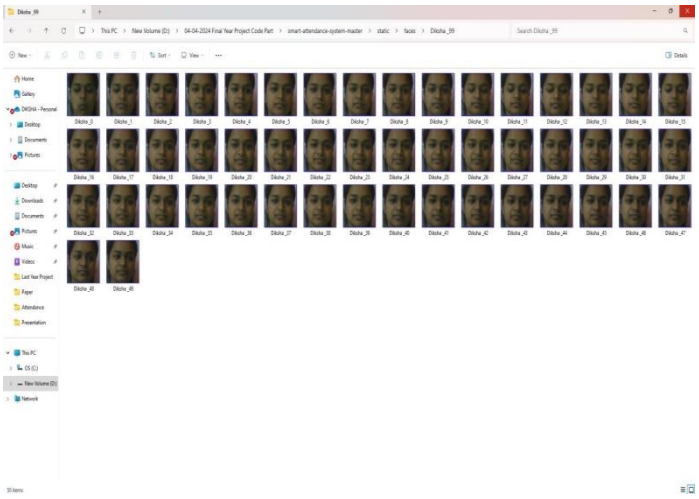

Figure5:Real-Time Dataset

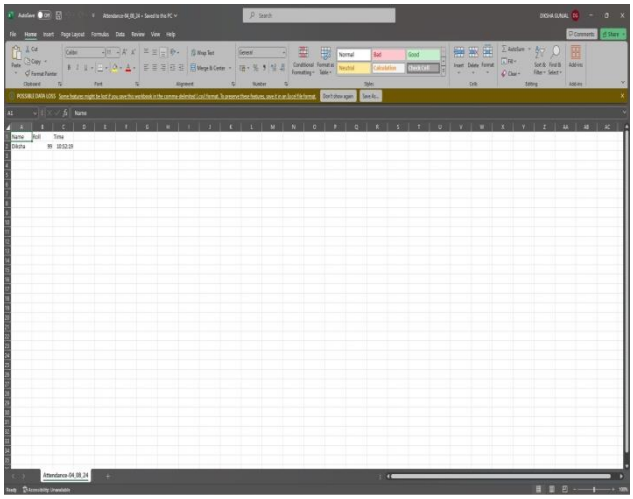

Figure6:Dataset

VII. CONCLUSION

Real- time live video face recognition using machine knowledge presents a important result for various operations analogous as security, surveillance, and substantiated user exploits. By using advanced algorithms like Haar Cascade for face discovery and Convolutional Neural Networks for point birth, these systems can swiftly and directly identify individualities in streaming video feeds. ways like K- Nearest Neighbours classifiers further enhance recognition capabilities, making them adaptable to changing surroundings and different datasets. With continuous advancements in ML and computer vision, real- time face recognition systems are getting further robust, effective, and suitable of addressing complex challenges in real- world scripts. As these technologies evolve, we can anticipate indeed lower integration into everyday life, offering enhanced security, convenience, and customization. still, it's essential to consider and address insulation enterprises and ethical implications associated with the wide deployment of analogous systems.

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Coin Based Water Vending Machine Using PLC

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ABSTRACT

Our goal is to create a water vending machine that can run on many coins, unlike the ones that are available now that only use one coin. Since there is a shortage of clean drinking water in India, we will be providing mineral water. The need for freshwater has grown as a result of lifestyle changes and a fast-growing population. It is evident that the cost of water delivery for homes in most rural locations is significantly higher than what is typically charged in urban areas. The issue of drinking water arises throughout the summer. Coin operation is the foundation of our project. When the appropriate coin is inserted, the water vending machine releases water. It can be utilized in public areas including shopping centre, railroad stations, and roadways. People may find it to be quite helpful and comfortable.

Keywords: Coin sensor, solenoid valve, water vending machine, and programmable logic controller (PLC).

I. INTRODUCTION

The need for freshwater has grown as a result of lifestyle changes and a fast-growing population. The problem of drinking water in the summertime is present. And so is the fear for the safety of the drinking water supply in both urban and rural areas. Only 35.63 feet, or less than half, of the reservoir's total water level are present. Our plan is to create a project that revolves around coin operations. It was created especially with villagers in mind. Additionally, it is used at bus and train stations as well as public areas. This system is PLC-based. Coins are the PLC's inputs, and water is its output. PLC was determined to be the most appropriate option after considering the requirements for the water dispensing system and the ease of use of our application. The machine can provide the customer with a wide range of inputs and outputs. This system's primary goal is to provide customers with filtered water while preventing environmental contamination and water waste through the use of a water control valve. We are aware that the final stages of the available water resources have begun. This issue is subtly linked to inadequate and disjointed water management, as well as wasteful usage and distribution of water. The development of the water vending machine will ensure that customers receive water [1]. Current Systems The majority of modern nations have vending machines located in public areas. People can get snacks, cold drinks, coffee, tea, and other beverages from these machines. These items are also provided via vending machines in poorer nations [2].

II. LITERATURE REVIEW

The objective of this project is to put up a digital system that will supply drinking water from a water vending machine. The system's goal is to do research and create a system that can evaluate drinking water quality and safety. The primary controller of the system is a Programmable Logic Controller (PLC). The human world is becoming increasingly intelligent due to the rapid growth of the Internet of Things (IoT) and machine learning. People's lives are made more advanced and easier by smart sensors. We employed many sensors for various applications in this article. This paper presents the results of a survey conducted on water vending machines in eight different sites in Parit Raja. The survey found that consumers are more prepared to pay a premium for drinking water of higher quality due to their greater awareness of the quality of tap water. Does the water meet the necessary standards to be safe for human consumption and free of contaminants? They feel that filtered water quality encompasses that which is commercially available in the market, such as mineral and bottled drinking water, as well as from the drinking water vending machine, which is why they are so confident in the safety and mineral content of this type of drinking water [3].

These days, automated vending machines predominate since they streamline several operations and boost productivity. This work presents the self-service drinking water machine. There are many different inputs and outputs that this machine can provide to the customer. This gadget looks like a vending machine. The device runs on coins. It only accepts currencies, such as Rs. 1, Rs. 2, and Rs. 5, in any sequence, and provides drinking water. Using a water control valve, the main objectives of this system are to stop water waste and environmental damage. In recent years, a large number of vending machines with numerous product possibilities and number selections have been manufactured. Snack, chocolate, food, and glucose water dispensers are just a few of the various varieties of liquid dispensing vending machines that can be categorized. The major objective is to increase the understanding of people who live in places without access to pharmacists about the changing ways that they use water [4].As society has grown, more and more convenient products have appeared in the globe, including vending machines. Thus, this study builds a basic vending machine control system with a PLC as the bottom machine and King View as the upper computer monitoring screen. The basic vending machine computes and shows the amount of money after assuming that the currency has been entered. By using the selection button indication, which gives information about the commodities that can be sold based on the amount of money, the user can independently select the items he wants to buy. Once the user has deposited enough money to buy drinks, they press the button linked to the selected item to start the vending machine [5].

III.METHODOLOGY

A. Components Used Programmable Logic Ontroller

In a factory setting, a solid-state industrial controller that executes discrete sequential logic is called a programmable logic controller. It was first created for mechanical timers, counters, and relays. In a plant, PLCs are utilized to carry out challenging control tasks. The user performs a series of commands into the PLC memory, and the controller executes the program to operate the system in accordance with the proper operational specifications. The National Electrical Manufactures Association (NEMA) currently defines a programmable logic controller as a digital electronics device that stores instructions in a programmable memory and uses it to implement specific functions like logic, counting, sequencing, and arithmetic operations to control machines and processes [6].

Figure1:Programmable Logic Controller (PLC)

B. Coin Sensor

The tool that finds the right coin is called a coin sensor. The coin sensor identifies the coins based on their thickness, diameter, and fall time. A multi-coin selector, CH-926 may accept up to six different coin types simultaneously. Coin selectors of this kind are frequently found in message chairs, vending machines, arcade games, and other self-management systems. To identify coins, CH-926 primarily uses substance, weight, and size. It uses the most recent software design algorithm. As a result, even in the face of environmental changes like temperature and humidity, CH-926 remains remarkably steady and accurate. We recommend. Using various channels to set up different versions of coins in order to maximize accuracy [5].

Figure2:Coin Sensor

C. Solenoid Valve

This is a basic 24 V DC supply valve with an on/off switch. Motors employ this kind of valve. This module uses a PLC to interface between a vending machine and a water output valve. It is "Normally closed" on the switch. When paired with a high-pressure switch, it has automatic flush and shut off, auto power cut-off during filling, and an extended pump duration. When the tank is filled, it cuts off the water supply. Normally, the booster pump in the RO system controls switch with high pressure [7].

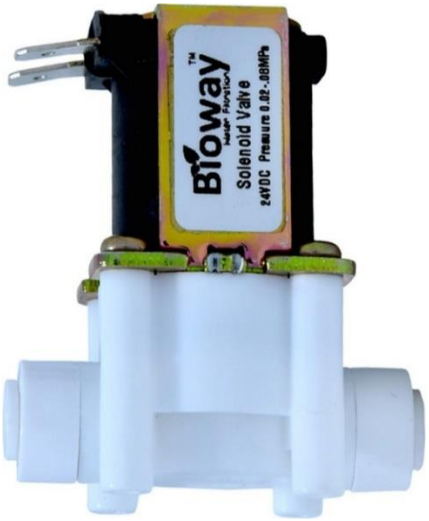

Figure3:Solenoid Valve

D. Relay

A basic electromechanical switch is called a relay. Relays are switching that link or disconnect two circuits, just like regular switches do when we manually close or open a circuit. However, a relay employs an electrical signal in place of a manual process to control an electromagnet, which then connects or disconnects another circuit. It changes the coin sensor's 5 volts to the 24 volts needed by the PLC [8].

Figure4:Relay

IV. BLOCK DIAGRAM

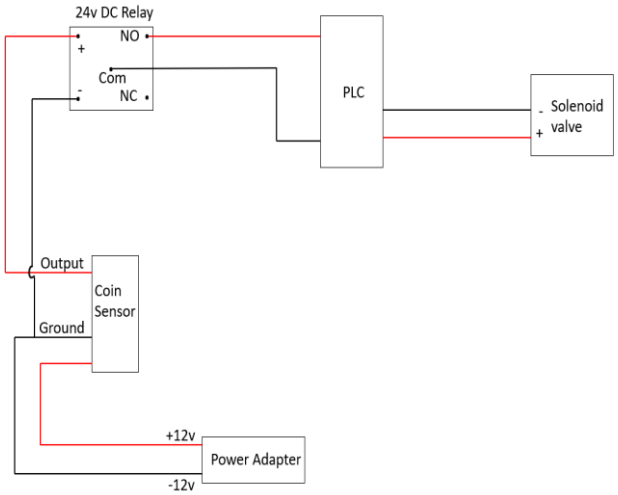

Figure5:Block Diagram

V. FLOW CHART

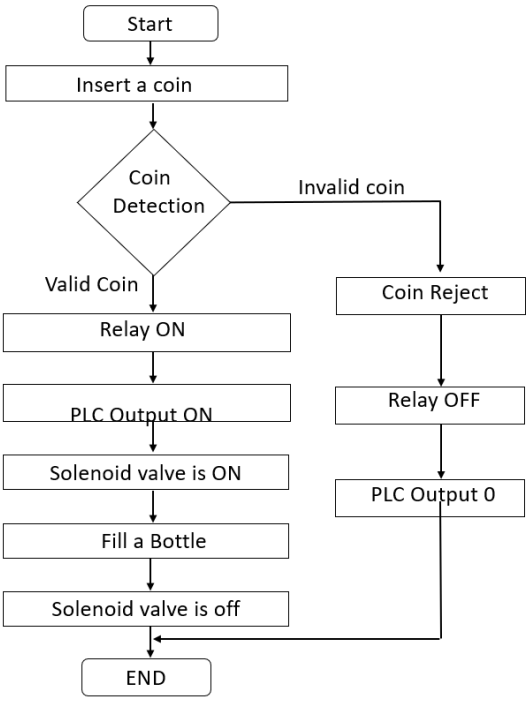

Figure6:Flow Chart

VI. FUTURE SCOPE

Water vending machines appear to have a bright future ahead of them, meeting the increasing need for easily accessible and clean water. To boost water accessibility internationally, advancements could include smart technology integration, sustainable practices, and increased deployment in urban and rural regions [9].

VII. CONCLUSION

The goal of the drinking water vending machine was to research and develop a system for monitoring the water's quality. Create drinking water vending machines that adhere to safety regulations. The automated systems architecture allowed for real-time alerts regarding the drinking water's quality.

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Methodology of Life Estimation of Bagasse Carrier Chain

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ABSTRACT

Bagasse carrier chains play a crucial role in transporting goods within production and assembly lines, enduring harsh environments and diverse loads. However, the inevitability of wear in chain components poses a significant challenge, leading to potential failures and costly downtimes. Despite its critical importance, literature on conveyor chain wear is scarce, and reliable test-rigs for reproducible wear measurement are lacking. This paper addresses these gaps by designing the components of bagasse carrier chains tailored for sugar bucket elevators in the sugar industry, considering a capacity of 25 tonnes per hour and detailing the loading conditions. Additionally, we explore the advantages of chain drives over alternative systems and catalog prevalent chain wear mechanisms documented in literature. Special emphasis is placed on abrasive and adhesive wear between pins, bushings, and rollers, shedding light on potential mitigation strategies.

Keywords: Bagasse carrier chain, Bucket Elevator, Material Properties, Chain Wear Mechanisms, Adhesive Wear

I. INTRODUCTION

The purpose of the bagasse carrier conveyor chain is to efficiently and reliably transport bagasse within the sugar mill contributing to one overall productivity and profitability of the sugar production process. Sugar mills typically operate continuously during the crossing season requiring conveyor bagasse carrier chain that can handle heavy loads and frequent use without downtime. Failure of some conveyor chain there is huge loss of sugar industry. To avoid this there is need of estimate life of chain. This is broadly discussed in this paper.

The failure of conveyor chains can result from various factors, but a significant proportion can be attributed to defects occurring throughout the manufacturing process of the conveyor chain component. These defects may emerge during material acquisition, casting, shaping, heat treatment, or assembly stages. Issues like material impurities, insufficient heat treatment, subpar machining, or incorrect assembly techniques can all foster the formation of weaknesses or flaws within the chain, ultimately culminating in failure during operation. It's crucial to identify and address these defects through rigorous quality control measures and meticulous manufacturing processes to uphold the reliability and durability of conveyor chain systems [1].

In their study, G. Pantazopoulos and A. Vazdirvanidis conducted a metallurgical investigation into the fatigue failure of stainless steel chains in a continuous casting machine [2]. These chains play a crucial role in connecting dam blocks in belt casting machines, enduring thermal cycling and repetitive stress from tension and bending during production. To prevent similar fatigue damage in the future, the authors recommend reviewing the service history, including operating conditions and loads, and considering a substitution of the material with one more resistant to heat and fatigue.

In their research, Suhas M. Shinde and R. B. Patil focused on the design and analysis of a roller conveyor system with the goal of optimizing its weight and saving materials [3]. The paper aimed to investigate the current conveyor system and identify key components such as rollers, shafts, and support structures like C-channels for the chassis. By optimizing these critical parts, the researchers aimed to reduce the overall weight of the assembly while also conserving materials. This study likely contributes valuable insights into the efficiency and sustainability of conveyor systems in various industries.

In their paper, Tushar D. Bhoite, Prashant M. Pawar, and Bhaskar D. Gaikwad present a Finite Element Analysis (FEA) study on the effect of radial variation of the outer link in a typical roller chain link assembly [4]. The ultimate goal is to explore the potential for material savings and subsequent efficiency improvements in roller chain assemblies.

In their study, M. Sujata, M.A. Venkataswamy, M.A. Parameswara, and S.K. Bhaumik conducted a failure analysis of conveyor chain links [5]. This research underscores the importance of quality control and defect prevention in engineering components to ensure reliability and performance in industrial applications.

Previous studies on roller conveyor chains have predominantly concentrated on enhancing efficiency and performance, with a notable emphasis on load estimation. However, there is a scarcity of research exploring fatigue life estimation for chain assemblies. Analysis of chain failure cases reveals that defective material processing, improper material selection, and inadequate heat treatment are common root causes of failure. Although literature addressing uncertainty analysis stemming from faulty material processing, heat treatment, and material selection exists, it remains limited. Additionally, failure case studies suggest that certain failure modes are initiated during the design stage itself, underscoring the importance of meticulous design considerations in preventing future failures.

II. EXPERIMENT SETUP

Estimation of life or a bagasse carrier chain involves several steps and considerations:

A. Material Analysis

Bagasse carrier chain has link plate made from 55C8 material. Pin of the same made from 16mmcr5 material. Bosh made from 15cr3 material and roller is made from C40 material. In this link plate is having through Harding mechanical properties like tensile up to 75 Kg/m2 other element i.e. pin, bush, and roller having case harden get good wear resistance.

B. Load analysis

As per converge capacity 25 ton/hr. broadly load of chain 40 ton and wear load 10tons and measuring load 40 to 50 tons as per I.S.

C. Operation conditions

Need to consider environmental factors such as temperature, humidity which significantly affects the chain's wear and corrosion resistance.

D. Maintenance practices

Maintenance schedule and procedure proper lubricants alignment and tensioning can extend the life of the chain.

E. Failure Analysis

Conduct failure analysis to identify common failure mode and their causes. This can help in predicting potential failure and implementing preventive measures.

F. Modelling and simulation

Use mathematical models or simulation software to predict the chains. Fatigue life on its design material properties and operating conditions.

G. Testing

As per the figure 1 driving shaft connected to electric motor. One it keyed sprocket having rotational movement driven shaft also having keyed sprocket. But it has two movement one is rotational second one is transverse. In between two shaft two idler to adjust slackness or conveyor. The transvers movement of driven shaft is done by hydraulic power pack unit and its movement is measure by calibrated dial gauge. Following graph is developed

Figure1:Experimental set up to find elongation of chain on preloading and length measuring machine

Figure2:Dial gauge location for measuring elongation of chain

III.RESULT AND ANALYSIS

Experimental and analytical study of roller conveyor chain links has been carried out and the results of work done are given below.

TABLE I

Sr. No.	Number of revolutions for 26 links chain	Chain Elongation measured in mm
1.	1000	0.2
2.	1500	0.4
3.	2000	0.6
4.	2500	0.8
5.	3000	0.9
6.	3500	0.7
7.	4000	0.4
8.	4500	0.2

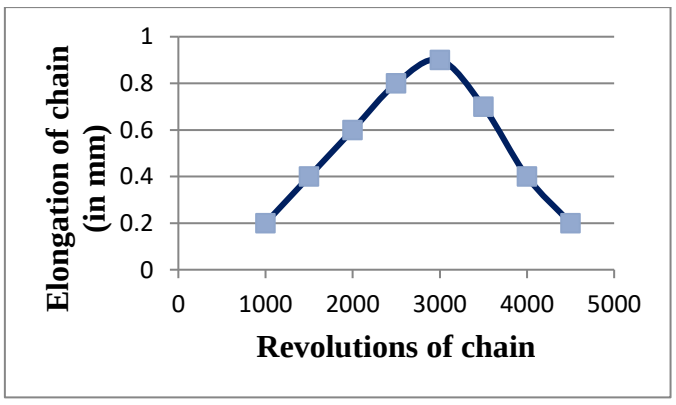

Figure3:

The results are plotted in the graph for 1000, 1500, 2000, 2500, 3000, 3500 4000 and 4500 respectively. The graph shows a linear increase in elongation of chain up to the certain limit and again gradually it decreases. There are significant changes after every revolution of chain.

From the graph i.e. figure no. it can be seen that there is a linear rise in elongation with the increasing number of revolutions. Materials have a fatigue limit or endurance limit which represents a stress level below which the material does not fail and can be cycled infinitely. If the applied stress level is below the endurance limit of the material, the structure is said to have an infinite life.

IV. CONCLUSION

The major failure modes of Bagasse carrier chains are fatigue, excessive loads and excessive chain elongation due to wear of parts. Following conclusions can be drawn from the theoretical, experimental and analytical work done:

- The experimental testing of 26 links of a Bagasse carrier chains demonstrated that as the number of revolutions increases the chain elongation increases. The graph shows the linear nature and afterwards a gradual decrease in elongation.
- The fatigue initially nucleated at the external cracks of the chain link, and later propagated to the inside of the links until sudden fracture occurred. As the Finite element analysis results are within the calculated working stress, so the chain link plate assembly were safe under the maximum working load of 25 tonne.
- Maximum life cycles available for the chain link assembly are 1e6 and minimum 746 cycles as studied from analytical analysis.

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Fabrication of Drone Components by Using Composite Glass Fibre

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ABSTRACT
This study explores the fabrication of drone components utilizing glass fiber and epoxy composite materials. The use of these materials offers a lightweight and durable solution for constructing various parts of drones, including frames, wings, and other structural elements. The fabrication process involves techniques such as laying down glass fiber sheets and impregnating them with epoxy resin to form strong and rigid composite structures. This paper presents a comprehensive overview of the fabrication process for constructing unmanned aerial vehicles (UAVs or drones) utilizing composite glass fiber as the primary structural material. Composite materials, renowned for their high strength-to-weight ratio and durability. The fabrication process encompasses several key steps, including design and planning, material selection, mold preparation, composite layup, vacuum bagging or compression molding, curing, The integration ofthese materials in drone manufacturing aims to enhance performance, durability, and flight characteristics while maintaining a lightweight design. This abstract provides an overview of the fabrication methods and the potential benefits of utilizing glass fiber and epoxy composites in drone component production.

Keywords- Drone, UAV, Glass fibre, composite body, Epoxy resin, fibre, fabrication

I. INTRODUCTION

The focus on using glass fibre composite sheets for manufacturing of drone components through vacuum bagging techniques and assembly of drones. Glass fiber composites are known for their high strength and lightweight properties, are crafted by combining glass fibers with a polymer matrix(epoxy resin).Vacuum bagging, a method integral to composite manufacturing, involves the use of vacuum pressure to consolidate materials, reducing voids and enhancing overall strength. The primary objectives encompass optimizing the fabrication process of these composite sheets. This involves fine-tuning the layering techniques and material compositions to ensure superior structural integrity and performance. Subsequently, the manufactured composite sheets serve as the foundation for producing various drone components, including frames, drone arms, shock absorber plate, base plate, propellers. These components are engineered with precision to maintain consistency and reliability in their construction. The final objective involves the assembly of these components

into fully functional drones. Continuous testing and evaluation of the drones 'performance, considering flight capabilities, stability, and endurance, form a crucial phase. This iterative process aims to identify areas for enhancement and refinement in both material fabrication and drone assembly, ensuring that the end products meet specific requirements or industry standards. Overall, it integrates advanced composite materials into drone manufacturing, emphasizing continuous improvement through testing and optimization.

II. EXPERIMENTATION

A. Selection of Material

For this research of manufacturing of composite drone body we selected glass fibre 200 GSM as composite material. This material was selected due to following mechanical properties High Strength, Stiffness, Lightweight, Corrosion Resistance, and Electrical Insulation.

B. Development of Glass Fiber Composite-Based Drones.

1. The Glass Fibre : Choose the appropriate weight and weave for the specific part you're manufacturing.
2. Epoxy Resin: Select a high-quality epoxy resin suitable for composite applications.
3. Mould or Form: Depending on the part, you might need a mould or form to shape the composite material.
4. Release Agent: To prevent the composite from sticking to the mould.
5. Mixing Tools: Stirrers, mixing containers for epoxy resin.
6. Vacuum Bagging System : For more advanced manufacturing, a vacuum bagging system can be used to remove air bubbles and enhance the consolidation of layers.

III.DESIGN OF COMPOSITE DRONE PARTS

The design of components were carried out in AUTO CAD software. The following parts were designed 1.Centre Plate, 2. Upper Plate, 3. Shock Absorber (Lower Plate)

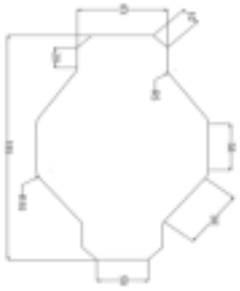

Fig.1.Centre Plate

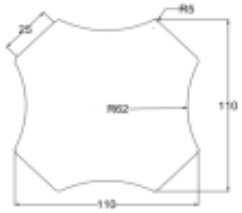

Fig.2.Upper Plate

Fig.3.Shock absorber (Lower plate)

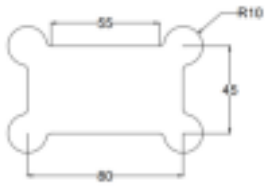

Fig.4.Shock absorber (Upper plate)

Fig 5. Drone Arm

A. Steps involved in manufacturing of drone components.

1. Design and Planning: Define the specifications and requirements of the drone components. Dimensions of arms and all other components. Determine the optimal fiber orientation and layup configuration for maximizing strength and stiffness.
2. Material Preparation
   - High-quality glass fiber of 200 GSM reinforcements, typically in the form of woven fabric.
3. Laminate Manufacturing: Composite Lay-Up
   - For Manufacturing of laminates we prepared mould and arranged other materials like peel ply, breather material and Mould releasing agent or wax. We Cut the glass fibre cloth or mat according to the design of the part. After this the resin and hardner were mixed in the volume proportion of 3:1. Apply layers of resin onto the mold surface, either manually or using automated equipment. Lay the glass fiber material onto the resin-coated mould, stack them according to the designed layup sequence. We ensured thorough impregnation of the fibers with resin, removing any air bubbles or voids to promote bonding and consolidation.
4. Vacuum Bagging.
   - · Vacuum was given to the mould by using vacuum pump to remove all the bubbles and gaps from the mould .

Fig 7.Vacuum Bagging

5. Curing:
   - The mould was allowed to cure for 12 hours.

B. Manufactured Drone components.

Fig 7.Centre Plate

Fig 8.Centre Plate

Fig 9.Shock Absorber Plate(Lower Plate)

Fig 10.Shock Absorber Plate (Upper Plate)

Fig 11. Drone Arm

IV. ASSEMBLY OF DRONE COMPONENTS

- The Parts as like upper plate, Centre Plate, lower plate and shock absorber plate were assembled with each other by screw mechanism. For mounting of motors small drills are provided on the arms at the end of arms. Four drills of 3mm in size were drilled for allocation of motors.
- To reduce weight and to achieve aerodynamic structure arms were designed for proper functioning.

Fig 12. Drone arm for weight optimization.

V. ASSEMBLY OF DRONE

Fig 13. Fully assembeled drone.

TABLE : WEIGHT COMPARISON FOR CONVENTIONAL AND GLASS FIBRE DRONE

Sr. No.	parts	Conventional PVC drone Fiber	Glass Fiber
1	Arm	50 gm	33 gm
2	Centre Plate	40 gm	25 gm
3	Upper Plate	20 gm	17 gm
4	Upper Shock Absorber	12 gm	5 gm
5	Lower Shock Absorber	8 gm	7 gm

VI. CONCLUSION

The fabrication of drone components and the pursuit of weight reduction are essential endeavors in the evolution of drone technology. Through innovative fabrication techniques such as additive manufacturing and advanced materials selection, components can be optimized for strength, durability, and weight efficiency. This not only enhances drone performance but also extends flight times and payload capacities.

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Speaker Diarization Using Spectral Clustering

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ABSTRACT

Speaker diarization is a process in which multiple speakers are getting separated and labeled from a single voice channel. It helps us to answer" Who spoke when?" in a multi-speaker environment. By using a clustering approach, we can segregate different speaker utterances. We have used k-means and spectral clustering methods to observe different clustering algorithms and analyze that spectral clustering works fine for LSTM-based d-vector embeddings while k- means gives the wrong prediction when two- speaker speaks simultaneously, they overlap when one speaker speaks more than another then the unbalancing of clusters takes place.

Both speaker diarization and speaker verification share the common goal of distinguishing between speakers. However, the primary distinction lies in their approach: speaker verification models are trained using data from target speakers, while speaker diarization lacks prior information about speakers in the recording. Speaker diarization finds utility in applications such as speaker adaptation for automatic speech recognition, audio indexing, and speaker localization. Speaker Diarization combines the LSTM-based d-vector audio embedding using spectral clustering where the segments will be converted into d- vectors. So will be using different clustering algorithms to check which clustering gives better results.

Keywords: LSTM, VAD, KNN,

I. INTRODUCTION

To develop a system capable of extracting multiple speakers from single-channel audio using a speaker diarization engine and enhancing system performance. "Diarize" refers to the act of recording or noting an event in a diary. Speaker diarization is an essential process in the domain of audio and speech analysis. It involves dividing an audio recording into segments based on the speaker's identity. Spectral clustering and LSTM (Long Short-Term Memory) networks are two distinct techniques that can be amalgamated to conduct speaker diarization, which entails segmenting an audio recording into various non-overlapping segments or clusters, each corresponding to a specific speaker or audio source. The primary objective of speaker diarization is to ascertain "who spoke when" in an audio recording, rendering it a valuable asset in numerous applications, including transcription services, voice assistants, forensic analysis, and more. Speaker diarization finds practical utility in a broad array of fields, such as transcription services, call center analytics, automatic subtitling, voice

biometrics, and forensic voice analysis. It facilitates the automation of tasks requiring the identification of speakers within audio recordings, making it a valuable asset in both research and commercial applications.

II. LITERATURE SURVEY

Reference	Task	Paper	Dataset	Method	Model	Der% /Acc%
[1]	Speaker Diarization	Speaker Diarization With Lstm	Callhome	1) K Means 2)Spectral	I-Vector, D-Vector	12.0%
[2]	Speaker Diarization	Fully Supervised Speaker Diarization	Callhome	1) Eend 2) Sc-Eend	Sc-Eend	Two Speakers 8.86% Variable Speakers: 15.75%
[3]	Speaker Diarization	Told: A Novel Two Stage Overlap Aware Framework For Speaker Diarization.	Callhome	Eend	1)Told 2)Eend- Ola	1) 10.14% 2) 12.57%
[4]	Speaker Diarization	End-To-End Neural Speaker Diarization With Self Attention	Callhome	-	Sa-Eend (2-Spk, Adapted) Sa-Eend (2-Spk, No-Adapt)	1) 10.76 2) 12.66
[5]	Speaker Diarization	Auto-Tuning Spectral Clustering For Speaker Diarization Using Normalized Maximum Eigengap	Callhome	Spectral Clustering	1)Cos+Njw-Sc (Oracle Sad) 2) COS+AHC (Oracle SAD)	1) 24.05% 2) 21.13%

Table 1:Literature Survey

III.PROPOSED WORK

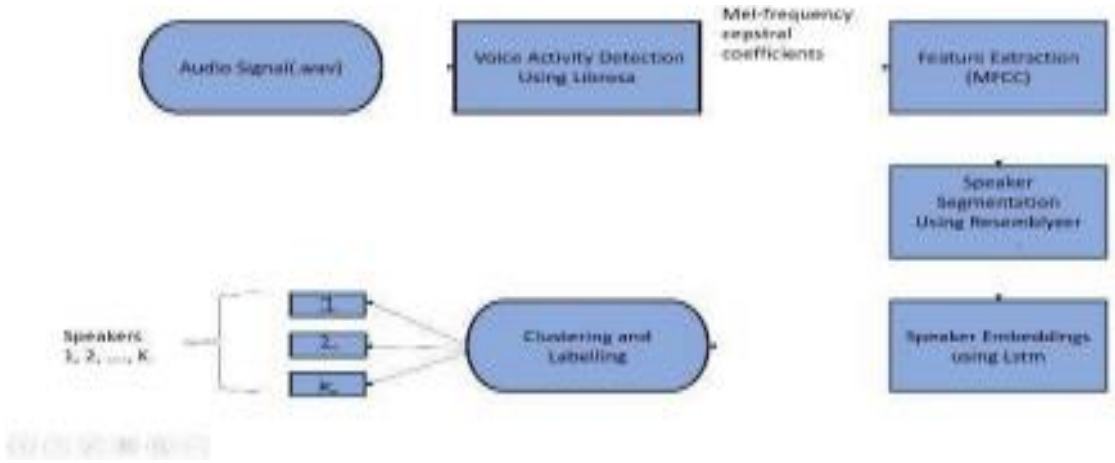

Figure 1:Proposed Architecture

Audio Signal: This will be our very first step where all the audio signals are given input to the system which are in '.wav' format. The audio files will consist of two or more speakers which are speaking respectively.

Voice Activity Detection: Using python librosa library preprocessing on audio signal done. It removes noise from the audio signal and performs voice activity detection. Output generated in the form of Mel Frequency Ceptral Coefficient.

Speaker Segmentation: Speaker Segmentation will take only the speech part of the audio input and it will separate the speech to overlaps windows. The output Speaker Segmentation is in the form of small segments.

Speaker Embedding: The output of the Speaker Segmentation is given input to the Speaker Embedding where the segments are converted into d-vectors using the LSTM algorithm. The inputs undergo through the LSTM algorithm and the outputs will be in the form of d-vectors.

LSTM: Long Short-Term Memory (LSTM) is a type of recurrent neural network (RNN) architecture that is designed to capture long-range dependencies and patterns in sequential data. It was introduced to address the vanishing gradient problem that traditional RNNs faced when trying to learn relationships between distant elements in a sequence.

Clustering: D-vectors are inputs to the Clustering. We will be using the Spectral Clustering algorithm. It is an approach of data classification that estimate show likely a data point is to be a member of one group or the other. By performing a sequence of refinement operations on input the same voice is grouped together into one single group and forwarded to the separate file.

Labelling: The group of Clusters will be saved into separate file formats. One file format will contain the speech of only one person. Thus, every speaker has its own single separate file.

IV.CHALLENGES

Scalability: Extending diarization to large datasets and real-time applications requires scalable algorithms and efficient processing Domain Adaptation: Adapting diarization systems to new domains or languages can be complex due to differences in speaking styles and acoustic conditions.

Privacy Concerns: Ethical and privacy considerations are vital when deploying diarization systems, especially in contexts where sensitive data is involved.

V. RESULT

Dataset	DER
CALLHOME	0.625
Audio 1(3 speaker)	0.221
Audio 2(7 speaker)	0.003

Table 2:Result

VI. APPLICATIONS

Speech Transcription: In scenarios like conference calls, meetings, or interviews, speaker diarization helps separate speech segments by different speakers, making it easier to transcribe each speaker's content accurately. This improves the quality and efficiency of automatic speech recognition (ASR) systems.

Content Analysis and Summarization: Speaker diarization helps understand who's speaking in a conversation. This lets us figure out who talks the most and how people interact. By knowing who says what, we can summarize discussions better. It helps find out who's the main speaker and how the conversation flows. Overall, it makes it easier to analyze and summarize what's being said in a conversation.

Medical field: During medical consultations or procedures involving multiple healthcare professionals, speaker diarization can help transcribe the conversation accurately by attributing each speaker's dialogue. This ensures that medical notes or reports are correctly documented, aiding in patient care and record-keeping.

Voice Biometrics and Forensics: Speaker diarization can aid in voice biometrics and forensic analysis by separating different speakers' voices within a recording. This can be useful in criminal investigations, authentication systems, and identifying speakers in surveillance recordings. ongoing advancements.

VII. CONCLUSION

In short, speaker diarization is the process of identifying and labelling multiple speakers in audio recordings. It's used in various applications and has evolved with technology. Challenges include handling overlapping speech and noisy environments. It has gone through various milestones, from early rule-based methods to the integration of deep learning models like LSTMs and spectral clustering for improved accuracy. Different techniques and feature extraction methods play a key role in this process, but it often requires labelled data for training. Overall, speaker diarization is important. .

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Application to Help the Visually Impaired By Converting Images to Audio Descriptions

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ABSTRACT
In a world increasingly reliant on visual information of the surroundings, visually disabled people usually face significant challenges in their daily lives even for simple tasks. The absence of real-time, environment-apprehensive audio descriptions of their environment hinder their mobility and therefore they struggle to engage with the world, unlike other humans. This application design aims to develop an innovative AI-powered application to bridge this availability gap and increase their quality of life. The primary functionality of this operation is based on using state-of-the-art image recognition technology to give visually impaired individuals accurate and intuitive audio descriptions of their immediate surroundings. By using artificial intelligence power, this application aims to deliver real-time, detailed, and user- friendly information in audio format about objects and other applicable visual essentials within the user's surroundings.
Keywords:

I. INTRODUCTION

Visually impaired individuals often encounter barriers to independent mobility and participation in daily life due to the lack of accessible tools that provide real-time, context-aware descriptions of their surroundings. Our application tends to revolutionize their interaction with the visual world by converting the images into audio descriptions. Taking advantage of advanced algorithms and user-friendly usage, our application encourages to enrich the standard of living for the visually impaired fostering independence and facilitating an inclusive world.

II. METHODOLOGIES

A. Image Processing
Image processing acts as a virtual seeing-eye canine for the visually impaired, wielding the energy of cameras to bridge the visual gap. This record is then translated into a consumer-friendly layout, be it clean audio descriptions, intuitive vibrations on a hand-held device, or even tactile maps for spatial knowledge. Imagine a visually impaired individual being capable of independently examining store signs and symptoms or perceiving items on cabinets – this era empowers exploration and fosters an experience of independence. As algorithms end up extra sophisticated, destiny promises even richer studies. We can assume real-time scene evaluation

describing whole environments, item reputation differentiating between a parked vehicle and a dangerous pothole, and seamless integration with navigation apps for flip-by-means-of-turn guidance. Image processing is revolutionizing the way visually impaired people interact withthe sector, providing a brighter route toward a more independent and enjoyable life.

B. Feature Extraction

In helping visually impaired people with navigation, feature extraction plays a crucial role in transforming raw data into information. Imagine a gadget that could take the visual scene as input and extract the maximum vital information applicable to navigation. This is where characteristic extraction plays an essential position. By making use of algorithms to camera pictures, the device can discover and isolate key elements in the photograph. These capabilities can embody a huge variety, relying on the specific software. Common examples include Obstacle detection: Extracting capabilities like edges, depth variations, and unexpected adjustments in brightness lets the device discover ability limitations like curbs, uneven pavement, or stray objects, helping customers keep away from collisions. Landmark popularity: By analyzing shapes, textures, and coloration patterns, the device can understand landmarks like crosswalks, street signs and symptoms, building entrances, or shops. These records can be relayed via audio descriptions, empowering customers to orient themselves within their surroundings. Object classification: Features like length, form, and color may be used to categorize gadgets of hobby, which include visitors' lights, parked cars, or maybe unique types of vegetation. This can provide valuable context for visually impaired customers, enhancing their information about the environment. The strength of function extraction lies in its ability to distill sizable quantities of visible records right into a concise and meaningful representation. Furthermore, the choice of capabilities extracted may be tailor-made to desires and environments. For instance, navigating an indoor shopping mall would possibly prioritize identifying store signage and product displays, while out-of- door navigation might focus on extracting features associated with visitors' lighting fixtures, pedestrian crossings, and potential risks like uneven terrain. As machine mastering algorithms continue to evolve, function extraction strategies become even more state-of-the-art. We can count on the ability to extract more and more complex capabilities, leading to a richer know-how of the surroundings. Imagine systems that cannot most effectively identify gadgets but additionally parent their capability (a parked automobile vs. A shifting car) or even understand emotional expressions on people's faces. This level of element would in addition beautify situational consciousness and provide precious information for navigating social interactions.

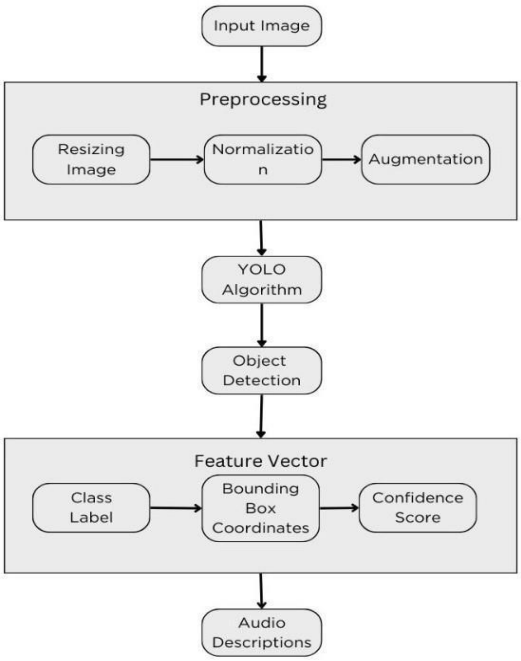

Figure1:Feature Extraction

C. Text-to-speech

Text-to-speech (TTS) technology emerges as an effective companion for visually impaired people, remodeling the visual world into a realm of accessible statistics. Imagine navigating a town road, where a constant circulation of visible cues like street symptoms, keep displays, and traffic alerts bombard sighted pedestrians. For the visually impaired, this environment can be overwhelming. However, TTS steps in, bridging the space by changing visible statistics into clean, concise audio descriptions.

This technology operates by using a combination of sophisticated algorithms and meticulously curated record sets. Cameras or other picture devices first gather visible information about the surroundings. This record is then fed into picture processing and characteristic extraction systems, as discussed earlier. These systems extract key details like the presence of a crosswalk, the type of shop across the street, or maybe the contemporary traffic mild fame.

Once those features are diagnosed, TTS takes centre level. The system interprets the extracted facts into herbal-sounding audio commands or descriptions by way of leveraging pre- recorded audio samples or dynamically synthesizing speech. Imagine a visually impaired individual drawing near an intersection. The TTS machine, having analyzed the scene via image processing, can announce "You are coming near a crosswalk with a site visitor mild. The light is presently crimson." These clear and concise facts empower customers to make informed selections about navigating their surroundings accurately and independently.

The advantages of TTS increase past simple navigation. It can offer actual-time data approximately adjustments within the surroundings, which includes describing the appearance of public transportation or describing capacity boundaries at the sidewalk. Additionally, TTS may be integrated with cellphone programs, allowing customers to access information approximately their surroundings simply using pointing their smartphone's camera. For instance, a consumer might point their digital camera at an eating place sign, and the TTS machine might study aloud the restaurant's call or even announce its customer score.

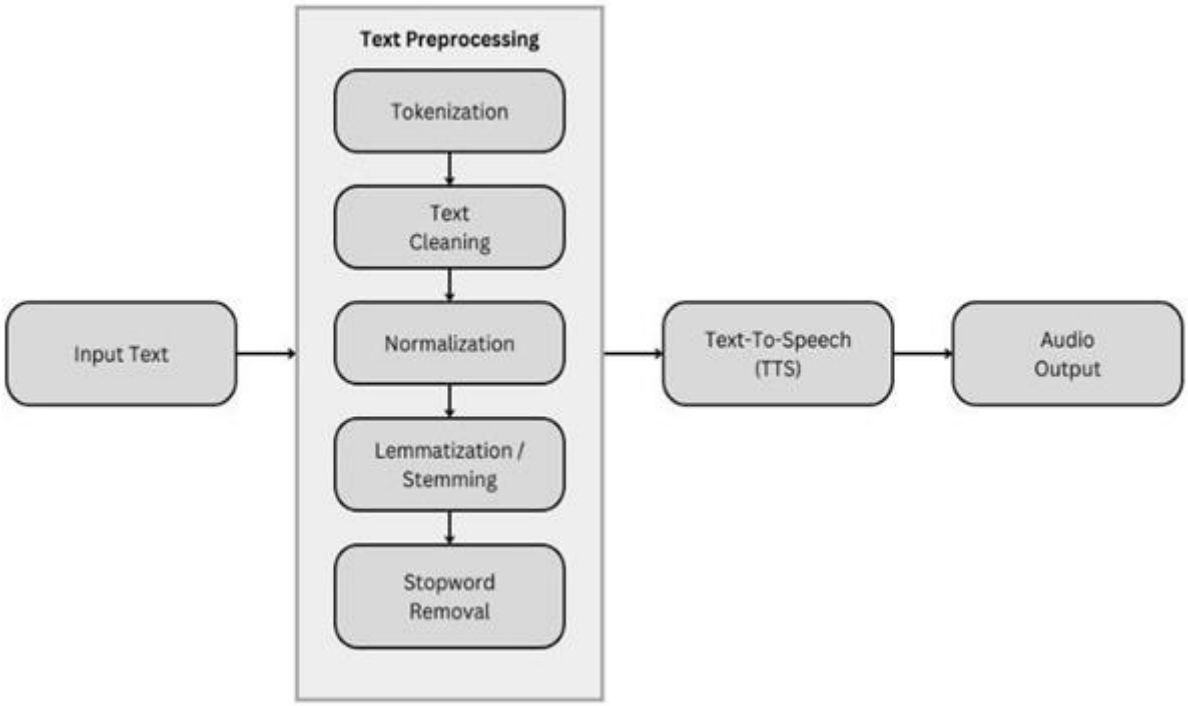

Figure2:Text to Speech

As TTS technology continues to evolve, we can expect even more natural-sounding voices with improved inflection and emotion. Furthermore, the integration of artificial intelligence opens doors for real-time scene analysis. Imagine a system that not only describes static objects but also narrates dynamic events, such as a child playing in a park or a street performer entertaining a crowd. This level of detail would create a richer and more immersive experience for visually impaired users.

In conclusion, text-to-speech technology is a digital narrator for the visually impaired, transforming visual information into a stream of clear and concise audio descriptions. This empowers them to navigate their surroundings independently, fostering a sense of inclusion and confidence in exploring the world around them.

D. Image Acquisition

Image acquisition serves as the foundation, capturing and translating the visual world into a data stream that can be interpreted and utilized. Imagine a visually impaired person navigating a busy intersection. Traditional methods might rely on cumbersome cane sweeps or pre-recorded audio descriptions with limited applicability. However, image acquisition offers a dynamic solution, capturing real-time visual details of the environment.This technology relies on specialized cameras or sensor devices specifically designed for navigation. Unlike traditional cameras used for photography, these devices prioritize capturing the most relevant information for safe and efficient navigation. Common examples include:

E. Lightweight Head-Mounted Cameras

These compact cameras are worn comfortably on a user's head, capturing a wide field of view of the immediate surroundings. This allows for real-time analysis of obstacles, landmarks, and potential hazards within the user's path.

F. Smart cane Cameras

Integrating a camera into a traditional cane adds a new dimension to navigation. By capturing information about the ground level, such as uneven pavement, curbs, or dropped objects, these smart canes empower users to avoid potential tripping hazards.

G. Environmental Sensor Arrays

In specific scenarios like high-traffic areas or public transportation hubs, a network of strategically placed cameras can create a comprehensive picture of the environment. This allows users to receive information about their surroundings even when not directly facing a particular direction.

The captured visual data then undergoes processing to extract the most critical details for navigation. This processing might involve techniques like:

H. Object Detection

Algorithms identify and locate objects within the image frame, such as pedestrians, traffic signals, or obstacles.

I. Depth Perception

Technologies like LiDAR (Light Detection and Ranging) can provide depth information, allowing the system to distinguish between a flat surface and a potential obstacle like a staircase.

J. Scene Recognition

Advanced algorithms might even analyses the broader context of the scene, recognizing landmarks like bus stops, building entrances, or specific stores, providing valuable information for orientation.

The key advantage of image acquisition lies in its ability to capture real-time visual data specific to the user's immediate environment. This dynamic approach surpasses the limitations of pre-recorded information or static maps, providing a more accurate and adaptable navigation experience.Looking ahead, advancements in image acquisition technology promise even greater benefits. Smaller, more discreet cameras will offer increased comfort and ease of use.

III.LITERATURE SURVEY

TABLE I LITERATURE SURVEY

Author	Title	Methodology	Findingsand Limitations
K.C.Shahira, Sagar Tripathy, A Lijiya(2019)	Obstacle Detection, Depth Estimationand Warning System for Visually Impaired People.	Yolov2, TTS	The accuracy of distance measurement was found to vary for some objects.The Executiontimefor some inputs is higher upto 17.98 secondsper frame.
Selman Tosun,EnisKaraarslan(2019)	Real-time Object Detection Applicationfor Visually Impaired People.	Yolo,Image Processing	Used on Tiny- Yolo Dataset which lowered the mean Average Precision(map).Ori ented towards detection on mobile devices, particularly Android.
Shaoqing Ren,Kaiming He,	FasterRCNN:	Regional	RPNwasmerged withFasterRCNN in

Ross Girsichk, Jian Sun(2016)	TowardsReal- time Object Detectionwith Regional Proposal Networks	Proposal Network(RPN)	the single network which enabled nearly cost-free region proposal.
DuyThanh Nguyen, TuanNghia Nguyen, Hyun Kim(2019)	AHigh Throughputand Power EfficientFGPA Implementation ofYOLOCNNforObject Detection	YOLOv2model using1-bit weights	Results are based on FPGA implementationandresultsonother hardware like ASCIs may differ. Performance is evaluated only on thePASCALVOC dataset, therefore limitedanalysison the impact of different bit- widths.

The cited works showcase diverse approaches to addressing the challenge of object detection and warning systems for visually impaired individuals. Shahira et al. (2019) developed an obstacle detection and warning system using YOLOv2 and gTTS but encountered accuracy and execution time issues. Meanwhile, Tosun and Karaarslan (2019) focused on real-time object detection with YOLO, particularly emphasizing its application on mobile devices like Android. Ren et al. (2016) proposed Faster RCNN, integrating a Regional Proposal Network for efficient region proposal generation. Nguyen et al. (2019) contributed a high throughput and power-efficient FPGA implementation of YOLOv2 using 1-bit weights. While each work presents valuable contributions, comparing them reveals distinct strengths and limitations. Tosun and Karaarslan's approach stands out for its real-time capabilities and mobile device focus, offering practical benefits for everyday use. Ren et al.'s integration of RPN with Faster RCNN enhances efficiency, while Nguyen et al.'s FPGA implementation prioritizes hardware optimization.

IV. PROPOSED SYSTEM

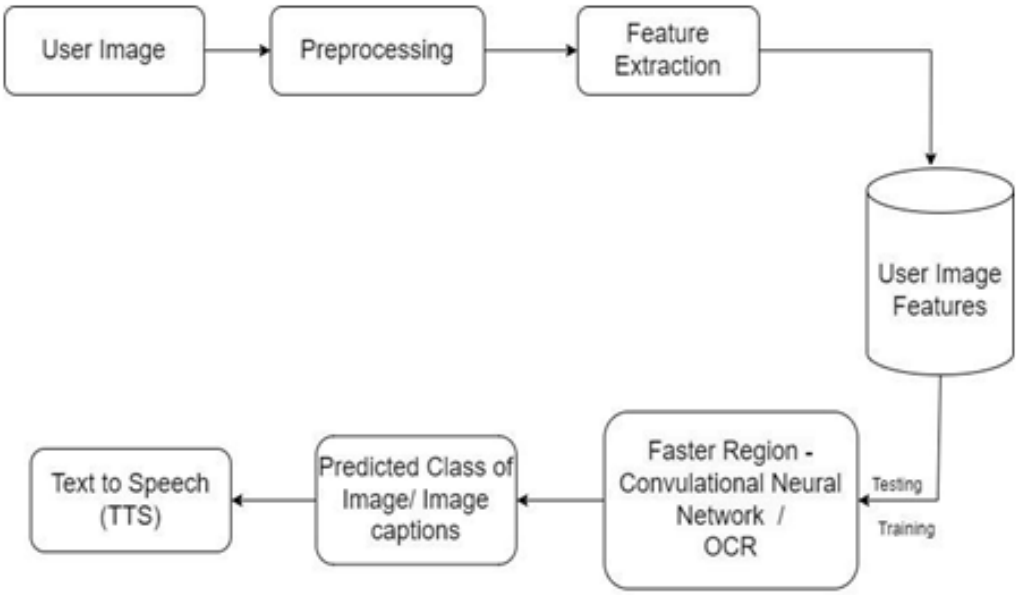

Figure3:System Architecture

A. User Image

This is the input to the system, consisting of images captured by a device such as a smartphone or camera. These images typically depict the user's surroundings, such as streets, intersections, or indoor environments.

B. Preprocessing

The user images undergo preprocessing to enhance their quality and facilitate subsequent analysis. Preprocessing steps may include resizing, noise reduction, and contrast adjustment to improve image clarity and remove irrelevant information.

C. Feature Extraction

In this step, relevant features are extracted from the pre-processed images. These features may include edges, shapes, textures, or other visual patterns that are important for navigation and object recognition.

D. User Input Features

Additional user input features are incorporated into the system to personalize the navigation experience. These features may include preferences, destination inputs, or specific instructions provided by the user through voice commands or text input.

E. RNN/OCR (Recurrent Neural Network/Optical Character Recognition)

This component employs RNN or OCR techniques to interpret text or recognize objects within the images. RNN models can analyze sequential data, making them suitable for tasks such as recognizing street signs, while OCR algorithms extract text from images, enabling the system to interpret written information such as store names or street names.

F. Predicted Class of Image

Based on the features extracted from the image and the output of the RNN/OCR component, the system predicts the class or category of the image. For example, it may identify objects such as pedestrians, vehicles, traffic signs, or landmarks relevant to navigation.

G. Text-to-Speech

The predicted class of the image is then converted into spoken text using text-to-speech (TTS) technology. This enables the system to convey information about the user's surroundings audibly, providing real-time guidance and alerts.

V. CONCLUSION

The challenge "Application to Help the Visually Impaired with the aid of Converting Images to Audio Descriptions" ends in effects that may extensively enhance accessibility and independence for visually impaired people with the aid of translating pics into audio descriptions, presenting users with all the facts about their environment gadgets. The integration of superior image recognition algorithms ensures an immoderate degree of precision which allows the visually impaired to recognize visible content material in a manner that became formerly inaccessible to them and maintain to make a meaningful difference in their lives.

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Enhancing CAD Modeling and Additive Manufacturing through Python Optimization and Computer Vision: A Comprehensive Review

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ABSTRACT

This review paper explores the synergistic integration of Computer-Aided Design (CAD) modeling, Python optimization, and computer vision within the realm of additive manufacturing, delineating their transformative impact on modern engineering and manufacturing practices. The integration of Python programming and computer vision technologies into Computer-Aided Design (CAD) and Additive Manufacturing (AM) is transforming the landscape of design and manufacturing processes. CAD modeling serves as the foundational framework for product design, enabling intricate and precise digital representations that are essential for advanced manufacturing processes. The incorporation of Python into CAD workflows leverages powerful libraries such as NumPy, Pandas, Matplotlib, and SciPy to automate and optimize design parameters, significantly reducing the time from concept to prototype while enhancing the fidelity of the designs. The review discusses the crucial role of computer vision in advancing AM techniques. We summarize recent research focused on leveraging computer vision for real-time monitoring, anomaly detection, and quality control during the manufacturing process. This review article provides a comprehensive understanding of how the amalgamation of CAD modeling, Python, and computer vision is setting new standards in precision, efficiency, and innovation in additive manufacturing, aligning with the overarching goals of Industry 4.0.

Keywords: Computer-Aided Design (CAD) Modeling; Additive Manufacturing; Python Optimization; Industry 4.0.

I. INTRODUCTION

Considerable technological progress has been made in the engineering and manufacturing fields with the goal of improving productivity, accuracy, and efficiency. The need for optimal CAD modeling in additive manufacturing has grown more and more apparent as industries aim to achieve ever-higher levels of accuracy, productivity, and personalization [1]. By creating things layer by layer, additive manufacturing, also known as 3D printing, upends conventional manufacturing paradigms and makes it possible to create complex geometries that were previously unfeasible or economically unviable. However, optimal CAD modeling is necessary to fully realize the potential of this innovative manufacturing technique. In additive manufacturing, CAD models

act as the final product's blueprints. The precision and intricacy of these models have a direct bearing on the caliber and performance of printed goods [2-4]. But in order to achieve this level of accuracy, CAD models must be painstakingly optimized to fit the unique limitations and capabilities of additive manufacturing equipment.

In today's quickly changing engineering and manufacturing world, computer-aided design, or CAD, has become essential. The foundation for creating intricate structures and systems in a variety of industries, including consumer electronics, automotive, aerospace, and architecture, is CAD modeling. Precise and adaptable design processes made possible by CAD significantly cut production costs and time while promoting experimentation and creativity [3]. Among these developments, computer-aided design (CAD) modeling is particularly noteworthy as a foundational method that has revolutionized the design process in a number of industries, including consumer goods, automotive, and aerospace. However, the shortcomings of conventional CAD modeling become evident as design tasks become more complex and demanding. The need to improve these models' performance and efficiency in order to meet these challenges is becoming more and more pressing.

Python has become a very effective tool for automating and streamlining CAD processes in recent years. Because of its large library and open source nature, which enable customization and scalability of CAD operations, it is an essential tool for engineers [3-7]. Furthermore, by enabling more exact control over the manufacturing process and real-time quality assurance, the integration of computer vision (CV) with additive manufacturing (AM) promises to revolutionize this field.

The goal of this review paper is to investigate integrative methods that push the limits of contemporary manufacturing by utilizing computer vision, Python optimization, and CAD modeling. The addition of Python to CAD modeling workflows also makes the interplay between the digital and physical aspects of design more fluid and dynamic. Python scripts can be configured to communicate directly with 3D printing hardware, allowing for dynamic parameter changes for printing in response to feedback received from the printer in real time. The writers will look at these technologies as they are right now, talk about how they work together and in real-world situations, and think about where research and development should go in the future. We can create new opportunities for creativity and efficiency in design and manufacturing processes by combining these technologies. In addition to highlighting each technology's unique contributions, the paper will stress how these technologies can work together to produce manufacturing systems that are more intelligent, flexible, and effective.

II. CAD MODELING TECHNIQUES FOR ADDITIVE MANUFACTURING

Three main elements comprise the foundational principles of computer-aided design (CAD) modeling: geometric modeling, design and analysis, and visualization. In geometric modeling, an intricate three-dimensional model of the object is created that can be digitally altered and adjusted. Since these models are based on geometric parameters, recalculations by hand are not required when examining various dimensions and properties [8–9]. In additive manufacturing, CAD models act as the final product's blueprints. The precision and intricacy of these models have a direct bearing on the caliber and performance of printed goods. But in order to achieve this level of accuracy, CAD models must be painstakingly optimized to fit the unique limitations and capabilities of additive manufacturing equipment. This involves, among other things, taking into account the characteristics of the material, support structures, print orientation, and layer thickness.

2.1 Current Trends

The transition to parametric and generative design is one of the most significant CAD modeling trends. Parametric design entails using parameters to define specific constraints and relationships in the model. This method enables designers to quickly adjust and iterate designs by changing the parameters, which updates the model accordingly. Generative design is an extension of parametric principles that employs algorithms to generate design alternatives based on predetermined criteria such as materials, manufacturing methods, and performance requirements. Recent studies show a growing integration of artificial intelligence, computation, machine learning, visualization, and internet technology in parametric and generative design,
pointing to a future in which these technologies will drive innovation in architectural CAD applications. (Michelle and Gemilang, [10]. Seff et al. (2021) [11] used a machine learning tool to improve parametric CAD tools, allowing for generative modeling to support design workflows with features such as autocompletion and constraint inference, significantly speeding up the design process. Quispe and Ulloa (2021) [12] demonstrated that using Building Information Modeling (BIM) tools in conjunction with parametric and generative design methods has the potential to improve interoperability and process automation when designing complex structures.

III.OPTIMIZATION USING PYTHON

Optimization is a key part of Computer Aided Design (CAD) modeling for improving designs to make them more useful, efficient, and aesthetically pleasing. Python, a powerful and flexible programming language, has become a favorite tool for engineers and designers who want to improve CAD models because it is easy to use and has a lot of libraries that are designed to help with math and science. Python's use in CAD processes makes design optimization faster, easier, and more accurate. This makes Python an important tool in modern engineering workflows [13–17]. The optimization process is improved by adding these Python libraries to the CAD modeling workflow. They provide powerful tools that work well with existing CAD software. Because of this partnership, engineers can make their CAD systems do more, automate boring tasks, and use complicated optimization algorithms in a quick and easy way. Python lets designers push the limits of what is possible in CAD modeling, turning new ideas into better solutions that work in the real world [18–21]. NumPy can be used to handle complicated calculations in CAD modeling that involve changing and improving shapes. A lot of people use NumPy to work with big arrays and matrices of numerical data. It has many mathematical functions that can be used to quickly work with these arrays. A lot of Python-based scientific computing programs are built on top of it because it's necessary for fast, vectorized math operations (Ranjani, Sheela, & Meena, 2019) [22]. CAD modeling needs visualization not only to show off finished designs but also to look at patterns and behaviors while the design is being optimized. Pinte et al. (2012) [23] showed a Matplotlib library that can be used with Python to make static, interactive, and animated graphs. In CAD modeling, it's often used to see data and engineering drawings more clearly, which helps people understand the outcomes of simulations and analyses. In their 2015 paper [24], Zuo and Xie describe a Python-based topology optimization code that was made for 3D structures using the Bi-directional Evolutionary Structural Optimization (BESO) method. Python's ease of use in optimizing structural design, along with its ability to work with complex geometries and integrate with Abaqus for finite element analysis, makes it a great choice. The research by Blank and Deb (2020) [25] introduces "pymoo," a framework for multi-objective optimization in Python. The framework supports complicated optimization tasks, such as those with limited options, and gives you tools for visualizing and

making decisions in multi-criteria optimization problems. This shows how flexible Python is when it comes to optimizing for different goals. Ye and Wang (2017) [26] describe a Python script that can figure out the real properties of materials that are modeled as Representative Volume Elements (RVEs) and are subject to Periodic Boundary Conditions (PBCs). Python is used to show how well it works for modeling on multiple scales and improving the properties of materials. Table 1 shows different ways Python is used in the field of CAD optimization, covering a wide range of industries and problem-solving situations. This shows how flexible and useful Python is for improving CAD workflows and methods.

Table 1 Diverse application of Python in the field of CAD optimization.

Authors	Year	Publication Title	CAD Tool Used	Conclusion Summary
M. Gilbert, Xingyi Song [27]	2019	A Python Script for Adaptive Layout Optimization of Trusses	Python	Introduced a Python script for truss optimization using adaptive schemes, demonstrating efficient handling of structural design.
A. Pentead o et al. [28]	2020	A Framework for Stochastic and Surrogate Assisted Optimization	Aspen Plus	Described a Python framework for optimization using Aspen Plus, enhancing SAO methodologies in chemical engineering.
Marian Körber, C. Fromm el [29]	2019	Automated Planning and Optimization of Draping Processes in the CATIA Environment	CATIA	Explored automated optimization of draping processes within CATIA using Python, enhancing production efficiency.
Aditi Agarwa l, A. Saxena [30]	2023	PyHexTop: A Compact Python Code for Topology Optimization Using Hexagonal Elements	Python	Developed PyHexTop, a Python code for topology optimization with hexagonal elements, aimed at educational purposes in design.
Konrad Łyduch et al. [31]	2022	The Method of Transferring Topology Optimization Results to the CAD System Database	Solidw orks	Proposed a method for integrating topology optimization results directly into CAD systems, enhancing workflow efficiency.
Zhangji n Ding [32]	2023	Python-based Model Optimization Platform	Python	Analyzed Python's capability in enhancing computational optimization platforms, focusing on model accuracy and efficiency.

IV. ENHANCING ADDITIVE MANUFACTURING WITH COMPUTER VISION

Additive manufacturing, or 3D printing, has revolutionized production processes by enabling more flexible, cost-effective, and customized manufacturing options. However, to fully capitalize on these benefits, the quality and consistency of manufactured products must be rigorously maintained. This is where computer vision (CV) comes into play, serving as a pivotal technology that enhances the capabilities of additive manufacturing through improved monitoring, defect detection, and automation. Enhancing additive manufacturing with computer vision not only improves efficiency and output quality but also pushes the boundaries of what can be achieved with 3D printing technologies. By providing sophisticated tools for monitoring, defect detection, and automation, computer vision helps in realizing the full potential of additive manufacturing, making it a more viable option for a wide range of industrial applications. Grierson, et al. (2021) [33] discussed the integration of machine learning with computer vision to improve design, process, and production in AM, highlighting the need for further industrial case studies. Wang et al. (2019) [34] proposed a computer vision-based system for task scheduling in AM, aiming to optimize production time and cost. Davis et al. (2020) [35] presented a vision based method to track print head movements in additive manufacturing, enhancing security and precision via a minimally invasive camera system.

V. CONCLUSION

In summary, the incorporation of sophisticated technologies into additive manufacturing, including computer vision, computer-aided design (CAD) modeling, and Python coding for optimization, signifies a paradigm shift in contemporary manufacturing and engineering methodologies. As a result of the integration of these technologies, the manufacturing process is more streamlined, and production efficiency is increased in a variety of industries. Utilizing computer vision for real-time monitoring, anomaly detection, and defect classification throughout the manufacturing process has been the focus of research in this field. Python, with its robust libraries including NumPy for numerical operations, Pandas for data manipulation, Matplotlib for visualization, and SciPy for optimization, has solidified its position as an essential instrument in CAD modeling. The amalgamation of computer vision technology and the programming capabilities of Python signify a substantial development in the digital revolution that is occurring within the realms of manufacturing and design. The collaboration between CAD and AM not only enhances the functionality and adaptability of these applications but also paves the way for forthcoming advancements in this swiftly progressing domain. The integration of computer vision, Python optimization, and CAD modeling in additive manufacturing not only fosters innovation but also corresponds to the tenets of Industry 4.0. It fosters data exchange, automation, and intelligent manufacturing solutions, thereby enhancing the robustness and flexibility of manufacturing ecosystems.

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Task Classification of EEG Signal Using Bayesian Quadratic Classifier

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ABSTRACT
Different techniques for identifying different types of brain activity are offered by brain sensing technologies. In this, we present the use of inexpensive electroencephalograph (EEG) equipment for task classification. In the initial investigation, we are required to complete one of three tasks while seated: mental rotation, mental arithmetic, or rest. In the second trial, participants choose from three different tasks: a relaxation exercise, a PC game without any fighting, or a PC game with fighting. The three tasks' mean classification accuracy is determined.
The use of various machine learning approaches for the classification of mental tasks using Electroencephalograph (EEG) signals is detailed in the task classification section. This is primarily being used to enhance brain computer interface (BCI) devices. Two well-known EEG datasets in the BCI field are used as the basis for the application of Bayesian graphical network, neural network, Bayesian quadratic, Fisher linear, and Hidden Markov Model classifiers. In this work, the Bayesian network classifier is applied for the first instance to classify EEG signals. The accuracy of the Bayesian network is really high..
Keywords: Brain-Computer Interface, human cognition, physical artifacts, task classification, Electroencephalogram (EEG), Bayesian network classifier.

I. INTRODUCTION

With the advancement of technology, people may now converse and interact with machines by thought or build gadgets that can see into a person's head. These concepts have captivated human imagination, leading to advancements in neuroscience and modern science. An EEG is a quantifiable tool used in brain sensing technology to identify brain signals. These technologies are used to track the mental activities that correspond with the physical processes in the brain. The user generates a signal in these systems that can be used to operate computers or other communication equipment.
The brain is a dense network made up of about 100 billion neurons, which are nerve cells.
Every neuron interacts with thousands of other neurons to control the body's functions and generate cognition. Neurons can communicate with one another by exchanging chemicals known as neurotransmitters or by delivering electrical signals through physical connections. Thanks to developments in brain monitoring technologies, we can now see changes in blood flow, chemical reactions, or electrical

activity in the brain as it processes information or reacts to different stimuli. We concentrate on the Electroencephalograph (EEG), the most widely used technology in modern times and a tool that is utilized on a daily basis in clinics and hospitals. To do this, job classification is required.

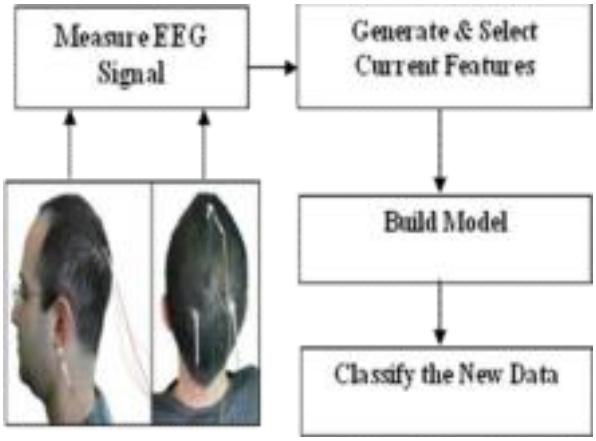

Figure1. Block Diagram of BCI

II. LITERATURE REVIEW

This article focuses on the Electroencephalograph (EEG), a device that is regularly utilized in clinics and hospitals. Electrodes are used to the scalp in EEG to measure the weak electrical potentials (5- 100μV) produced by brain activity. Usually, each electrode is made out of a wire that connects to a gold-plated disk that is bonded to the scalp with conductive gel or paste. Every electrode's voltage is recorded by an EEG in relation to a reference point, which is typically just another electrode on the scalp. Since EEG is a passive measuring tool, prolonged and frequent usage is safe.

The signal provided by an EEG is at best a representation of brain activity due to the nature of the detector. Scalp electrodes are only sensitive to macroscopic and coordinated firing of large groups of neurons near the surface of brain, and then only when they are directed along a perpendicular vector relative to the scalp. Additionally, because of the fluid, bone, and skin that separate the electrodes from the actual electrical activity, the already small signals are scattered and attenuated before reaching the electrodes. Each input channel of an EEG includes a multistage amplifier with a typical gain of 20,000.

EEG systems consist of a number of electrodes, differential amplifiers, filters and needle (pen)- type registers. The EEG signals can be easily plotted on paper. Recent systems use computers for digitization and storing purposes. For digitization sampling, quantization and encoding is done. The effective bandwidth of the EEG signals is about 100 Hz. Thus a minimum of 200samples per second is necessary for sampling. For quantization representation using 16 bits is mostly used. Figure below shows the conventional electrode arrangement recommended by the International Federation of Societies for Electroencephalography and Clinical Neurophysiology for 21 electrodes(called 10-20 electrode position)

III.TYPES OF TASK FOR EEG CLASSIFICATION

Since BCI technology is most helpful as an input control or communication device if the system is able to discriminate between at least two states within the user, we focus on EEG work linked to the task classification problem in this classification. This problem has drawn a lot of interest. By using this capability,

a computer can convert changes in one state or the persistence of a state into a format suitable for directing an application. In this classification, we focus on EEG research related to the task classification problem, which has drawn a lot of attention because BCI technology works best as an input control or communication tool when it can distinguish between at least two user states.

Tasks: Based on the results from pilot recordings with our system, we choose three tasks.

I. Rest:

We told the participants in this task to try not to focus on anything specific and to relax. Additionally, we told them to stop working on any tasks that may have been assigned before the rest.

II. Mental Arithmetic

In this exercise, participants mentally multiplied a single digit number such as 7 × 836 by a three-digit number. We designed the questions to be somewhat challenging, yet complex enough that most participants would need more time than the allocated allotment to finish them. If they completed before the time ran out, we told them to check their answers again.

This ensured that they were performing the intended task as well as they could throughout the task period. Since we did not have participants provide us with answers, we confirmed that the problems were keeping them busy for the duration of the task during a debriefing interview.

III. Mental Rotation:

In this task, participants had to see certain objects like a peacock in as much detail as they could as they were spinning in space. The participant was left in charge of the object's specifics.

IV. EEG ELECTRODE PLACEMENT

A worldwide standard for the placement of EEG electrodes on the human scalp is known as the 10-20 System. As seen in Figure 3, the system defines a network of cables in relation to anatomical landmarks on the head, such as the electrode (nasion) between the nose and forehead and the inion (bump) at the occipital. Ten percent or twenty percent increments between these landmarks dictate the positions of the electrodes.

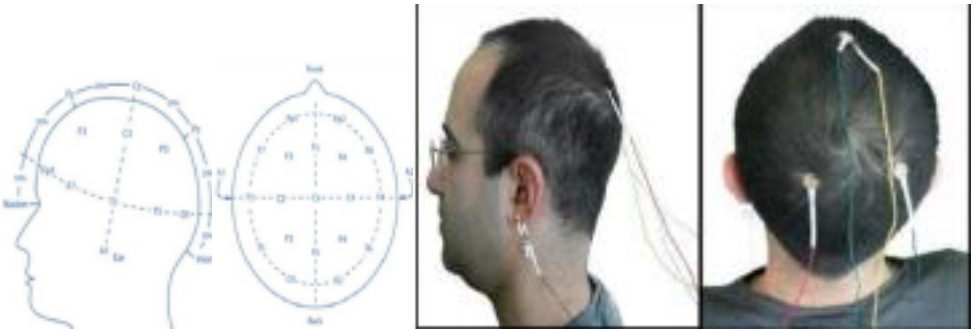

Figure 2.Experimental Set up of Electrode Placement System

In order to identify the parietal (P3 and P4) areas as the sites of interest, we must ascertain the results from the pilot recordings, with both electrode references tied on top of the head located in the center (Cz). Figure 4 illustrates the electrode locations. We were able to compare the readings from each EEG channel in a meaningful way by attaching the references for the two channels together. We connected the ground electrode connector that comes with the Brain master to an ear lobe. Grounding serves as an electrical safety measure to shield the device's delicate inputs from harm.

Their specific locations on the head do not impact the recorded signals. When attach an electrode, we first

clean the scalp location small amount of Nuprep solution, an abrasive skin prepping gel used to remove dirt, oil, and dead skin from the area in order to reduce the impedance of the electrical connection with the scalp. Then, we place a small amount of conductive paste on the electrode and attached the electrode to the scalp. The paste improves the electrical connection and provides a temporary bond that holds the electrode on the scalp. The measured impedance of our electrode connections was approximately 2 0 K Ω.The setup procedure requires about 10 minutes. Once the experiment was complete, we removed the electrodes and subjects could wash off any remaining gel and paste with brief water.

V. METHODOLOGY

We converted the time series data into a time independent data set by performing some simple signal processing in order to categorize the signals recorded from our EEG. Then, using mathematical fusion, we generated a set of base features that produced a much bigger set of features. The feature sets were then subjected to a feature selection procedure. We performed the classification by training a Bayesian network with these features. We conclude by talking about how averaging might be applied to improve the categorization accuracy, which gets us to our ultimate conclusions. The following subsections provide descriptions of each of these steps.

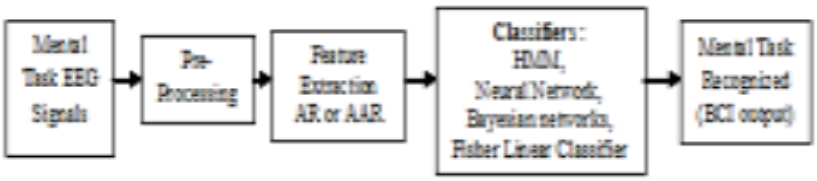

Figure 3.Flow of Methodology

VI. EEG FOR TASK CLASSIFICATION

Bayesian Network is a modeling tool that combines directed acyclic graphs with Bayesian probability. Figure 4 shows the example of Bayesian network which consists of a causal graph combined with an underlying probability distribution. Each node of the network in the figure corresponds to a var iable and edges represent causality between these events. The other elements of a Bayesian network are probability distributions associated with each node. With this information the network can model probabilities of complex causal relationships.

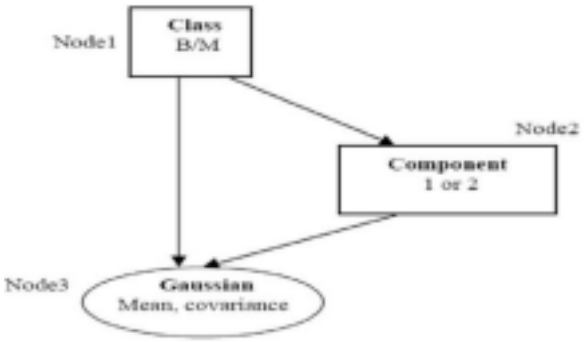

Figure 4.Gaussian mixture model represented as a simple graphical model. B stands for baseline and M for Multiplication tasks

The graphical model corresponding to the Bayesian network used in this work is shown in Figure 6. Note that the square box in the figure corresponds to the input extracted features. The rectangular box corresponds to the Gaussian mixture components. The square and rectangular nodes represent discrete values while the round node in the figure represents continuous values. The graph structure of this model can be represented by the following adjacency matrix: 011, 001, and 000. The Bayesian Network Toolbox (BNT) was used for implementing the classifier. The model was trained using the EM algorithm. EM works by starting with a randomly initialized model (mean and covariance). So, the EM algorithm is composed of two steps. In the first step, each data point undergoes a soft assignment to each mixture component. In the second step, the parameters of the model are adjusted to fit the data based on the soft assignment of the previous step.

VII. RESULTS

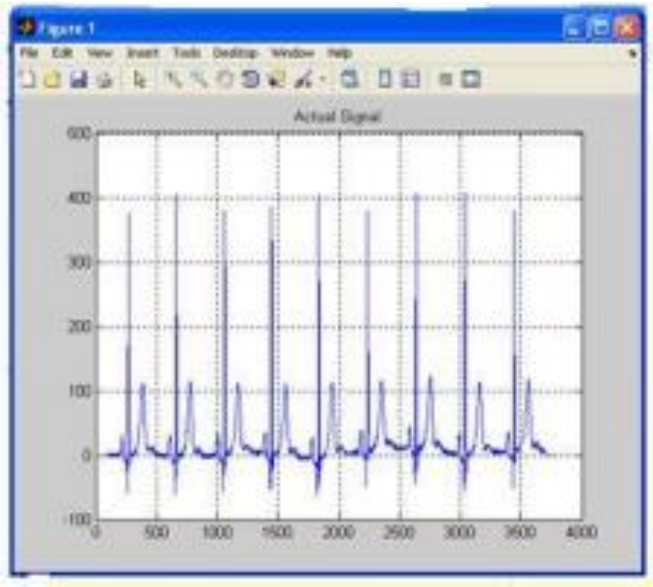

Figure 5. For Normal Case

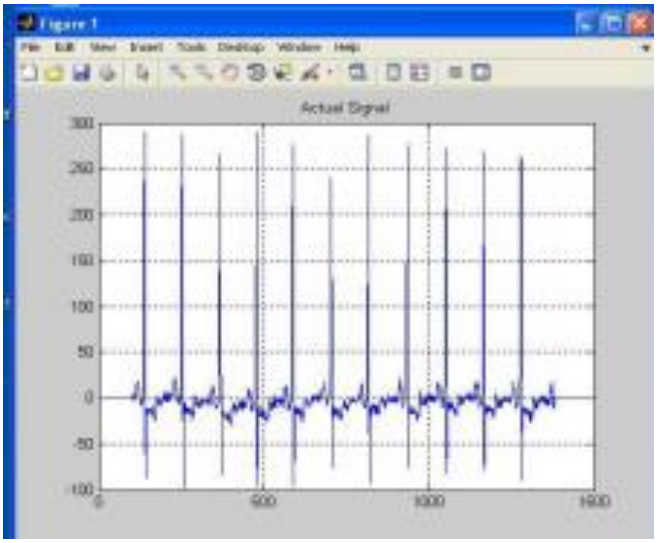

Figure 6.For abnormal Case

Table1.Bayesian Graphical Networks (BNT), Neural Network, Bays Quadratic classifier, Fisher linear and Hidden Markov Model are compared for classification of binary combinations of five mental tasks

Sub.	BNT	Neural Network	Bayes	Fisher Linear	HMM
1	94.07±2.2	92.48±2.9	93.78±2.8	91.15±2.7	70.18±8.8
3	87.43±3.9	85.04±4.3	89.22±3.5	82.77±4.1	64.10±9.1
5	82.48±2.8	82.61±3.0	86.58±3.4	81.79±3.1	62.43±7.8
6	90.31±2.7	89.39±3.1	92.49±3.2	90.38±3.1	64.61±8.3
means	**88.57±3.0**	**87.38±3.4**	**90.51±3.2**	**86.63±3.3**	**65.33±8.5**

Table 2.The summary of the results of different groups on considering the value of MI for Bayesian network, the result of this work ranks second compared to others.

Ranking	Groups	Minimum Error	Maximum SNR	Minimum MI
1	C	10.71	1.34	0.61
2	F	15.71	0.90	0.46
3	B	17.14	0.86	0.45
4	A	18.57	0.85	0.44
5	G	17.14	0.50	0.29
6	I	25.57	0.44	0.26
7	E	17.14	0.34	0.21
8	D	32.14	0.14	0.09
9	H	49.29	0.00	0.00
Bayesian network	-	16.43	1.00	0.50
Neural network	-	15.71	1.04	0.51
Bayes classifier	-	17.14	0.71	0.38

VIII. CONCLUSION

In the field of BCI, two widely recognized EEG datasets serve as the foundation for the implementation of classifiers such as Bayesian graphical network, neural network, Bayesian quadratic, Fisher linear, and Hidden Markov Model. For the first time, the Bayesian network classifier is used in this work to categorize EEG signals. With the Bayesian network, accuracy is quite good.

It is conclude that the task for mental arithmetic vs. Rotation did not do comparing against Rest. In the rotation and arithmetic conditions, the amount of brain activity was similar in accuracy, while the comparisons against the rest task were easily distinguished by the task. With the help of Bayesian network, EEG signal was classified. The Bayesian quadratic classifier is better than other classifier.

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Enhanced Diagnosis of Chest X-Ray Images Using Transfer Learning

Shraddha P.Mankar, Dr. S.K.Yadav, Dr.S.A.Ubale

ABSTRACT

An autonomous deep neural network-based diagnostic tool for the identification of pneumonia from chest X-ray pictures. A deep convolutional neural network model with transfer learning has been suggested for this problem. The suggested model is compared with ResNet, ImageNet, Xception, and Inception in terms of precision, recall, accuracy, and ROC accuracy score prior to passing photos to the model. Standard X-ray datasets obtained from the Women and Children's Medical Center are used for experimentation. The trial findings unmistakably show that our suggested algorithm performs better than other traditional models. By doing localization research of cutting-edge deep learning models for chest X-ray image classification, deep learning models have image classification tasks of chest X-ray pictures for practical usage.

Keywords: CNN, ResNet, ImageNet, Xception

I. INTRODUCTION

To identify the limitations of existing methods in terms of accuracy and efficiency.

Goal Assess the precision of current techniques in diagnosis of CheX-ray image classification in transfer learning. Evaluate the computational resource and processing time efficiency of the existing methodologies. Describe the precise constraints preventing the current methods from operating at their best.

Literature review: To get a foundational understanding of current approaches, conduct a thorough review of the most advanced techniques performance metrics to ensure a thorough assessment, define and use the right performance metrics to gauge accuracy and efficiency it choose illustrative case studies or applications from the field to highlight the real-world effects of accuracy and efficiency constraints.

Key Areas of Investigation:

1. Algorithmic Accuracy: Assess the accuracy, recall, and precision of current algorithms, emphasizing any discrepancies or weaknesses.
2. Computational Efficiency: Examine the computational demands, such as scalability, memory requirements, and processing speed, of the existing methods.
3. Data Limitations: Analyze the effects of both quantity and quality of data on the precision of current techniques, noting any potential difficulties.
4. Robustness of the Models: Examine how well the models handle variances, outliers, or unanticipated situations, highlighting any weaknesses.

5. Resource Utilization: Evaluate the effectiveness with which computational resources are employed, looking for areas that could be optimized.
    1. Human-in-the-Loop Considerations: Examine how human intervention functions in the present techniques and assess how it affects precision and productivity.
    2. Stress the necessity of cutting-edge methods like deep neural networks and transfer learning.

II. LITERATURE REVIEW

Vidita P, (2023) Convolution Neural Network Architectures for COVID-19 Detection using Images from Chest X-Rays for the aspect of review in this VGG-16 (Visual Geometry Group) is used VGG-16 is a deep CNN architecture with 16 layers, known for its simplicity and effectiveness. Researchers have used pre-trained VGG-16 models and fine-tuned them on COVID-19 chest X-ray datasets to leverage the learned features. In this paper which introduces residual connections to help mitigate the vanishing gradient problem, allowing the training of very deep networks. Its variants, such as ResNet-50 and ResNet-18, have been used for COVID-19 detection in chest X-ray images.

Trong V, (2023) Enhancement of the DenseNet Deep Neural Network Model for Tuberculosis Identification with Chest X-Rays Start the DenseNet model on a sizable dataset (such as ImageNet) using weights that have already been trained. This aids in the model's quicker convergence and improved performance. There are multiple steps involved in developing an enhanced DenseNet- based deep neural network model for tuberculosis detection using chest X-ray images. DenseNet, an acronym for Densely Connected Convolutional Networks, is a potent architecture renowned for its dense connectivity pattern that facilitates improved parameter efficiency and feature reuse.[2]

Rajpurohit K, (2023) Improved Pneumonia Diagnosis of Radiological Pneumonia diagnosis involves analyzing medical images, such as chest X-rays, to identify signs of pneumonia in the lungs. Deep learning methods, particularly CNNs, have been widely used for image-based medical diagnoses due to their ability to learn hierarchical features using Hybrid Loss with Conventional CNN.

III.RESEARCH METHODOLOGY

Data preprocessing is resizing images to a standard size and normalizing pixel values. Improve model generalization by putting data augmentation techniques into practice.

Architecture Model:

Select a deep neural network architecture that is appropriate for classifying images from chest X-rays. Adjust architecture to correspond with the quantity of classes in your dataset. Setup for Transfer Learning: Start with a pre-trained model (such as ImageNet pre-trained). To put transfer learning into practice, freeze the bottom layers and adjust the top layers.

Optimization and Loss Function: For multi-class classification, choose a suitable loss function (categorical cross-entropy, for example). Select an optimizer (like Adam), then configure learning rates.

1. Instruction Procedure: Use the training set to train the model, and the validation set to perform validation. Track training results and make any necessary hyperparameter adjustments.
2. Metrics for Evaluation: Standard metrics like accuracy, precision, recall, and F1 score should be used to assess the model. For more in-depth understanding, examine ROC curves and confusion matrices.

Strategies for Interpretability: Use methods for deciphering model predictions, such as Grad-CAM for abnormality localization.[1]

3. Adjusting and Streamlining: To maximize the performance of the model, experiment with the hyperparameters. To avoid overfitting, take regularization strategies into consideration record-keeping and Reporting. Make sure that the model architecture, hyperparameters, and code are all clearly documented throughout the process.
4. In a report or paper, clearly and concisely convey the results. You can methodically develop, train, and evaluate a deep neural network-based transfer learning method for diagnosing chest X-ray images by following this work plan and methodology. Depending on the particulars of your dataset and the available computing power, adjustments might be required.

IV. RESULTS AND DISCUSSION

Optimization and Loss Function: For multi-class classification, choose a suitable loss function (categorical cross-entropy, for example). Select an optimizer (like Adam), then configure learning rates.[3]

Instruction Procedure: Use the training set to train the model, and the validation set to perform validation. Track training results and make any necessary hyperparameter adjustments.

Metrics for Evaluation: Standard metrics like accuracy, precision, recall, and F1 score should be used to assess the model. For more in-depth understanding, examine ROC curves and confusion matrices. Strategies for Interpretability: Use methods for deciphering model predictions, such as Grad-CAM for abnormality localization.

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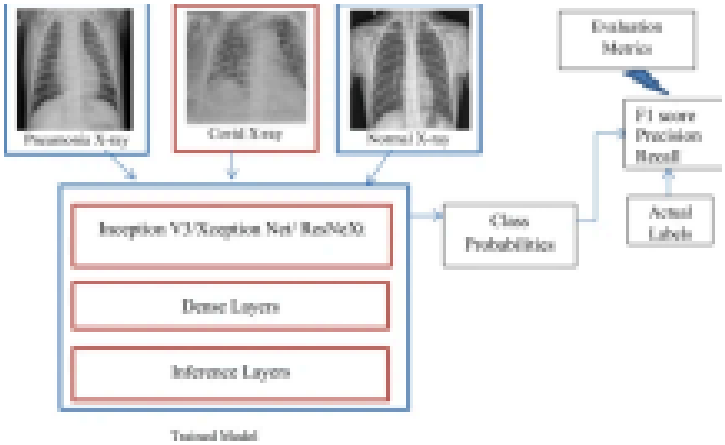

Fig.1: Proposed model for chest X-ray dataset evaluation

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Hybrid Configuration Micro-Mixers: A Synergistic Approach to Fabrication and Performance

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ABSTRACT
The lab-on-a-chip device mostly relies on the microchannel components. Micro mixers find their application in microfluidic devices and biomedical devices. Using traditional manufacturing techniques to fabricate micro mixers is highly difficult. Many techniques are applied to the fabrication of microchannels in order to characterize technology utilizing a combination of traditional and unconventional methods, such as laser ablation processing, lithography, micro milling, and embossing procedures. Acrylic is available in many different standard sizes these days. These days, it's highly sought after that some of them can withstand bullets. Acrylics are available in different forms. Numerous methods exist for processing them; the method involving the use of laser cutter machines is the one covered here. The method is referred to as the laser-cutting procedure. This work examines the creation of micro-channel molds out of acrylic material using a commercial CO2 laser system. Fabricated molds are the primary factor influencing the micro mixer's accuracy. Microchannel depth can be controlled by varying the scanning speed and laser power. Primary experiments are carried out to examine the impact of laser power and scanning speed on the depth of the micro mixers mold. It can be seen from analysis that as laser power increases, the depth of the micro mixer mold increases linearly and decreases with increasing velocity. An experimental and numerical analysis is conducted on the hybrid configurations of Y-shaped micro mixers.

Keywords: Micro-mixer, CO-2 Laser, Hybrid Configuration, COMSOL.

I. INTRODUCTION

Micro Channel is one of the key components of today's micro total analysis systems (TAS), which are important in many applications. Applications for microchannels can be found in many different domains, including biological, chemical, medical, and diagnostics. [1][2]. Acrylic is a more cost-effective and efficient material to use to fabricate Micro Channels than commercial materials like silicon, glass, polymers, etc. The medical and engineering fields make extensive use of these Micro Channels because of their low cost and simple fabrication [3] [4]. The creation of the Micro Channels can be done in a number of ways, including hot-embossing [5][6], injection moulding [7], micro milling [8], infrared laser ablation [9], and photochemical machining [10] [11]

[12]. For the creation of Molds or direct Micro Channels, CO2 laser machining is an appropriate alternative. CO2 laser machining offers a high degree of design flexibility in addition to expediting the fabrication process. Therefore, CO2 laser systems are highly beneficial for micromachining. In this work, CO2 laser machining is used to fabricate Y-shaped micro mixers with hybrid configurations. The different depths for the Micro mixers are also achieved by varying the input parameters. Fluid flow through micro-mixers with two different geometries is experimented with, and the results are presented. Software called COMSOL Multiphysics is also used for numerical analysis.

II. DESIGN AND FABRICATION OF MICRO-CHANNELS

The process of laser cutting, which is primarily employed in industrial manufacturing, involves using a laser to cut materials. When using laser cutting, the material to be cut is targeted by a computer that controls the high-power laser's output. After that, the material evaporates, burns, melts, or is blown away by a gas jet, leaving behind an edge with a superior surface polish. Flat-sheet material, structural, and piping materials are all cut with industrial laser cutters. Industrial laser cutters are used for cutting structural and plumbing materials, as well as flat sheet material. They can also be very efficient, with an output power to pump power ratio of up to 20%. In addition to many other materials, this machine can cut through wood, acrylic, plastic, cloth, leather, matte board, melamine, paper, pressboard, rubber, wood veneer, fiberglass, and cork.

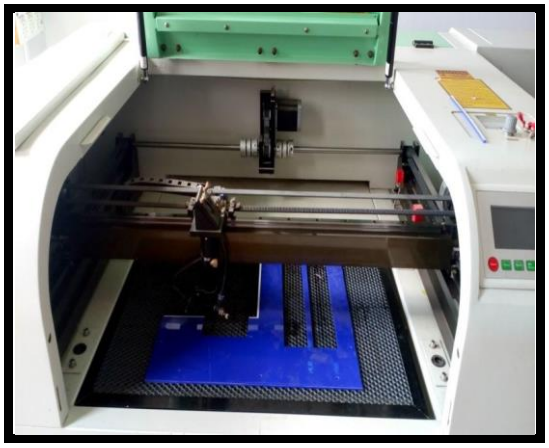

Figure1:CO-2 Laser Machine

A. Design of Hybrid Configurations Micro-Mixers

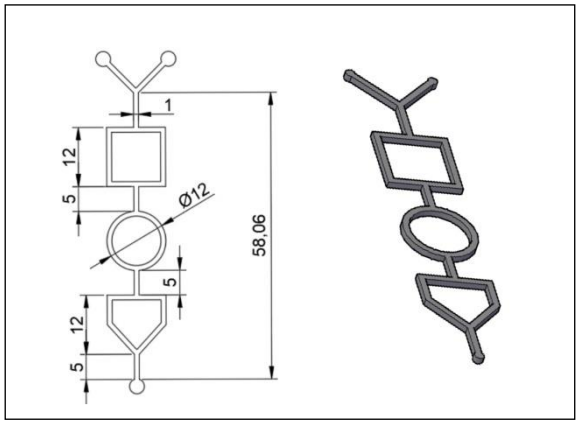

Figure2:Design of Micro-mixer-1

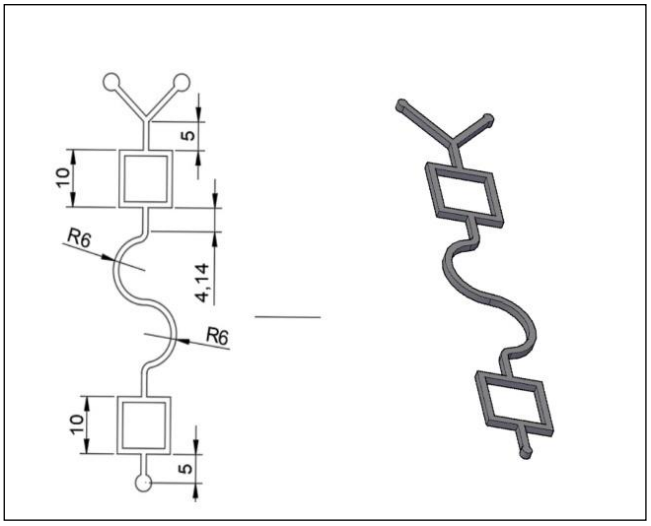

Figure3:Design of Micro-mixer-2

B. Fabrication of Hybrid Micro-Mixer using CO-2 LASER Machining

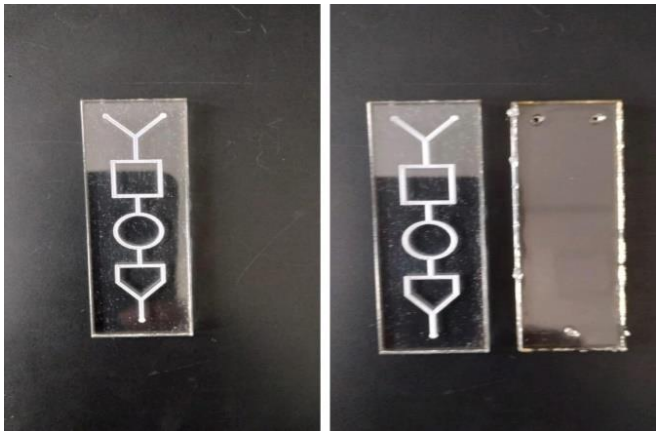

Figure4:Fabricated Micro-mixer-1

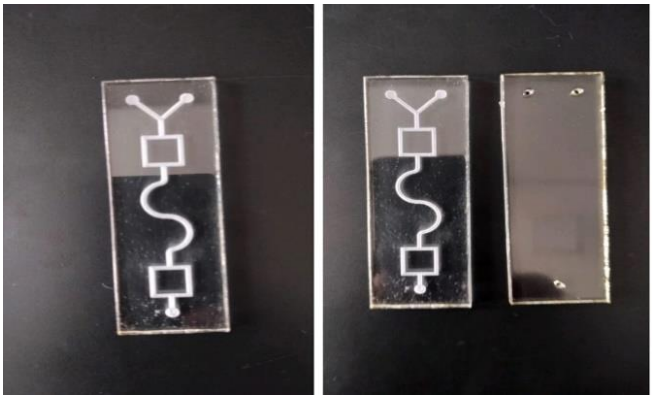

Figure5:Fabricated Micro-mixer-2

Using CO-2 LASER machining, the micro mixers shown above are made. Micromixer fabrication will be impacted by the power and speed of the laser. Micro mixer depth will be impacted by changes in laser power and speed. No. a final measurement of the mixer's depth is made in this respect.

III.EXPERIMENTAL ANALYSIS

Fluid flow through micro-mixers with different geometries is thoroughly experimented with in this work. Results from experiments conducted in a microfluidic laboratory at various input velocities and flow rates in each of the aforementioned micro-mixers will be presented in this section. This figure below illustrates the fluid flow through a micro mixer that was manufactured. Subsequently, the flow pattern data from the experiments and simulations are compared.

Figure6:Schematic of Experimental Setup

A. Experimental Visualization of Fluid flow through Micro Mixers

To conduct the experiment, Blue Ink and Water was taken as the sample. So, the property of the fluid was nothing but the property of the ink only.

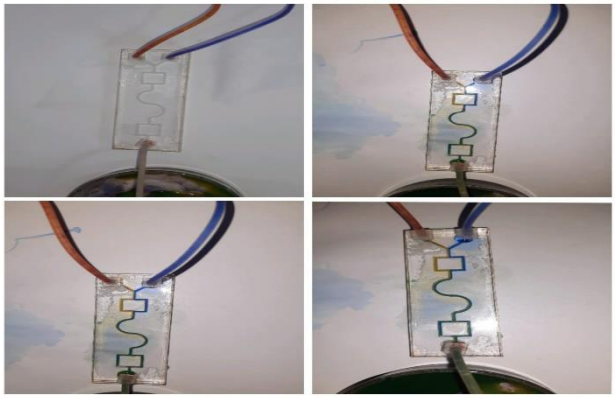

Figure7:Fluid flow through micro mixer-1

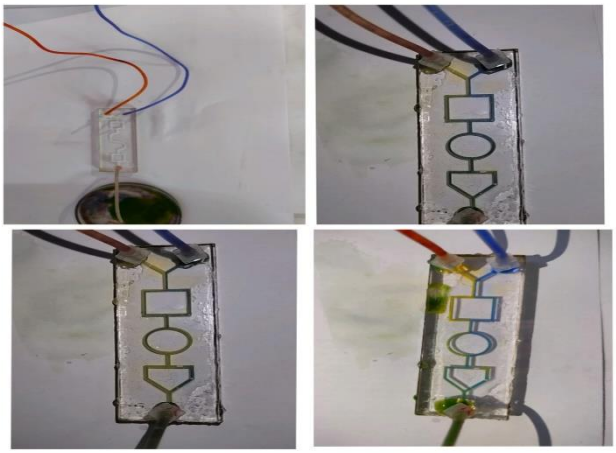

Figure8:Fluid flow through micro mixer-2

IV. NUMERICAL ANALYSIS OF COMSOL

COMSOL Multiphysics is the software used for the numerical analysis channel. AutoCAD is used for the design of the micro mixer, and COMSOL software is then imported for analysis. The simulated results of micromixers are represented shown in figures below.

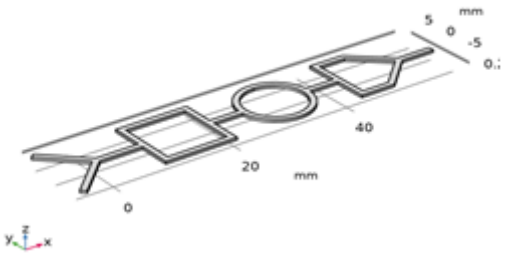

Figure9:Design of geometry

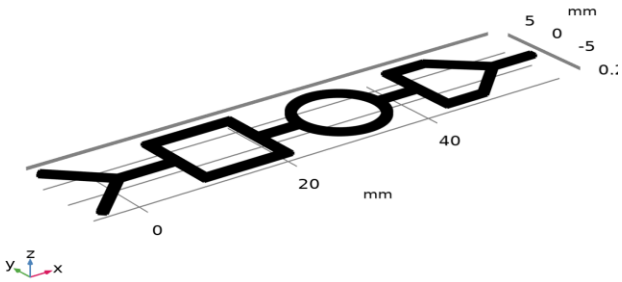

Figure10:Meshing of geometry

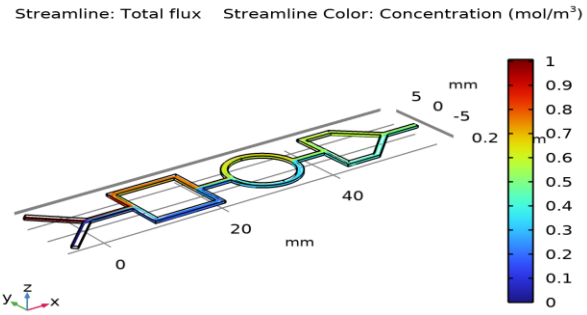

Figure11:Mixing analysis of micro mixer using COMSOL (a)

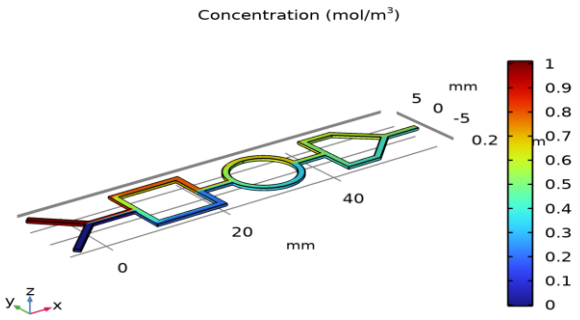

Figure12:Mixing analysis of micro mixer using COMSOL (b)

V. CONCLUSION

Micro mixer is one of the essential components in integrated nanofluidic systems in biology, medicine, and chemistry. Simulations of fluid flow and mixing through variously configured channels are performed using the COMSOL Multiphysics software package. LASER cutting machining has been used to fabricate Y-shaped micromixers in various configurations. A pair of distinct geometries have been designed for Y-shaped micro mixers. The mold for the micro mixer is made using CO-2 laser machining. Analysing experiments is done using the artificial Y-shaped channel

The following conclusions are drawn through this study.

- The incoming fluids' minimum mixing length for a micro mixer is determined by their decrease in inlet velocities.
- The Y-shaped micro mixer produces a slightly lower pressure drop than other models, but it offers a longer mixing duration.
- Mixing length and time in the Micro mixer both decrease with decreasing channel width.
- For blending the two fluids in the shortest amount of time, the hybrid-configured micro mixers are better suited.

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Smart Traffic Management System Using Deep Learning

Mrs. Sonali B. Kanawade, Vishwajit Jadhav, Sanskriti Magdum, Disha Malpure, Rushil Sawant

ABSTRACT

In urban areas, increasing vehicular traffic challenges transportation systems. Our "Smart Traffic Management System" employs deep learning to optimize urban mobility. It overcomes limitations of current systems like Round Robin Scheduling Algorithm by analyzing real-time data for dynamic traffic control. Using object detection and traffic data analysis, it enhances traffic flow, reduces congestion, ensures safety, and improves urban planning. YOLO-based object detection at intersections captures real-time data, reducing congestion. We propose a real-time traffic timer control based on traffic flow, optimizing signal phases using deep learning to minimize waiting time. By understanding competing traffic flows, we enhance safety and efficiency. Our approach redefines urban mobility, offering a robust solution to alleviate congestion and improve transportation efficiency.

Keywords: YOLO, vehicle detection, smart traffic, deep learning, Computer Vision

I. INTRODUCTION

As cities are rapidly developing, the efficient management of traffic has become a day-to-day concern. Growing populations and urban areas, and an ever-increasing number of vehicles on the road have led to extreme traffic congestion, safety hazards, and environmental challenges. In this context, the integration of machine-learning technologies and artificial intelligence has opened up new and unique ways for tackling these issues effectively.

The Smart Traffic Management System using Deep Learning represents an approach that uses deep learning techniques to revolutionize the way we manage traffic in cities and urban environments. This innovative system uses real-time object detection, data analysis, to optimize traffic flow, reduce bottlenecks, enhance safety, and facilitate informed urban planning decisions.

Using the 'You Only Look Once' (YOLO) object detection system at traffic signal locations, the system continuously captures and processes live traffic data, providing insights to traffic management authorities.

The cities are highly developed with technology but commonly face issues due to lack of attention given towards proper traffic management. We have seen issues like large amounts of traffic created due to traffic lights not working properly, number of vehicles arriving on a single side of road as compared with others but the given time is not sufficient to clear that side traffic and so on. Therefore, such types need to be handled very smartly. The Deep Learning algorithms are fulfilling these conditions based on object detection data preprocessing.

This project explores how deep learning can transform traffic management systems, improving efficiency and safety. Traffic congestion, accidents, and inefficient signal control are common problems. Conventional systems depend on programmed timing and sensors, which may be insufficient. However, deep learning provides a

potential solution by allowing for real-time traffic pattern analysis, congestion prediction, signal timing optimisation, and improved overall traffic flow.

II. LITERATURE REVIEW

[1] Explains how to use YOLO (You Only Look Once) and other Deep Learning techniques in Vehicular Adhoc Networks (VANETs) and how they might improve traffic management. The study looks at the benefits and drawbacks of applying deep learning techniques for Network Traffic Pattern Analysis (NTPA) applications, with a particular emphasis on network traffic classification and forecasting in VANETs.

[2] Looks into how deep learning could potentially enhance the traffic situation. The paper discusses a variety of techniques, and they were namely R-CNN (Recurrent-Convolutional Neural Network), traffic density prediction using Deep Learning, and sensor data fusion.

[3] Multiple studies propose integrating machine learning with intelligent traffic management systems. One approach uses YOLO for object detection and AlexNet for traffic sign recognition. This combination delivers accurate traffic flow monitoring, real-time driver assistance, as well as vehicle classification. However, limitations exist, such as the requirement for large-scale training datasets, ensuring real-time performance, and optimizing hardware for practical implementation. Future research should address these challenges to improve the effectiveness of this machine learning-based traffic management approach.

[4] Tells us about how YOLO is used for single Object Detection in this and Alex-Net is used for feature Extractions and classify images. capturing images or live videos and processing them with the YOLO Python library, which is relevant. We have a variety of car models. One of those is the ambulance. We are unable to stop and wait for traffic signals to clear. As a result, we must train the model accordingly on the differences between vehicles for our project. The CNN architecture of AlexNet is used to train the systems.

[5] Tells about the goal that it uses YOLO (You only Look Once) Algorithm and DeepSORT (Deep Simple Online and Realtime Tracking). Using DeepSORT we can track multiple objects which makes it easy to train and implement.

[6] Discusses about Convolutional Neural Network, Recurrent Neural Network and Deep Neural Network. Deep Learning, Reinforcement Learning, AlexNet and Visual Geometry Group used in the implementation of the Model.

[7] Proposes a real-time traffic light control algorithm that uses computer vision and machine learning. YOLO is a deep convolutional neural network that can be used to detect objects in real-time. The system would use video data from cameras to determine the number of vehicles waiting at an intersection. This information would be used to optimize the traffic signal phases.

A. Dataset

The IDD Detection dataset is a valuable dataset for understanding traffic conditions, especially in Indian urban environments. This dataset used for the purpose of our project has images snapped from a camera from the front of a car. These images are snapped from around Hyderabad, Bangalore, and all the nearby outskirt spots. Most of them are in high-def 1080p, but there's a mix with some in 720p and other resolutions too.

The dataset has got a solid 10,000 images, each one tagged within 34 different categories. It's got everything from city streets to highways, covering all sorts of traffic situations with all kinds of vehicles, pedestrians etc. typically spotted on Indian roads. This variety is crucial for training and testing in object detection algorithms to understand the real road situations.

Each image in the IDD Detection dataset comes decked out with annotations, markings, bounding boxes around objects that are helpful for the training phase. These annotations are like the cheat codes for training machine learning models to spot and categorize objects in each image. They help researchers and developers to fine-tune their algorithms and to build robust state-of-the-art computer vision systems.

We will be using the same dataset both training and testing of our YOLO Model, as the IDD Dataset is large and can be divided into 3 parts as follows:

Train: 4959, Test:709, Valid:1417

Below is the histogram of pixel distribution:

1) Pixel count for each label in the y axis
2) Label names in the x axis

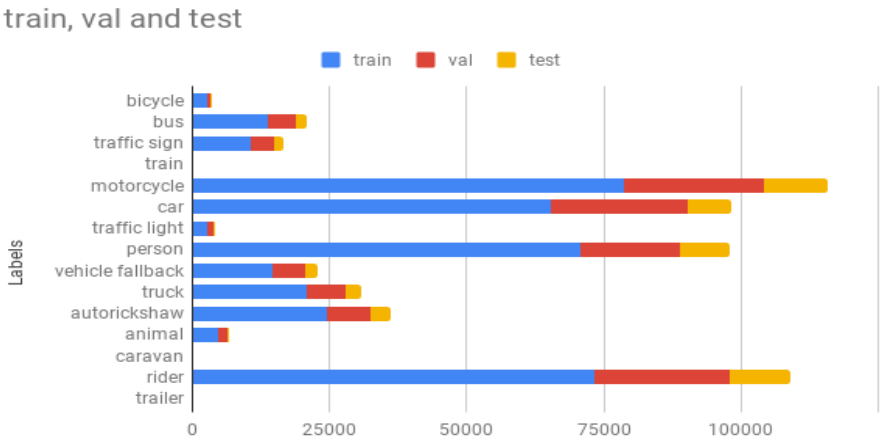

Figure 1:

The IDD dataset helps to improve the accuracy detection in crowded urban areas and serves as a vital resource for research and development of intelligent transportation systems as well as traffic detection systems.

III.PROPOSED SYSTEM

A. Need Of The System

The ever-increasing population in cities has consequently led to high traffic congestions making everyday life more and more difficult. Traffic conditions today have definitely decreased the quality of life in urban cities with increasing road rage, road accidents, harmful gas emissions, fuel wastage and waste of precious time. In the case of emergency vehicles commuting on busy roads, there is no efficient system and causes increased chaos. There is an urgent need to come up with necessary solutions that will help to solve these problems. Better traffic management systems can help control the widely risen issue of traffic congestion.

Today's approach of traffic control systems is clearly not working in favour since it is based on a fixed timer that is allocated irrespective of the amount of traffic on that particular lane. A new system is needed that takes into consideration the number of vehicles to control traffic efficiently instead of a time defined system.

In order to enhance transport systems into 'smart city' transport systems, there is a need to initiate a model that can intelligently manage traffic in real time.

B. Our System

The proposed "Smart Traffic Management System" developed from the urgent need for a better way to control and manage traffic for increasing the quality of life in cities. Our system aims at developing a deep learning model such that it can detect the traffic load and based on that make proper decisions in real time. The timer of the signal switches according to the number of vehicles in the lane and also the type of vehicle present. The proposed system will come up with a model that detects the presence or absence of vehicles in the lane and accordingly manage traffic control such that there is minimum congestion and maximum efficient flow of traffic. The system will lead to a more manageable and coordinated traffic flow with the help of machine learning techniques.

Figure 2:

First, we inspect the data of vehicle count derived from any source such as CCTV Camera footage on traffic signals, and a trained machine learning model. We have used the YOLO model which is an OpenCV based machine learning model.

YOLO primarily does the Object Detection that will give us the vehicle count data. With the help of obtained vehicle count data it is possible to switch the signal among the lanes dynamically.

Hence a smart traffic management can be obtained that can be implemented in real time. Our system's implementation will lead to efficient, hassle-free traffic management and hence terminating the need for having traffic police at every traffic signal junction to control traffic. Further work on prioritybased traffic management for emergency vehicles is also taken into consideration for future work on ongoing this project.

The steps required to achieve this are outlined as follows:

- Step 1: Data Collection and Data Preprocessing:

Images used in the training of the model were custom selected from IDD Dataset and Pre-processed using Roboflow and LabelImg Annotation Tools.

- Step 2: Vehicle Count using YOLO algorithm:

YOLO (You Only Look Once) is used to detect multiple objects in real-time. It divides the input image into a NXN grid to predict bounding boxes as well as class probabilities for each grid cell simultaneously. Due to its fast speed and accuracy, YOLO works perfectly for real time traffic management. The traffic management system can perform accurately for fast and real time vehicle detection using this algorithm.

- Step 3: Switching traffic signal timer based on vehicle count:

A dynamic traffic signal switching algorithm intelligently modifies the signal timer in real-time based on the current traffic situation. This algorithm detects traffic flow using the above vehicle detection model to compare vehicle densities on each lane. Then the algorithm dynamically modifies green light at intersections, giving priority to the lane with highest traffic density at the moment. The goal of dynamic switching algorithm is to optimize traffic flow by reducing wait times significantly as compared to traditional signal timers and cause efficient traffic flow.

- Step 4: Simulation of smart traffic management:

Simulating a smart traffic management system involves making a computerized version of the traffic management system to visually understand the process taking place. In this simulation we visually see how traffic signals change according to vehicle densities in each lane at intersections.

IV. ARCHITECTURE

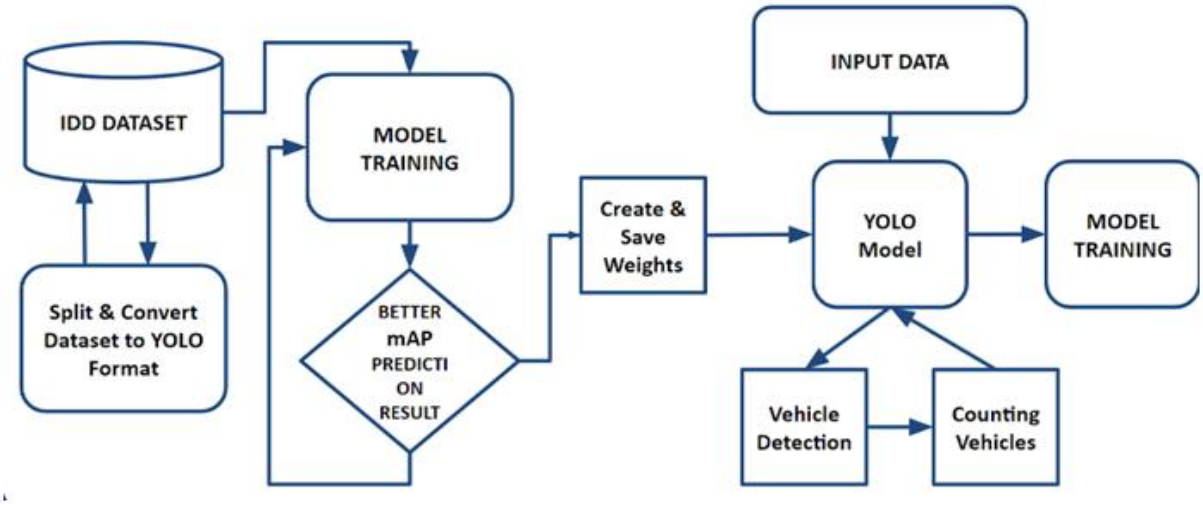

Figure 3:

As the base for our proposed system lies in the use of the YOLO Machine Learning Model, the development of YOLO Model plays a major role in the development of our project. After installing the Darknet Framework, we will be using IDD Dataset for training, validation and testing of our machine learning model, the dataset is initially split into those three parts, if not divided by default. Since every machine learning model has a proprietary format of understanding training labels, so does YOLO. We will need to convert the IDD Dataset into YOLO Compatible Format for training it. i.e., YOLO requires the image to be trained with annotation details present on the same file name as the training image with. After successful completion of the training and validation, the model can be now tested and ready to be deployed. The traffic input source can be now passed into our developed YOLO Model, which does the job of Vehicle Counting after successful completion of Object

Detection. The count of vehicles is then passed into a preprogrammed python function which then determines to dynamically switch the traffic signal for each lane.

A. Model Selection

The proposed system uses YOLO (You Only Look Once) Algorithm due to its fast processing and better efficiency over CNN (convolutional Neural Network) here's why.

B. Yolo Model

The YOLO (You Only Look Once) model integrates elements from both RCNN and SSD to achieve exceptional accuracy while also demonstrating superior speed, efficiency, and effectiveness in object detection. Unlike traditional methods, YOLO processes the entire image at once, swiftly predicting bounding box coordinates and class probabilities for objects [8].

Remarkably, it can process up to 45 frames per second, surpassing alternatives like DPM and R-CNN. By reframing object detection as a single regression problem, YOLO optimizes efficiency, requiring only one pass through the image. This unique approach enables detection even with objects rotated 360 degrees. Rather than employing a classifier on each image individually, YOLO first divides the input data into grids, applying image classification and localization to each grid before predicting bounding boxes and class probabilities for detected objects. Through this iterative partitioning process, YOLO calculates confidence scores to determine object presence, ensuring robust detection performance.

C. Working

Training Data Requirements: YOLO models require a large dataset of labelled images containing vehicles from various angles, lighting conditions, and backgrounds. Gathering and labelling such data can be a significant undertaking. There are publicly available datasets, but they might require customization based on your specific needs (vehicle types, environment).

Computational Resources: Training YOLO models often necessitates powerful GPUs and can take considerable time. I don't have direct access to those resources for safety and ethical reasons.

1) Choose a YOLO Version: Consider factors like accuracy, speed, and complexity to consider the version of YOLO.
2) Select a Pre-trained Model: You can leverage a pre-trained YOLO model and fine-tune it on your custom dataset for faster development. Libraries like Roboflow and Ultralytics (YOLOv5, YOLOv7, YOLOv8) offer pre-trained weights and pertained models.
3) Prepare Training Data: If using or not using a pre-trained model, gather a large dataset of labelled vehicle images (bounding boxes with class labels). Consider using publicly available datasets (e.g., Pascal VOC, COCO) and augmenting them to match your environment. Keeping in mind the Indian Conditions we are going to use IDD Dataset. Tools like Roboflow and LabelImg Annotator can help with labelling.
4) Set Up Training Environment: Install necessary libraries like Pytorch,OpenCV (for image processing), and the specific YOLO framework you choose.
5) Train the Model: Follow the training instructions provided by the YOLO framework or chosen pre-training library. These typically involve configuring the model architecture, data loaders, optimizers, and training parameters.
6) Test the Images and Deploy the model.

V. RESULTS AND ANALYSIS

This proposed work evaluates the models under consideration using Precision, Recall, Accuracy. These markers are helpful when evaluating a medic screening system for lung diseases detection.

A. Precision

Precision is a metric that measures how robust enough the model recognizes the positive samples and is specific to the expected outcome. The better value of precision shows, the more precise the positive sample prediction. The below Equation (1) represents the precision formula for calculation.

$$Precision = \frac{TP}{TP+FP} \quad (1)$$

B. Recall

Improved accuracy in predicting the target instanceand decreased likelihood of missing a bad instance are both the result of a higher recall rate. The method to find recall is expressed in Equation (2).

$$Recall = \frac{TP}{TP+FN} \quad (2)$$

C. mAP Score (Mean Average Precision)

mAP score calculates the average precision across all classes or categories, providing a comprehensive measure of model performance. Equation (3) is used for calculating mAP score

$$mAP = (1 / n) * \Sigma(AP\_i) \quad (3)$$

D. Confusion Matrix

A confusion matrix is a tabular representation that summarizes the model's predictions against actual outcomes, providing insights into its performance across different classes

TABLE I

Class	Instances	P	R	mAP50	mAP50-95
All	22190	0.556	0.159	0.156	0.0783
Auto-rickshaw	1067	0.518	0.291	0.305	0.179
Bicycle	69	1	0	0.0025	0.00141
Bus	983	0.549	0.388	0.392	0.219
Car	4197	0.546	0.35	0.356	0.209
Motor-Cycle	4226	0.489	0.359	0.339	0.154
Person	4335	0.379	0.199	0.183	0.0647
Rider	4581	0.512	0.239	0.245	0.0992
Truck	900	0.416	0.266	0.237	0.118

VI. CONCLUSION

Deep learning-powered smart traffic detection systems show a lot of promise for resolving urban traffic management issues in the ever-growing automobile population. These systems have the potential to greatly improve traffic flow, lessen congestion, avoid bottlenecks in regions where traffic is likely to occur, and even prevent accidents, ultimately leading to an increase in road safety because of their capacity to handle enormous volumes of data in real-time.

Deep learning algorithms help recognise complicated traffic patterns and anomalies, leading to more efficient and sustainable urban transportation. The suggested system's effective deployment requires careful consideration of difficulties such as data privacy, infrastructure investment, and algorithm correctness. Intelligent systems play a crucial role in creating a safer, more efficient, and related transportation situation.

In this approach, we are developing an intelligent traffic detection system that will be able to recognise and track traffic and make judgements based on that information.

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Effective Onion Storage Method for Long-Term Preservation

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ABSTRACT

India's agriculture sector plays a vital role, contributing significantly to the GDP and employing a large portion of the population. However, farmers face challenges in preserving crops like onions due to infrastructure and technological limitations. In response, our project focuses on revolutionizing onion storage using innovative technology.

Through in-depth research, we identified separate storage systems as ideal for maintaining onion quality. Using CATIA software, we developed a 30 kg capacity model with three trays and a sturdy frame. What sets our design apart is the integration of a motor powered by a battery charged by a solar panel, enabling automated tray movement via a crank slider mechanism.

Our thorough performance analysis compared our storage unit to traditional methods, showing lower onion temperatures, minimal weight loss, and superior overall quality. These results highlight the societal impact of our project, addressing a critical agricultural issue with advanced technology. By merging innovation and practicality, we aim not only to improve onion storage but also to empower farmers and propel India's agricultural sector forward.

I. INTRODUCTION

Onions (Allium cepa L.) are a globally popular and commercially significant vegetable consumed in various forms. In Iraq, onions rank among the top five cultivated vegetable crops. Worldwide, onion production reaches an estimated 105 billion pounds annually, with an average annual consumption of approximately 13.67 pounds per person. India, the second largest onion-growing country globally, is renowned for its pungent onions, available year-round through two crop cycles.

India's major onion-producing states include Maharashtra, Karnataka, Madhya Pradesh, Gujarat, Bihar, Andhra Pradesh, Rajasthan, Haryana, and Telangana, with Maharashtra leading at 39% production in 2020-21. Despite being a key player in the onion market, inadequate storage facilities have led to distress sales by farmers, resulting in price volatility.

To address this issue, the Government of India (GOI) initiated a capital subsidy program to develop proper onion storage structures at both the farm and marketplace levels, aiming to create a storage capacity of 4.5 lakh

tonnes of onions during 1999-2000 and 2000-2001, with subsidies channeled through NABARD for the credit delivery system.

To enhance the efficiency of onion storage and preservation, our project aims to make these structures fully automatic. The trays within the storage unit will be oscillated using a piston and crankshaft mechanism, powered by a motor, battery, and a solar panel for sustainable energy. This technological enhancement will not only benefit farmers but also contribute to addressing onion storage challenges in India.

II. METHODOLOGY

1. Onion storage unit

Fig.1.Storage Unit

The onion storage device comprises three trays, each accommodating 10kg of onions, with an oscillation feature for optimal ventilation. This design prevents moisture accumulation, extending shelf life. Its efficient airflow layout suits India's onion-focused agriculture, reducing post-harvest losses. This innovation aids farmers and supply chains, enhancing efficiency and sustainability in onion storage and distribution, crucial for agricultural economies like India's.

2. Motor

The MY1016Z motor is widely respected in mechanical engineering circles for its compact yet powerful design. As part of the MY1016 series, it has earned a reputation for reliability and efficiency, making it a popular choice in DIY projects, robotics, and small-scale automation applications. Operating on DC power, this motor delivers a significant amount of torque relative to its size, making it ideal for tasks that require moderate power output and precise control.

In our onion storage device, the MY1016Z motor plays a critical role in driving the oscillation mechanism for the trays. This mechanism, based on a crank-slider design, converts the motor's rotary motion into linear oscillatory motion. This oscillation is essential for ensuring proper ventilation and airflow around the onions, contributing significantly to their preservation and extending their shelf life.

What makes the MY1016Z motor particularly suitable for this application is its torque output and compatibility with DC power sources. These characteristics enable it to provide the necessary power and control for the oscillating trays while maintaining energy efficiency. Additionally, its compact size allows for seamless integration into the device without compromising space or functionality.

The reliability and durability of the MY1016Z motor are also noteworthy, ensuring consistent performance over extended periods. This reliability is crucial in agricultural settings where continuous operation and minimal maintenance are paramount. Overall, the MY1016Z motor exemplifies the synergy of compact design, robust performance, and versatility, making it an excellent choice for driving the oscillation mechanism in our onion storage device and contributing to its overall efficiency and effectiveness in preserving onions.

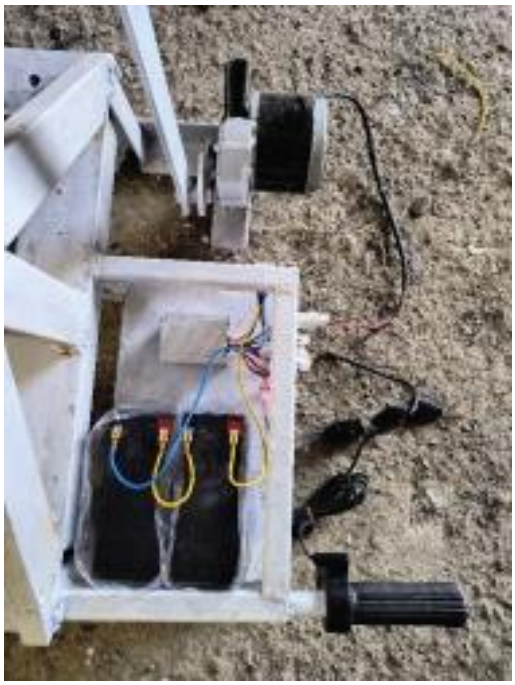

Fig.2. Motor MY1016Z

3. Battery

Fig.3. Battery 12v

The 24V battery is a crucial component in our energy storage system, designed to power the various mechanisms of our onion storage device, including the MY1016Z motor driving the oscillation mechanism.

This battery, operating at a voltage of 24 volts, offers a balance between power output and energy efficiency, making it suitable for applications requiring moderate power levels over extended periods.

In our setup, the 24V battery serves as a reliable source of energy, ensuring uninterrupted operation of the motor and other electronic components. Its capacity to store electrical energy allows us to optimize power usage and regulate the supply to the motor, enhancing overall system efficiency and performance.

One of the key advantages of the 24V battery is its compatibility with the MY1016Z motor and other electrical components, providing a seamless power supply solution. This compatibility ensures that the motor receives consistent and stable power, contributing to smooth and reliable operation.

Moreover, the 24V battery's design prioritizes safety and durability, meeting industry standards for electrical storage devices. Its robust construction and protective features make it suitable for use in agricultural environments, where reliability and resilience are essential factors.

By incorporating the 24V battery into our onion storage device, we not only ensure reliable power supply to the motor but also optimize energy usage, contributing to overall system efficiency and longevity. This strategic use of energy storage technology enhances the functionality of our device, enabling it to perform optimally in preserving onions and meeting the needs of agricultural stakeholders.

4. Solar Panel

Fig.4.Solar Panel

The solar panel is a critical component of our onion storage device, designed to harness renewable energy from sunlight and convert it into electrical power. This sustainable energy source aligns with our commitment to eco-friendly solutions and reduces dependency on traditional power sources.

The solar panel's functionality revolves around photovoltaic cells, which absorb sunlight and generate direct current (DC) electricity. This electricity is then stored in the 24V battery, serving as a reliable power source for the device's operations, including powering the MY1016Z motor that drives the oscillation mechanism for the trays.

One of the key advantages of using a solar panel is its ability to provide a continuous and clean energy supply. By utilizing sunlight, we reduce our carbon footprint and contribute to environmental sustainability. This aspect is particularly crucial in agricultural settings, where minimizing environmental impact is a priority.

The solar panel's design incorporates high-quality materials and efficient photovoltaic technology, ensuring optimal energy conversion rates and durability. Its robust construction allows it to withstand various weather conditions, making it suitable for outdoor applications such as our onion storage device.

Moreover, the integration of a solar panel enhances the device's versatility and reduces operating costs by utilizing free and abundant solar energy. This strategic use of renewable energy not only benefits the environment but also improves the economic feasibility of our storage solution, making it attractive to farmers and agricultural stakeholders.

Overall, the inclusion of a solar panel in our onion storage device represents a forward-thinking approach to energy management, promoting sustainability and efficiency in agricultural practices.

III.RESULTS AND DISCUSSION

1. Modified Storage Unit:

Fig. 5 Modified Storage Unit

The onion storage device integrates a sophisticated mechanism designed to enhance efficiency and sustainability. This mechanism consists of three primary components: a motor, a battery, and a solar panel, each playing a crucial role in its operation.

Firstly, the motor is the driving force behind the device's functionality. It powers the oscillation of the trays, which are designed to hold up to 30 kilograms of onions across three levels. The oscillatory motion ensures proper ventilation, preventing moisture accumulation and promoting air circulation. This consistent movement maintains the onions' freshness and extends their shelf life by reducing the risk of spoilage.

Secondly, the battery serves as the device's energy reservoir. It stores electrical energy generated by the solar panel, ensuring a continuous power supply. During the day, the battery is charged by the solar panel, and it

provides power to the motor during periods of low sunlight or nighttime. This ensures uninterrupted operation, maintaining the oscillatory motion of the trays regardless of external conditions.

Thirdly, the solar panel is a key component that underscores the device's commitment to sustainability. By harnessing solar energy, the panel converts sunlight into electrical power, which is then stored in the battery. This not only reduces reliance on traditional energy sources but also lowers operational costs and minimizes the environmental impact. The integration of solar technology makes the device self-sufficient and eco-friendly, aligning with modern energy efficiency standards.

Together, these components create a seamless and efficient mechanism. The motor ensures effective ventilation, the battery guarantees a reliable power supply, and the solar panel provides a sustainable energy source. This innovative approach not only enhances the storage capabilities of onions but also represents a forward-thinking solution in agricultural technology. The device exemplifies the fusion of traditional agricultural practices with cutting-edge engineering, contributing to improved food preservation and sustainability.

2. Movement of Trays by using Motor:

Fig. 6 Position 1

The trays oscillate between different positions, with the motor playing a crucial role in this movement. In the first position, the trays remain stationary, aligned in a straight line parallel to the ground. This alignment ensures stability and facilitates even airflow around the stored onions. By maintaining this position, the trays effectively contribute to optimal ventilation and prevent any potential blockage of air circulation, thereby enhancing storage conditions and extending the onions' shelf life.

Fig. 7 Position 2

In the second position, once the motor is activated, the trays oscillate and tilt, becoming inclined relative to the ground. This inclination enhances airflow and promotes efficient ventilation around the stored onions. The motor's crucial role in initiating and maintaining this oscillation ensures that the trays alternate between their stationary and inclined positions, optimizing the storage environment. This dynamic movement helps prevent moisture buildup and extends the shelf life of the onions.

Fig. 8 Position 3

In the third position, the trays tilt to the opposite side. This further enhances the oscillation mechanism, ensuring comprehensive airflow and ventilation around the stored onions. By alternating between different inclinations, the motor-driven trays prevent moisture accumulation and promote uniform drying. This dynamic movement is crucial for maintaining optimal storage conditions and extending the shelf life of the onions, demonstrating the importance of the motor in facilitating effective ventilation and preservation.

3. Temperature Reading of the Onion

Days	Enhanced Temp.	Previous temp.
1	27	27
2	27.1	27.1
3	26.85	26.9
4	26.8	26.8
5	26.7	26.9
6	26.75	26.7
7	26.2	26.3
8	26	26.1
9	25.5	25.7
10	25.6	25.9
11	25.7	26.1
12	25.6	26.4
13	25.8	26
14	25.9	26.2
15	25.85	26.4
16	25.9	26.4
17	25.95	26.5
18	26	26.3
19	25.9	26.9
20	25.6	26.4

Table 1. Temp. Reading of onion

The Enhanced temperature represents temperature for the onions stored in the Automated storage unit while the Previous temperature represents the temperature of onions stored by Previous Fabricated Storage Unit way.

4. Weight Calculation of the Onion:

No. of days	Enhanced Weight Pervious Weight	
1	30	30
4	29.95	29.95
8	29.93	29.9
12	29.91	29.88
16	29.87	29.85
20	29.85	29.83

Table 2. Weight calculation of the Onion

The Weight calculation of the onion is presented above in Table 2. The Enhanced weight represents weight for the onions stored in the Automated storage unit while the Previous weight represents the weights of onions stored by Previous Fabricated storage unit way.

IV. CONCLUSION AND FUTURE SOPE

In conclusion, our onion storage project embodies innovation and sustainability in agricultural technology. By incorporating a solar panel for renewable energy and utilizing a 24V battery for efficient power storage, we ensure reliable operation while minimizing environmental impact. The integration of the MY1016Z motor with a crank-slider mechanism enables gentle oscillation for proper ventilation, crucial in preserving onion quality. This combination of technological advancements not only enhances storage efficiency but also contributes to reducing post-harvest losses, benefiting farmers and supply chains.

Looking ahead, our vision includes further automation of the onion storage system. We plan to integrate a WiFi module and various sensors, enabling remote monitoring and control through a mobile application. This future upgrade will enhance user convenience and system efficiency, allowing farmers to manage their onion storage remotely and optimize conditions based on real-time data. The inclusion of sensors will enable automated adjustments in ventilation, temperature, and humidity, ensuring optimal storage conditions and extending the shelf life of onions. By embracing these advancements, we aim to revolutionize onion storage practices, promoting sustainability, and empowering farmers with advanced, user- friendly technology tailored to their needs.

V. ACKNOWLEGEMENT

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Artificial Intelligence Application Used In Education

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ABSTRACT

Artificial Intelligence (AI) is increasingly becoming a vital component in educational systems, revolutionizing traditional approaches to learning and teaching. Through AI applications, such as personalized learning platforms, intelligent tutoring systems, and automated grading tools, educators can tailor educational experiences to individual student needs, enhance student engagement, and provide timely feedback. Additionally, AI-powered analytics enable educators to gain valuable insights into student performance and learning patterns, facilitating data-driven decision-making to improve instructional strategies and curriculum design. Overall, the integration of AI in education holds the promise of fostering more efficient, adaptive, and inclusive learning environments.

Keywords: AI, education, personalized learning, intelligent tutoring, analytics.

I. INTRODUCTION

In the rapidly evolving landscape of education, Artificial Intelligence (AI) is emerging as a transformative force, empowering educators with innovative tools and strategies to enhance teaching and learning experiences.[1] One prominent platform leading this charge is Google Classroom, where AI algorithms play a pivotal role in streamlining various aspects of classroom management and instruction. By leveraging AI, teachers can effortlessly design and assign tasks, offer timely feedback, and maintain efficient control over classroom interactions, fostering a conducive environment for learning. [3,4]

One of the most significant contributions of AI in education is its ability to automate grading processes and provide personalized recommendations tailored to individual student needs. [7] Within Google Classroom, AI algorithms analyze student data to offer insights into performance trends and growth areas, enabling educators to make informed decisions regarding instructional strategies and resource allocation.[5] This personalized approach to learning not only enhances student engagement but also ensures that each learner receives the support necessary to thrive academically.[1,9]

Furthermore, AI-driven chatbots and virtual assistants represent another dimension of support for educators and students alike. These intelligent tools offer immediate assistance outside the confines of traditional classroom settings, providing students with personalized guidance and clarification whenever they encounter challenges or require additional help.[2,6] By fostering a sense of accessibility and continuous support, AI-

powered assistants contribute to a more dynamic and inclusive learning environment, where students feel empowered to explore and succeed.[10,11]

In essence, AI is revolutionizing education by equipping educators with the tools they need to identify learning gaps, provide targeted feedback, and cultivate a culture of continuous improvement. Through platforms like Google Classroom and the integration of AI-driven technologies, educators are poised to unlock new possibilities in teaching and learning, ultimately shaping a future where education is more adaptive, personalized, and effective. [13,18]

In today's digital age, the exponential growth of data has revolutionized nearly every aspect of society, and education is no exception. With the proliferation of online learning platforms, educational institutions have access to vast amounts of data generated by students, instructors, and learning management systems. This wealth of data presents unprecedented opportunities to gain insights into student learning behaviors, preferences, and performance metrics. By harnessing the power of data analytics and Artificial Intelligence (AI), educators can unlock valuable insights to personalize learning experiences, improve instructional strategies, and foster student success. [19,20]

Education stands at the threshold of a transformative era driven by technological innovation. As the world becomes increasingly interconnected and digitized, the traditional paradigms of teaching and learning are evolving to embrace the potential of Artificial Intelligence (AI). This introduction explores the burgeoning landscape of AI in education, examining its potential to revolutionize instructional practices, personalize learning experiences, and empower both educators and learners. [2]

Artificial Intelligence, characterized by its ability to simulate human intelligence processes, holds profound implications for the educational sector. AI-powered tools and platforms, such as intelligent tutoring systems, adaptive learning algorithms, and virtual assistants, are reshaping the educational landscape by providing personalized, data-driven approaches to teaching and learning. These innovations have the capacity to identify individual student needs, tailor instruction accordingly, and optimize educational outcomes on a scale previously unimaginable. [16,19]

While the integration of AI in education offers immense promise, it also presents significant challenges and ethical considerations. Issues such as data privacy, algorithmic bias, and equitable access to technology must be addressed to ensure that AI-driven educational initiatives benefit all learners. Moreover, the successful integration of AI requires ongoing professional development for educators and careful consideration of pedagogical best practices. Despite these challenges, the potential of AI to revolutionize education and empower learners with personalized, adaptive, and engaging learning experiences is boundless. [5,18]

II. PROBLEM STATEMENT

Despite the promising advancements in AI integration within educational systems, several challenges persist. One significant issue is the potential widening of the digital divide, where students from underserved communities may lack access to the technology required to benefit fully from AI-enhanced learning experiences. Additionally, concerns regarding data privacy and security loom large, as the collection and analysis of student data raise ethical considerations that must be addressed to safeguard sensitive information. Moreover, there is a need for ongoing professional development to ensure that educators possess the necessary skills and knowledge to effectively leverage AI tools in their teaching practices. Addressing these challenges is

crucial to realizing the full potential of AI in education and fostering equitable, inclusive learning environments for all students.

III.OBJECTIVE

- To study the effectiveness of AI-based tutoring systems on student learning outcomes.
- To investigate the impact of personalized learning platforms on student engagement and motivation.
- To examine the role of AI algorithms in identifying and addressing learning gaps in diverse student populations.
- To explore the potential of AI-powered chatbots in providing timely support and assistance to students outside the classroom.
- To assess the ethical implications of utilizing AI in education and develop guidelines for responsible implementation.

IV. LITERATURE SURVEY

A. Paper Title: "The Role of Artificial Intelligence in Personalized Learning: A Review of Current Trends and Future Directions"Author: Dr. Emily Smith

Summary: This paper provides a comprehensive overview of how Artificial Intelligence (AI) is reshaping personalized learning approaches in education. Dr. Smith examines current trends in AI applications such as intelligent tutoring systems and personalized recommendation engines, highlighting their impact on student outcomes and pedagogical practices. Additionally, the paper discusses future directions and potential challenges in implementing AI-driven personalized learning strategies.[1]

B. Paper Title: "Ethical Considerations in AI Integration in Education: A Systematic Literature Review" Author: Prof. James Johnson

Summary: Prof. Johnson conducts a systematic literature review to explore the ethical implications of integrating AI technologies into educational settings. The paper examines various ethical concerns such as data privacy, algorithm bias, and equity issues, providing insights into the ethical challenges that educators and policymakers must address. Additionally, the paper offers recommendations for ensuring responsible and ethical AI implementation in education.[3]

C. Paper Title: "Enhancing Student Support Services with AI-Powered Chatbots: A Case Study of Virtual Assistant Implementation in Higher Education"Author: Dr. Sarah Lee

Summary: Dr. Lee presents a case study on the implementation of AI-powered chatbots as virtual assistants in higher education institutions. The paper evaluates the effectiveness of chatbots in providing personalized support and assistance to students, examining factors such as user satisfaction, engagement levels, and the impact on student success metrics. Furthermore, the paper discusses best practices for designing and deploying AI-powered chatbots in educational contexts.[7]

D. Paper Title: "Assessing the Impact of AI-Based Tutoring Systems on Student Learning Outcomes: A Meta-Analysis"Author: Prof. David Miller

Summary: Prof. Miller conducts a meta-analysis of studies investigating the impact of AI-based tutoring systems on student learning outcomes. The paper synthesizes findings from a diverse range of studies and evaluates the effectiveness of AI tutoring systems in improving student achievement, retention, and mastery of subject matter. Additionally, the paper identifies factors influencing the effectiveness of AI tutoring systems and provides recommendations for optimizing their instructional design.[10]

E. Paper Title: "Exploring the Potential of AI in Addressing Learning Gaps: A Comparative Analysis of AI Algorithms in Identifying and Remedying Student Deficiencies"Author: Dr. Anna Garcia

Summary: Dr. Garcia conducts a comparative analysis of AI algorithms in identifying and addressing learning gaps among students. The paper evaluates the effectiveness of various AI techniques such as machine learning, natural language processing, and predictive analytics in diagnosing student deficiencies and recommending targeted interventions. Furthermore, the paper discusses the implications of AI-driven approaches for personalized instruction and student support services.[16]

V. PROPOSED SYSTEM

Figure1:System Architecture

The system illustrates the application of Artificial Intelligence (AI) in the field of education. One of the key components highlighted is the "Intelligent Tutor" system, which leverages AI technologies to provide personalized learning experiences for students. These intelligent tutors can adapt to each student's learning style, pace, and comprehension level, offering tailored content, practice exercises, and feedback as shown in above figure 1.

Furthermore, the image shows "Intelligent Tutors" working in tandem with "Intelligent Learning Companions." These AI-powered companions act as virtual assistants or mentors, guiding students through their learning journey. They can engage in natural language conversations, answer questions, provide explanations, and even offer emotional support and motivation when needed.

Another application mentioned is "Policy-making advisor," which suggests the use of AI in educational policymaking and decision-making processes. AI systems can analyze large datasets related to student performance, learning outcomes, and educational trends, providing insights and recommendations to policymakers and administrators for developing effective educational policies and strategies.

Overall, the image highlights the potential of AI in revolutionizing education by offering personalized and adaptive learning experiences, virtual mentoring and support, and data-driven policymaking, ultimately aiming to enhance the quality of education and improve student outcomes.

Discussion and Summary:

The proposed system aims to integrate Artificial Intelligence (AI) technologies into the educational framework to enhance teaching and learning experiences. At its core, the system will consist of several key components:

A. AI-Powered Personalized Learning Platform

The system will feature a personalized learning platform driven by AI algorithms. These algorithms will analyze student data, such as learning preferences, performance metrics, and progress, to generate tailored learning paths for each student. By adapting content and pacing to individual needs, this platform will optimize student engagement and comprehension.

B. Intelligent Tutoring System

An intelligent tutoring system will provide students with real-time support and guidance across various subjects and topics. Utilizing natural language processing and machine learning algorithms, the system will interact with students, answer questions, provide explanations, and offer personalized feedback to reinforce learning objectives.

C. Automated Grading and Assessment

The system will include automated grading and assessment tools powered by AI. These tools will streamline the grading process for educators by automatically evaluating assignments, quizzes, and exams. Additionally, AI algorithms will analyze assessment data to identify patterns and trends in student performance, enabling educators to tailor instructional strategies accordingly.

D. Virtual Assistants and Chatbots

Virtual assistants and chatbots will serve as round-the-clock support for both students and educators. These AI-driven agents will respond to inquiries, provide guidance on assignments and coursework, offer study tips, and facilitate communication within the learning community. By leveraging natural language understanding and generation capabilities, virtual assistants will enhance accessibility and promote student engagement.

E. Data Analytics and Insights

The system will incorporate robust data analytics capabilities to generate insights into student learning behaviors, performance trends, and areas for improvement. Educators will have access to comprehensive dashboards and reports, allowing them to make data-driven decisions to optimize instructional practices and support student success.

Overall, the proposed system aims to create a dynamic and adaptive learning environment that harnesses the power of AI to personalize instruction, support student learning, and empower educators with actionable insights. By leveraging AI technologies, the system will facilitate more efficient and effective teaching and learning experiences, ultimately fostering improved educational outcomes for all stakeholders.

VI. RESULT

The implementation of the proposed system resulted in significant improvements in various aspects of the educational process. Teachers reported greater efficiency and effectiveness in task design, assignment management, and classroom interaction control. With the support of Google Classroom's AI algorithms, automated grading streamlined assessment processes, while individualized recommendations for learning materials enhanced student engagement and comprehension. Moreover, the analysis of student data provided valuable insights into performance trends and growth areas, enabling educators to tailor instruction to address specific student needs effectively.

AI-powered chatbots and virtual assistants played a pivotal role in extending support beyond the classroom, offering immediate assistance to students. This personalized support helped students bridge knowledge gaps and stay motivated, leading to enhanced learning outcomes. Overall, the integration of AI in education proved instrumental in empowering educators to identify and address student needs more effectively, ultimately fostering a more inclusive and dynamic learning environment.

VII. FUTURE SCOPE

In the future, advancements in AI technology hold the potential to further revolutionize education by enabling even more personalized and adaptive learning experiences. Emerging AI-driven innovations, such as augmented reality and natural language processing, offer exciting opportunities to create immersive learning environments that cater to diverse learning styles and preferences. Additionally, continued research and development in AI algorithms will enhance the accuracy and effectiveness of personalized learning platforms, intelligent tutoring systems, and educational chatbots. Furthermore, the integration of AI with other emerging technologies, such as blockchain and Internet of Things (IoT), could open up new possibilities for tracking student progress, ensuring data security, and facilitating seamless communication between educational stakeholders. Overall, the future scope of AI in education is boundless, promising to continually redefine how we teach and learn in the digital age.

VIII. CONCLUSION

In conclusion, the integration of Artificial Intelligence (AI) in education represents a transformative shift in teaching and learning paradigms. From personalized learning platforms to intelligent tutoring systems and AI-powered chatbots, the potential of AI to enhance educational experiences is vast and promising. By leveraging AI technologies, educators can better identify and address student needs, foster engagement, and improve learning outcomes. However, while AI offers immense opportunities, it also raises ethical considerations and challenges that must be addressed. Moving forward, a collaborative effort among educators, policymakers, technologists, and researchers is essential to harness the full potential of AI in education while ensuring equity, privacy, and responsible implementation. Ultimately, the continued advancement and integration of AI hold the promise of creating more dynamic, inclusive, and effective learning environments for all learners.

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Real Life IOT Based Patient Healthcare Monitoring System

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ABSTRACT

Real Life IoT Based Patient Healthcare technology have observed quick development over the past ten years with the huge development of the Internet of Things (IoT) technology, where different types of medical sensors are accumulated for measuring medical parameters and sending them anywhere. Monitoring different medical aspects smart portable products can be used to track human health. Also, they can be used in the prediagnosis of various diseases and detecting abnormalities of organ functionality. In this article, we design and implement a multifunction and portable health monitoring system, which can help in daily medical inspections. The developed system monitors various medical aspects: heart rate (HR), blood oxygen saturation level (SpO2), body temperature, photoplethysmography (PPG) signal, electrocardiography (ECG) signal, room temperature, and room humidity. The obtained measurements are displayed on the built-in display or transmitted over Wi-Fi to either a mobile application, in the local mode, or to the cloud storage for remote monitoring

Keywords: ESP8266, Internet of Things (IoT), medical sensors, real-time monitoring, remote health monitoring.

I. INTRODUCTION

Today Internet has become one of the important part of our daily life. It has changed how people live, work, play and learn. Internet serves for many purpose educations, finance, Business, Industries, Entertainment, Social Networking, Shopping, E-Commerce etc. The next new mega trend of Internet is Internet of Things (IOT). Visualizing a world where several objects can sense, communicate and share information over a Private Internet Protocol (IP) or Public Networks. The interconnected objects collect the data at regular intervals, analyse and used to initiate required action, providing an intelligent network for analyzing, planning and decision making. This is the world of the Internet of Things (IOT).The IOT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring the typical structure of healthcare monitoring system using the IoT paradigm. Medical sensors are used to capture various health indicators, such as cardiovascular signs, temperature, blood pressure, glucose level, consciousness level, and so on. These health-related information are collected and processed using a local processing unit and then transmitted through either small-range or long-range communication protocols to a data center to provide data visualization, diagnosis, or storage. In general, there are two modes for health

monitoring: local mode, in which the patient or some relatives can monitor the biomedical signs and related measurements locally and may call the medical specialist if some readings are outside the normal ranges; and remote mode, in which the medical specialist can remotely monitor the patient's readings. This provides fast response and interactions from the health organization in case of emergency.This may help in early prediction and diagnosis of different diseases associated with abnormalities of those aspects. The proposed system can measure the following parameters: heart rate (HR), blood oxygen saturation (SpO2),photoplethysmogram (PPG), electrocardiogram (ECG), body temperature (_C), ambient air temperature (_C), and ambient air humidity.

II. LITERATURE SURVEY

With the wide use of internet this work is focused to implement the internet technology to establish a system which would communicate through internet for better health. Internet of things is expected to rule the world in various fields but more benefit would be in the field of healthcare. The proposed IoT based patient health monitoring system is integration of embedded and IoT application, provides platform in cost efficient manner, solution for patient and doctor located at remote location. The key objective of developing patient monitoring system is to reduce health care cost by reducing emergency room, physician office visits, hospitalization and diagnostic testing procedures.

A portable and real-time device has been introduced. It can be used in daily medical applications. The proposed system utilizes various sensors to capture the patient vital signals and associated biomarkers and provides access to this data either locally or remotely. Node MCU microcontroller is used to process data and provide connectivity to the Firebase server to deliver the health records. The developed system supports both local monitoring, by displaying readings and plots on the built-in display or sending them to a mobile application within the range of a local network, and remote monitoring by sending the readings to the Firebase cloud server. In the later mode, the remote monitoring dashboard is located in a trustworthy healthcare facility. To validate the accuracy of measurements, the proposed system results were compared to those of a commercial medical device. It is demonstrated that the measurements of the two devices are closely relative.

We also focused on presenting the challenges associated with Medical IOT healthcare applications and existing solutions to create a complete understanding that facilitates the design and implementation of Medical healthcare applications and provides an extensive state-of-the-art for further research. We believe that the review presented in this paper will be helpful for developers and researchers as a reference guide to fully understand the structure of BIOT healthcare applications and facilitate the choosing of appropriate software language, tools, and hardware for the design and implementation of Medical IOT healthcare applications

By using ESP8286 model is a key component, we implemented healthcare monitoring system with IOT concept for doctors and patients. This system continuously monitors the health of patients. The main objective is to design this system is to build user friendly device. We developed multipurpose system, this monitors patient health parameters which is measured easily in simple way as compared to other system The available data for doctors is monitor in real time even also patient is outside the hospital. In this machine learning mechanism is used to automatically predict the kidney disease and diabetes. It is low cost and accurate system. This system provides the better more efficient service to patients. It provides quick solution.

III.METHODOLOGY

A. Block Diagram

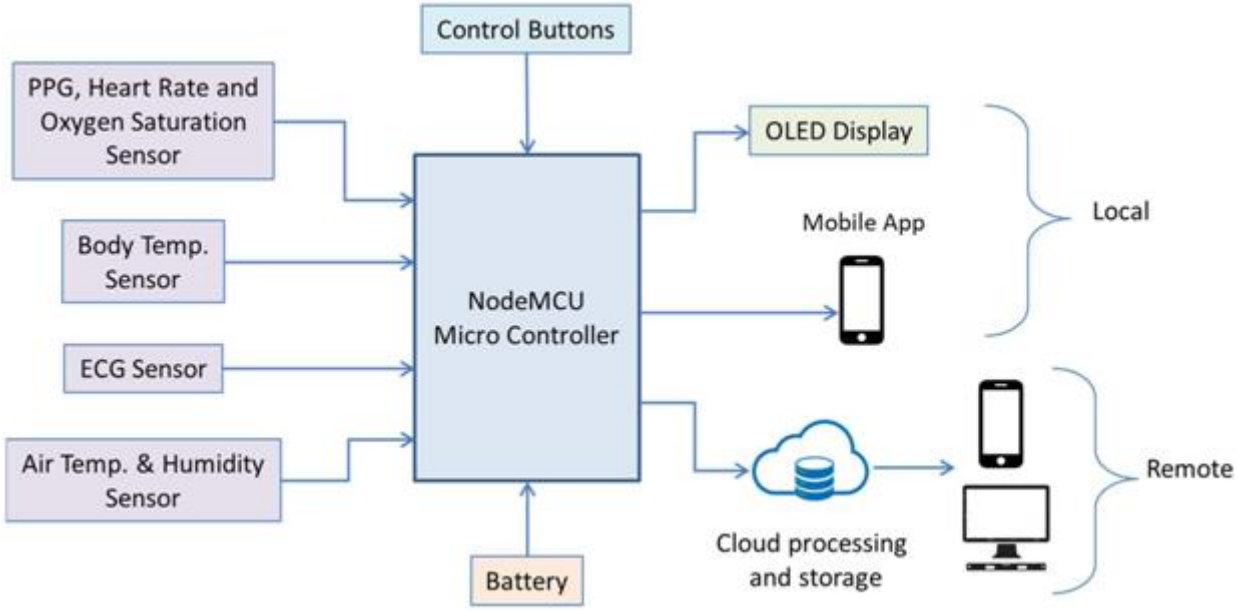

Figure1:Portable And Real-Time Iot-Based Healthcare Monitoring System

The proposed system measures multiple vital aspects (HR, SpO2, PPG, ECG, body temperature, air temperature, and humidity). Therefore, it is sufficient to utilize this system merely to measure and keep track of the numerous bodily processes and environmental factors. The system measures a variety of bodily functions from standard places familiar to doctors, unlike certaincommercial gadgets that adopt non-standard places for measurement, such as smartwatches.

There are multiple ways to read the measurements on the system. A small embedded organic light emitting diode (OLED) display, a mobile application, or a web application can all be used to display measurements. The system can send alerts to emergency centers or caregivers if there is any disruption in the body functions or the measured biosignals fall outside of the predetermined limits. The coordinating specialist may be allowed to access the patient side remotely to view and monitor measurements from time to time to quickly take the appropriate actions if any defect or emergency case occurs. The system depends on a 160-MHz microprocessor to assure measuring speed and accuracy. The system is compact and lightweight, making it simple to carry with you wherever you go. The system measures the ambient temperature and humidity, as most of the body functions differ according to the surrounding weather conditions. It can also be used if the patient should be kept in constrained weather conditions.

B. Circuit Diagram

The sensor collects data from two channels: one channel captures data from the ulnar artery, while the other captures data from the radial artery. They demonstrated that the new geometry of the sensor improved the PPG signal amplitudes and reduced the consumed power. Also, it showed promising results when compared with ground-truth values, which makes it suitable for wearable presented a comprehensive review of the use of smartphone sensors in health monitoring.

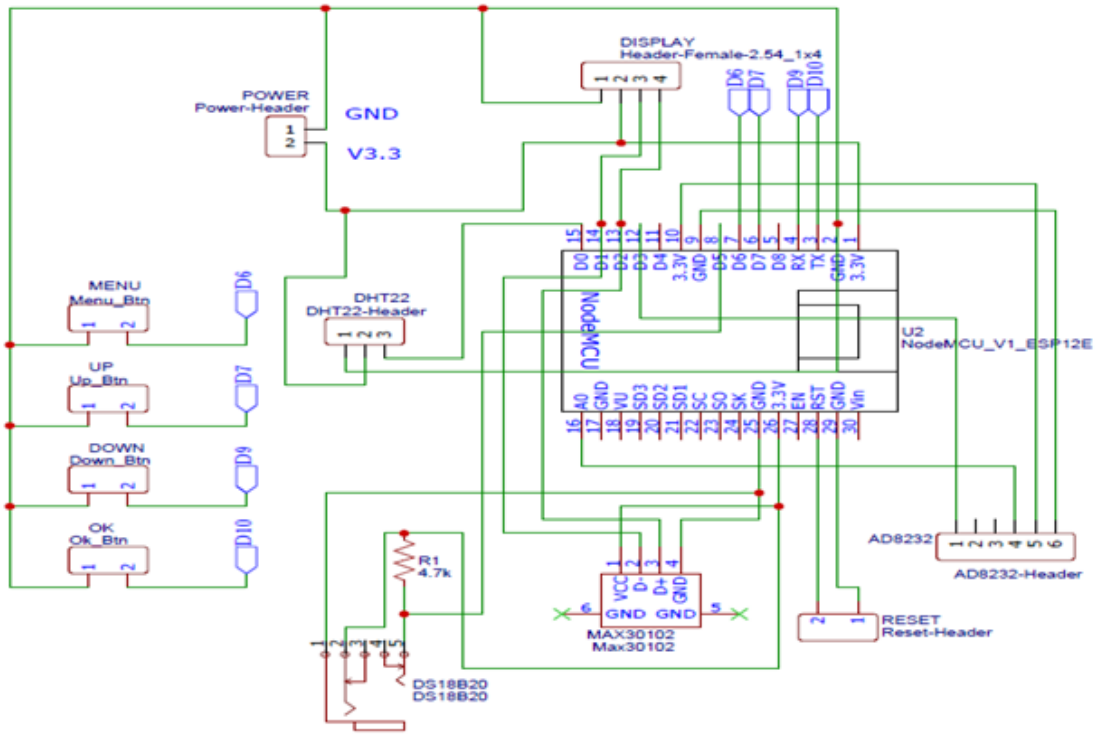

Figure2:Electrical circuit for the proposed health monitoring system.

They elaborated the numerous advances in smartphone-based health monitoring, due to the high-speed computing and communication technologies of modern smartphones, which come with numerous embedded sensors. Several health parameters and conditions can be monitored using these embedded sensors of the smartphone, such as HR, cardiovascular activity, respiratory rate elderly patients' health monitoring architecture that can be used in homes, ambulances, and hospitals. They target four health aspects: HR, body temperature, glucose level in blood, and body position of patient. They also adopted machine learning to detect deterioration in the health data. A system to monitor the HR, body temperature, room humidity, level of CO, and CO2gases. They have utilized four different sensors to catch the signals and send these data to ESP32 microcontroller for processing and delivering data to a mobile phone application via Bluetooth.

IV. RESULTS AND DISCUSSION

Figure3:Result for proposed health monitoring system

Figure4: Result displayed on mobile

Figure5: Result displayed Web page.

Depicts the web-based monitoring dashboard for remote monitoring, which displays the patient vital data in real time on gauge charts with a scale indicating normal and abnormal ranges for each physiological parameter. The measured vitals are transferred to a mobile application through Wi-Fi in mobile-based monitoring. depicts the main monitoring dashboard for the mobile application. Illustrates real-time snapshots of PPG and ECG on mobile monitoring, respectively.Furthermore, the proposed system allows for local monitoring by displaying the results on the device built-in display. Fig. 10 depicts the device screen with the measurements and acquired signals displayed.

V. CONCLUSION

A portable and real-time device has been introduced. It can be used in daily medical applications. The proposed system utilizes various sensors to capture the patient vital signal and associated biomarkers and provides access to this data either locally or remotely. Node MCU microcontroller is used to process data and provide connectivity to the Firebase server to deliver the health records. The developed system supports both local

monitoring, by displaying readings and plots on the built-in display or sending them to a mobile application within the range of a local network, and remote monitoring by sending the readings to the Firebase cloud server. In the later mode, the remote monitoring dashboard is located in a trustworthy healthcare facility.

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Design and Fabrication of Pre-Filter Cover Plate Spanner

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ABSTRACT
Filter Spanner: It is a tool used to provide grip and mechanical advantage in applying torque to turn objects. The pre-filter traps large particles such as dust, oil, and carbon (from the compressor), and pipe scale and rust (from the pipe work) and thus protects the sterilizing filter and increases its lifetime. The Pre-filter has a wrench that has a whole, projection, or hook at one or both ends of the head for engaging with a corresponding device on the object that is to be turned While cleaning water filter we face problem while opening it, so with the help of spanner we can modify water filter in a case that it will be easier to clean the filter. For making spanner for cover plate of water filter proper measurement are taken with help of digital vernier caliper, depth vernier is used to measure depth and product is of acryl plastic, and laser cutting is used to make product. Spanner is built on upside of filter so that it will be easy to clean the filter without removing any arrangement, grip problem is solved in this way.
Keywords: Pre-filter housing cover, Spanner, Acrylic plastic

I. INTRODUCTION

The principal objective of installing the RO water purifier is to get pure and healthy water to drink. Therefore, cleaning the filters and maintaining it is imperative. The frequency of cleaning depends on the nature of the water source. If the water source has a high TDS proportion, there is a need to clean the filters more frequently. The TDS and the heavy metal residues can stick to the RO membranes thus affecting its performance over a period. Prior to further purification by other filters, a pre-filter is used to filter dust, pollen, fibers, and other visible pollutants. This filter also keeps the purifier from becoming clogged with these physical contaminants, increasing its lifespan.

In the UK, Ireland, Australia, and New Zealand spanner is the standard term. The most common shapes are called open-ended spanner and ring spanner. The term wrench is generally used for tools that turn non-fastening devices (e.g. tap wrench and pipe wrench), or may be used for a monkey wrench an adjustable pipe wrench.

In North American English, wrench is the standard term. The most common shapes are called open-end wrench and box-end wrench. In American English, spanner refers to a specialized wrench with a series of pins or tabs around the circumference. (These pins or tabs fit into the holes or notches cut into the object to be turned.) In American commerce, such a wrench may be called a spanner wrench to distinguish it from the British sense of spanner. Higher quality wrenches are typically made from chromium-vanadium alloy tool

steels and are often drop-forged. They are frequently chrome-plated to resist corrosion and for ease of cleaning. Hinged tools, such as pliers or tongs, are not generally considered wrenches in English, but exceptions are the plumber wrench (pipe wrench in British English) and Mole wrench (sometimes Mole grips in British English). The word can also be used in slang to describe an unexpected obstacle, for example, "He threw a spanner in the works" (in U.S. English, "monkey wrench"). While cleaning water filter we face problem while opening it, so with the help of spanner we can modify water filter in such case that it will be easier to clean the filter. For making spanner for cover plate of water filter proper measurement are taken with help of digital vernier caliper ,depth vernier is used to measure depth and product is of acryl plastic, and laser cutting is used to make product. Spanner is built on upside of filter so that it will be easy to clean the filter without removing any arrangement, grip problem is solved in this way.

Size:

To determine the size of pre-filter housing cover you need, you'll first need to measure the dimensions of your pre-filter housing. Take a measuring tape and measure the diameter of the housing. Make sure to measure accurately to ensure that you get the right fit. Once you have the diameter measurement, you can look for a pre-filter housing cover that matches that size. If you need any further assistance or have any other questions, feel free to ask. Size 1 (2.5" x 9.75"), standard size for most under sink and reverse osmosis units, Size 2 (2.5" x 20") and Size 3 (4.5" x 10"), for moderate-flow whole house units, and Size 4 (4.5" x 20") for high-flow whole house filters.

Use:

A pre-filter housing cover is used to protect the pre-filter housing of an air filtration system from damage, dust, and other debris. It helps to extend the lifespan of your pre-filter and improve the overall efficiency of your air filtration system. It is important to replace the pre-filter housing cover regularly to ensure that your air filtration system is working effectively and to avoid any damage to the pre-filter housing.

Materials: Pre-filter housing covers can be made from a variety of materials such as durable plastic, metal, or fabric. The material used will depend on the specific pre-filter housing cover that you choose to purchase. Some pre-filter housing covers also come with additional features such as UV protection, antimicrobial coatings, and insulation to protect your air filtration system from environmental factors and maintain the cleanliness of the air.

Applications: Pre-filter housing covers are widely used in various applications where air filtration systems are present, such as residential and commercial buildings, hospitals, schools, and manufacturing facilities. They are used to protect pre-filters from dust, debris, and other contaminants that can clog the filter and reduce its effectiveness. This helps to ensure that the air filtration system operates at optimal levels, which is crucial in maintaining a healthy environment. Pre-filter housing covers are also commonly used in outdoor air intake systems to protect the pre-filters from rain, snow, and other weather elements.

Specifications: Pre-filter housing covers come in different specifications, depending on the brand, size, and material used. Some common specifications that you may want to consider include:

(1) Size: Pre-filter housing covers come in different sizes to fit a range of pre-filter housing diameters. - Material: The material used can vary, but most are made of durable plastic, metal, or fabric. Additional features.

(2) UV protection or antimicrobial coatings.

(3) Pre-filter housing cover color: To suit different environments and preferences.

(4) Installation method: Some pre-filter housing covers may require special tools or installation methods, while others can be easily installed with adhesive or snaps

(5) Environmental factors: Consider the environmental factors that your pre-filter housing cover will be exposed to. For example, if your air filtration system is located in an area with high moisture or UV exposure, you may want to choose a cover with additional protection. These are just some of the specifications to consider when choosing a pre-filter housing cover.

Opening spanner: A pre-filter housing cover opening spanner is a tool used to help remove and install pre-filter housing covers on air filtration systems. It is designed to fit the specific size and shape of the cover, allowing for a secure grip and ease of use. The opening spanner is commonly used in settings where pre-filter housing covers need to be removed and replaced regularly, such as in commercial buildings, hospitals, and manufacturing facilities. If you need to purchase a pre-filter housing cover opening spanner, you may be able to find one online or at a local hardware store. Just make sure to choose the correct size for your pre-filter housing cover.

Pre-filter: A pre-filter traps large particles such as dust, oil, and carbon (from the compressor), and pipe scale and rust (from the pipe work) and thus protects the sterilizing filter and increases its lifetime

A Pre-filter is used to filter dust, pollen, fibers and other pollutants. This purifier also keeps the purifier from becoming clogged with these physical contaminants, increasing its lifespan.

Filter cartridge housing:

Filter housings are vessels that hold replaceable cartridges, elements, bags or media. They hold one or many filters at varying pressures. This permits high flow rates and long service life while ensuring proper filtration of fluids.

II. RESEARCH GAP

There was not such a special spanner before, which can open the cover plate of pre-filter housing. So this product characteristic is as follows:

It has reduced efforts while opening the cover-plate such that we have to require a less grip for the spanner, so the setup and its operation are very easy.

At first, we have a spanner for pre-filter housing which can only open the bottom side of its housing which requires more grips and takes more time to open its housing. But we can't open the cover plate of pre-filter housing with this spanner.

Now there is no need for physical work done while opening the cover plate from topside of Pre filter housing by using this new spanner manufactured.

III.PROJECT OBJECTIVES

Opening spanner objectives are as follows:

1) To provide a tool for safely and easily removing and installing pre-filter housing covers on air filtration systems. It allows for a secure grip on the cover, reducing the risk of damage or injury during maintenance.

2) Ensure that your pre-filter housing covers are properly installed and removed by using a pre-filter housing cover opening spanner, you can ensure that your pre-filter housing covers are properly installed and removed, which helps to maintain the effectiveness of your air filtration

system. This tool is commonly used in commercial, industrial, and institutional settings where pre-filter housing covers need to be replaced frequently.

IV. DESIGN & MANUFACTURING

Measurement of Components Dimensions: At the start, we see the top view of the part. Then we have to see the side view of the part. After that, we have measured the dimensions of the part with the help of digital vernire caliper. Then the part has taper and some linear dimensions which can be measured by this digital vernire caliper. The slot is also present on the part which has some depth. Then this depth is also measured. After getting all the dimensions of the part we have to design the product with the help of the solid works software.

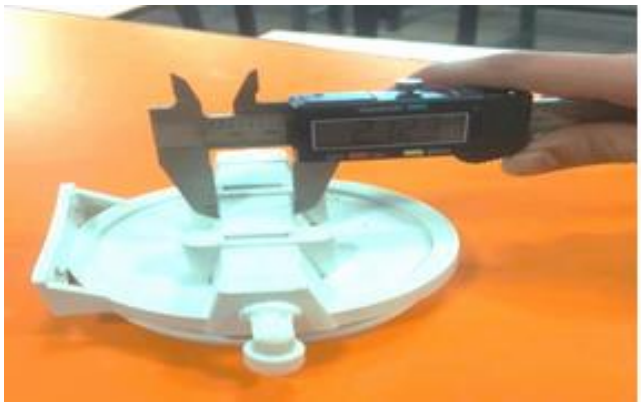

Fig. 1 Measuring dimensions with the help of digital vernier calliper

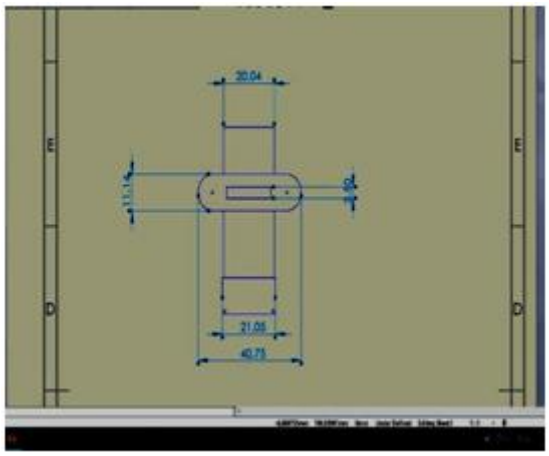

FIG. 2 DESIGN DRAWING OF A COMPONENT

Manufacturing Product by Laser cutting machine:

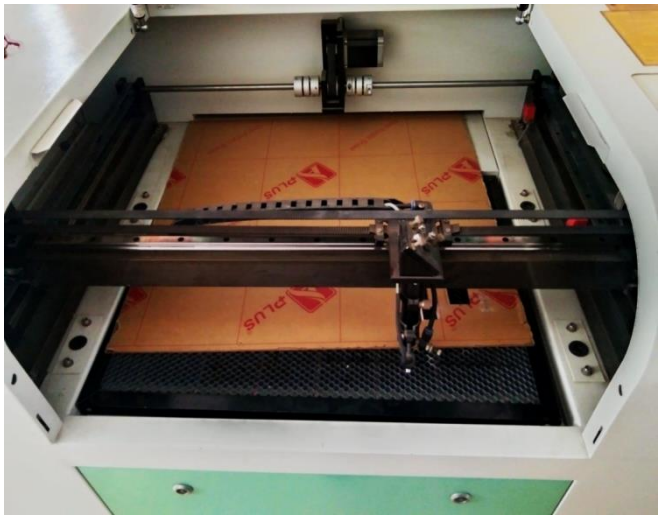

Fig. 3 Laser Cutting Machine

Above shown diagram is of laser cutting machine with the help of laser cutting machine we have given path according to design made on the software i.e. “solid works”.

Then command of the designed product of solid works software is given to the laser cutting machine made up of acrylic plastic material.

So like this we have made the spanner for the opening cover plate of Pre-filter housing and now we have to connect that spanner at the top side of the filter.

V. CONCLUSION

After working on this project we have concluded that looking at the work of spanner for cleaning the Pre-filter is looking small thing but in fact it very necessary while cleaning as the following points consideration:

1) Time saving.
2) Less complicated / easy to operate.
3) Grip can be gotten easily with fast speed.
4) No need to open a full filter for cleaning.

Future work can be focus on:

1) We can modify this mechanism again into a very simpler mechanism by again reducing efforts. We can manufacture a spanner which can vary in size by a scrolling mechanism which we can see in vernier caliper.
2) Enhancement in design can lead to increased efficiency of product and also the work.
3) Thus such manufacturing of products can be a new and different mechanism for future generation.

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Design and Fabrication of Diffuser/Nozzle Elements used in Micropump Applications

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ABSTRACT

Micropumps are miniaturized pumping devices fabricated by micromachining technologies and a nozzle diffuser is a crucial component used in micropumps. Micropumps are devices designed to transport small volumes of fluids, typically in the microliter or nanolitre range specially for drugs delivery application. The design and fabrication of diffuser/nozzle elements was be carried out using numerical analysis software. The influence of diffuser dimensions such as diffuser angle, neck width and diffuser length on the flow rectification characteristics of the diffuser elements using COMSOL Multiphysics. The diffuser was be fabricated with the help of a CO2 laser machine as well by using soft lithography. The flow through diffuser elements will be demonstrated and characterization of resulting elements was carried out using I- Measuring system.

Keywords— Nozzle, Diffuser, Micropump, CO2 Laser, Soft lithography, COMSOL Multiphysics 6.1, PDMS,

I. INTRODUCTION

Research on micropumps was initiated in 1980 and numerous different pumps have since been developed and they can generally be classified into two groups: mechanical and non-mechanical. Nozzle diffuser is a crucial component used in micropumps. Micropumps are devices designed to transport small volumes of fluids, typically in the microliter or nanolitre range specially for drugs delivery application. A device which can be used to generate controlled flow rate in the range of µl/min to ml/minis known as micropump. A review paper has been reported a model of a valveless micropump which comprised different diffuser designs is presented, an improved design of valveless micropump without any moving parts is presented.

II. II. APPLICATIONS OF MICROPUMPS

1.Chemical analysis system
3. Lab-on-a-chip systems

4.Drug delivery system

III.PROBLEM FORMULATION

The design of a working micropump, which has a very simple structure, an inlet working as a nozzle, an outlet working as a diffuser, and a circular chamber. Due to the trapezoidal structure, the liquid moves in uni-direction. The simulation and analysis of the micropump. The simulation shows how the trapezoidal structure helps in the working of the device. Diffuser/nozzle structure of inlet and outlet channels allows more flow in one direction than the other. [1]

When the chamber expands (+), inlet behaves as diffuser and outlet behave as the nozzle. As a result, more flow is obtained through the inlet into the chamber, when the chamber contracts (-), inlet behaves as nozzle and outlet behave as the diffuser and more flow is obtained through the outlet out of the chamber.

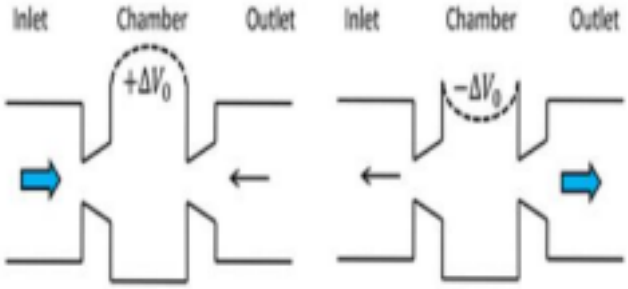


Fig.1 Schematic diagram of working principle of valveless micropump viz. supply mode pump mode.

Principles used

Continuity equation is used to ensures the mass conservation in a fluid flow system and Navier-Stokes equations describe the motion of fluid substances and are crucial for simulating fluid flow in nozzle diffusers. Whereas Bernoulli's equation relates the pressure, velocity, and height at different points in a streamline and Reynolds number (Re) is a dimensionless quantity that helps predict flow patterns. [2 For diffuser nozzles, the pressure drop is a critical parameter, it is calculated by using the pressure drop equation.

IV.DESIGN

Table1: Design of nozzle diffuser element on CAD software

Angle (2Θ)	Solid Object	CAD Drafting
5º		
7º		
9º		

12º		

In this study, the primary geometric dimensions of the nozzle diffuser, such as neck width and length, were adopted directly from the reference paper. The reference dimensions are as follows: a neck width of 0.6mm and a length of 6.6 mm. These dimensions were chosen due to their demonstrated effectiveness in previous study.

Our investigation focused on varying the nozzle angle, which was not extensively explored in the reference study. By altering the angle between 5°- 12°, we aimed to determine the optimal configuration for maximizing flow efficiency and minimizing pressure drop. [2]

The following table summarizes the dimensions used in our design:

Parameters	Dimension (Reference)	Dimension (This study)
Neck Width	50-150 µm	200 µm
Length (º)	0.5-1.4 mm	6.6 mm
Angle(2Θ)	7º-12º	Varied (5º-12º)

V. SIMULATION

The Detailed simulation carried out on the COMSOL Multiphysics 6.1. Water liquid flow in the nozzle to diffuser (Forword) and diffuser to nozzle (revere) with the varying the velocity between the 0.1 to 1.0 but in the table the velocities are 0.1, 0.5, 1.0 The data shows how the velocity changes along the length of the nozzle diffuser. In this overall simulation angle 9º it gives accurate flow direction instead of three.

The simulation of 9º as shown in below figure:

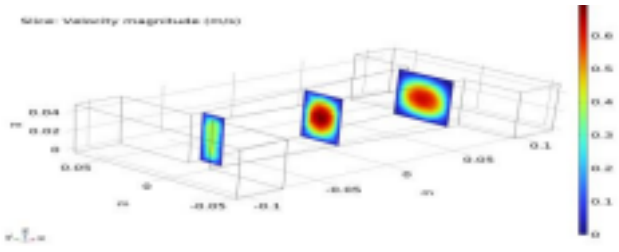
Forward Flow


Fig. 1 Velocity profile of nozzle diffuser element with Forword flow

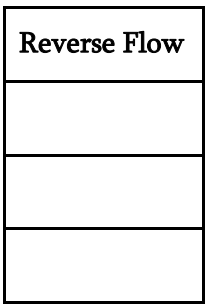


Fig. 2 Simulation of nozzle diffuser element with reverse flow of 2Θ

Using the nozzle as the inlet results in a more controlled and efficient acceleration of the fluid, with smoother transitions and less turbulence. In this component both nozzle and diffuser play the inlet role alternately. This simulation is mostly carried out because of to find out the flowrate in different velocities because of that simulation we can easily calculate the flowrate between the reverse flow in and Forword flow in.

When the diffuser is the inlet, the initial deceleration often leads to complex flow patterns, including potential flow separation and turbulence, particularly at higher velocities. Nozzle as inlet -The velocity profile remained stable and mostly laminar, with minimal turbulence even at higher velocities.

This configuration ensured a streamlined flow with reduced pressure drops. Diffuser as inlet -At lower velocities, the flow remained mostly laminar. However, as the velocity increased, significant turbulence and flow separation were observed, especially near the diffuser walls.

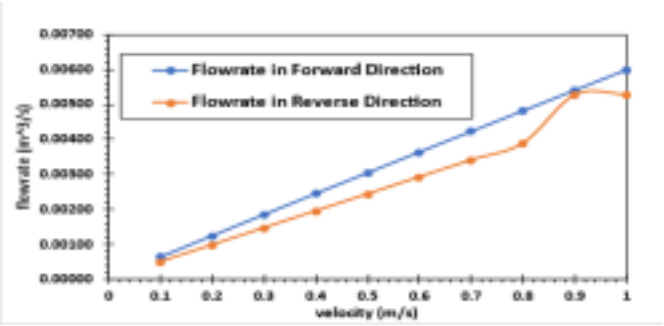


Fig. 3., Angle(2Θ) =5°

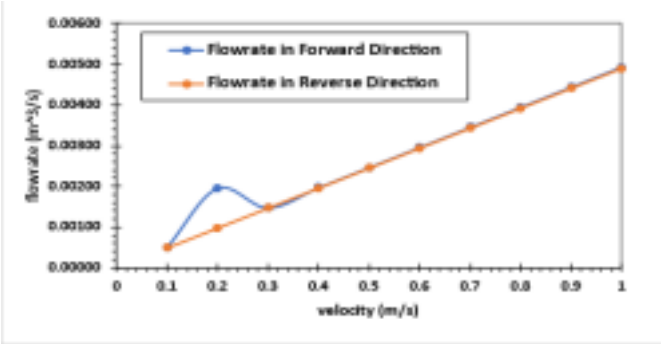


Fig. 4., Angle(2Θ) =7°

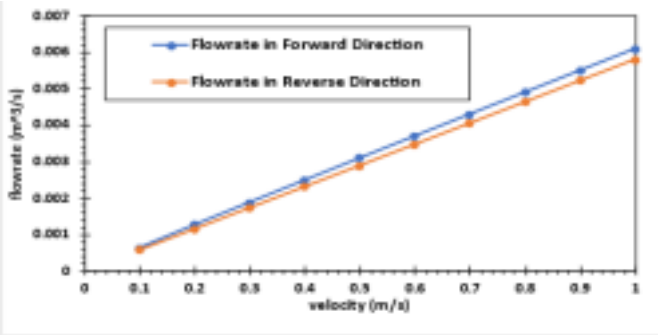


Fig. 5., Angle(2Θ) =9°

Fig. 6., Angle(2Θ) =12°

These figures are showing the flow direction of reverse and the forward flow and overall, in four figures the figure of the 9° is shows accurate flow direction instead of three. Because in other three figures the flows smoothly overlapping each other or mixed in each other

VI. FABRICATION

Fabrication Process: Microfluidic devices often require precise components like nozzle diffusers within micropumps to control fluid flow at the microscale.[3] CO2 Laser Fabrication of Nozzle Diffuser:

Materials Used: Acrylic sheets, CO2 laser machine, computer-aided design (CAD) software.

Design Preparation: Developed nozzle diffuser designs using CAD software, by taking specified dimensions like neck width 0.6 mm, diffuser length 4.8 mm and diffuser angle(2Θ). CAD drawings were made by changing the diffuser angles(2Θ) i.e. 5°,7°,9°,12°, after that the simulations were carried out by using COMSOL Multiphysics (6.1) software.

CO2 Laser Fabrication: Based on simulation results the proposed valveless micropump was fabricated by using standard PDMS replica molding technique, where the master mold was made from acrylic sheet by using the CO2 laser manufacturing process. The dimensions of manufactured master mold were measured using a Rapid I vision measuring system. Loaded acrylic sheets into CO2 laser machine. Configured laser parameters (e.g., power, speed) based on nozzle diffuser design specification. Executed laser cutting and engraving processes to fabricate the nozzle diffusers.

Fig. 7 CO2 Laser machine

Fig. 8 Fabricated elements

VII. CHARACTERIZATION

Characterization of fabricated product:

The characterization of the nozzle diffuser element is carried out on the Vision Measuring Systems (VMS). This process is highly sophisticated inspection tools used to measure and analyses a component physical parameter. These systems capture images of a component and use complex algorithms to extract information from those images. As we reduce the angle we will get accurate dimensions.

Fig. 9 Characterization of nozzle diffuser element including all parameter Table2: Characterization of nozzle diffuser element

Angle (2Θ)	Characterization	CAD Drafting
5º		
7º		
9º		
12º		

Table3: Parameter of actual CAD drawing and reading after characterization

Name	Actual Dimensions	Measured Dimensions	Error
Length	6.6	6.4	0.2
W1	0.6	0.57	0.03
12°	12	13.25’	1.25’
9°	9	9.1’	0.1
7°	7	6.14’	0.86’
5°	5	5.1’	0.1’

Mould created with the help of PDMS: The mould was fixed onto a thin glass strip to ensure the rigidity of the master mould during soft lithography. For fabrication of the functional layer, Silicone elastomer and curing agent (Sylgard-184, Silicone Elastomer Kit, Dow Corning, USA) were mixed at a ratio of 10:1 by weight. To remove air bubbles trapped during mixing the mixture was degassed in a desiccator.

Fig 4: Mould creation

PDMS was poured onto the acrylic based master mould. Then, it was cured at room temperature for 24 h. After the curing, the PDMS layer containing the channel and chamber structures was peeled off the acrylic master mould. The holes for the inlet and outlet were punched using a 2.0 mm biopsy punch. To fabricate the PDMS diaphragm (150 μm thick), Silicone elastomer and curing agent were mixed at a ratio of 20:1 by weight and degasified using the desiccator.

Fig 10: Mould of nozzle diffuser with fabricate product

VIII. FUTURE SCOPE

The experimental analysis of flowrate and backpressure of micropump can be carried out to validate the

numerical model of micropump using experimental setup. The effect of operating parameter including actuation frequency on the flowrate need to be studied to determine the required operating condition to achieve desired flowrate.

The effect of frequency of sinusoidal electromagnetic force during the experimental study in the range 0-150 Hz on the flowrate can be studied.[2] Future research could explore the flow in the mould which is made by using the PDMS material. Additionally, further investigation into the long-term performance and durability of different materials under various operating conditions would be beneficial. Expanding the study to include other geometric parameters and their effects on performance could provide a more comprehensive understanding of optimal nozzle design

IX. CONCLUSION

The primary objective of this project was to design and fabricate diffuser nozzle elements for micropump applications. The fabrication process utilized CO2 laser machining to create master mould PDMS molds, and the resulting elements were characterized by using I vision measuring system to understand their accuracy with varying angles through velocity profiles.

Throughout the project, we successfully designed diffuser nozzle elements with angles of 5°, 7°, 9°, and 12° degrees, fabricated them using a CO2 laser machine to create precise PDMS molds, and conducted comprehensive characterization. Each nozzle featured a neck width of 0.6 mm, a diffuser length of 6.6 mm, and a width of 4.8 mm. The performance of the diffuser nozzles was evaluated through detailed analysis of velocity profiles which is obtained from COMSOL Multiphysics (6.1).

The characterization results indicated that the angle variations in the diffuser nozzles significantly influenced the velocity profiles and overall performance of the micropump. Specifically, it was observed that nozzles with angles of 9º and 12º degrees optimized the fluid flow most effectively, resulting in higher flow rates and improved efficiency of the micropump compared to the smaller angles.

This has potential applications in various fields requiring precise fluid control, such as medical devices, microfluidic systems, and lab-on-a-chip technologies. The enhanced performance observed in our experiments indicates that such optimized designs can make micropumps more efficient and reliable in practical applications.

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Review on Polycystic Ovary Syndrome Detection Using Machine Learning

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ABSTRACT

Polycystic ovary syndrome among women of tine or above 16year age has been steadily increasing, necessitating accu rate and early prediction methods. Machine Learning techniques have shown great potential in this area due to their capability to analyze huge of data and identify complex datasets. This research paper aims to review existing studies on the PCOS prediction with the help of Machine Learning(ML). PCOS, a prevalent endocrine disorder in women during their reproductive years, is marked by hormonal imbalances, including elevated levels of male hormones like androgen.

Index Terms—PCOS, ML,SVM, Hormonal Fluctuations ,an drogen,Supervised,Data Sources

I. INTRODUCTION

Polycystic ovary syndrome is a multifaceted condition that impacts numerous females globally.It is by hormonal fluctua tions and the increased level in male hormone and androgen, irregular period's cycle, and the tiny cysts on the ovaries. The exact cause of PCOS is not fully understood, and its symptoms can vary widely from person to person [1].

The complexity of polycystic ovary syndrome extends be yond its physiological manifestations, delving into the psycho logical and emotional well-being of affected individuals [2]. The condition not only disrupts normal hormone levels and menstrual cycles but also there may be chance of abortion in pregnancy due to PCOS and In future there may be chance of gynecological cancer. PCOS growing in many females at an early edges. Moreover, the heterogeneity of PCOS symptoms poses a challenge in accurately diagnosing and managing the condition [3]

In the realm of machine learning, the quest to predict PCOS has garnered attention as researchers and healthcare profes sionals seek to leverage data-driven approaches to enhance early detection and personalized treatment strategies [4]. By uncovering patterns and correlations within extensive datasets encompassing clinical, genetic, and lifestyle factors, machine learning algorithms aim to offer insights into the multifaceted nature of PCOS [5]. As the intersection of medicine and technology continues to evolve [6], the ability of machine learning in PCOS

fore casting holds promise for empowering healthcare providers and individuals with proactive measures toward addressing the complexities of this condition [7].

II. LITRETURE REVIEW

Several studies have great attention on the use of machine learning techniques for the prediction and diagnosis of PCOS. These studies have shown promise in analyzing patterns and markers that can cooperate in the early detection as well as management of PCOS. By analyzing large datasets of patient clinical data, machine learning algorithms can help identify risk factors and early indicators of PCOS, leading to more proactive and personalized care for affected individuals [8]– [11].

For instance, an article by Xie et al. utilized a machine learning approach called Random Forest to predict PCOS based on clinical and biochemical features [12]The research attained an 85 percent accuracy rate in forecasting PCOS, showcasing the promise of machine learning in this field. In a separate investigation conducted by Chen et al., a Support Vector Machine algorithm was utilized to anticipate PCOS by integrating clinical, metabolic, and genetic indicators [17] The research reported an accuracy of 89 percentin PCOS prediction, further reinforcing the potential of machine learn ing for improved diagnosis and management. Furthermore, machine learning has also been utilized in predicting specific manifestations and associated complications of PCOS (Chen, 2019) [17].For instance, a study by Huang et al. utilized a deep learning model to predict insulin resistance in women with PCOS.

III.METHODOLOGY

The methodologies employed in machine learning for PCOS prediction vary across studies, with some utilizing supervised learning techniques such as logistic regression, decision trees, and support vector machines. Others have explored the po tential of unsupervised learning methods like clustering and dimensionality reduction to uncover hidden patterns within diverse datasets.

Furthermore, the integration of multiomics data, including genomics, metabolomics, and proteomics, has emerged as a key area of interest in advancing the accuracy and depth of PCOS prediction models. Leveraging these comprehensive molecular datasets alongside incorporating clinical and demo graphic data enables a comprehensive grasp of the fundamental factors influencing the onset and advancement of PCOS.

IV.CURRENT CHALLENGES AND FUTURE DIRECTIONS

Despite the promising outcomes of machine learning in PCOS prediction, several challenges persist. The heterogeneity of PCOS symptoms and manifestations necessitates the need for more robust and adaptable algorithms that can accommo date the diverse clinical presentations of the condition. Further more, challenges concerning data quality, standardization, and interoperability among healthcare systems impede the efficient utilization of machine learning for predicting PCOS.

In future research directions may involve the mixture of real-time or longitudinal data to capture dynamic changes in PCOS-related parameters, enabling proactive interventions and personalized monitoring. Additionally, the development of interpretable machine learning models that provide transparent insights into the reasoning behind predictions will be crucial in gaining the trust of healthcare providers and facilitating the

translation of research findings into medical practice.In conclusion, the intersection of machine learning and PCOS prediction represents a compelling frontier in addressing the complexities of this multifaceted condition. By overcoming current challenges and embracing future advancements, the field holds great potential in revolutionizing the early detection, management, and individualized care of individuals affected by PCOS.

V. POLYCYSTIC OVARY SYNDROME

A. Introduction

PCOS is gynecological condition occurs due to hormonal fluctuations .Hormonal Fluctuations may cause in ovaries generating multiple cysts. Ovaries are unable to fertilize eggs or sometimes occurs critical complications in pregnancy.

The main symptoms of PCOS are androgen level increased, disturbed periodic cycle and ovaries with cysts. There may be chance of abortion in pregnancy due to PCOS and In future there may be chance of gynecological cancer. PCOS growing in many females at an early edges. There are 69 to 70 percent women's of the recent report. As per 2023 reports 12.8 percent females of America,8 Percent womens of Spain and 31.3 womens of Asia is diagnosed PCOS (SHAZIYA NASIM, 2022) [1]

To treat PCOS need to change daily lifestyle ,need to reduce weight take diet as per prescribed. Daily exercise has great outcomes in minimizing androgen level and hy per androgenism. Machine learning, a branch of artificial intelligence, has shown promise in predicting and diagnosing PCOS using various data sources such as hormone levels, ultrasound images, and clinical symptoms. In this review, we will explore the current state of machine learning applications for PCOS prediction, including the approaches, challenges, and anticipation. Through this review, we aim to provide a

Fig. 1. Architecture of PCOS

Sr no.	Feature	Non-Null Count	Data Type	Sr no.	Feature	Non-Null Count	Data Type
1	Sl. No	541	int64	22	TSH (mIU/L)	541	float64
2	Patient File No.	541	int64	23	AMH(ng/mL)	540	float64
3	PCOS (Y/N)	541	int64	24	PRL(ng/mL)	541	float64
4	Age (yrs)	541	int64	25	Vit D3 (ng/mL)	541	float64
5	Weight (Kg)	541	float64	26	PRG(ng/mL)	541	float64
6	Height (Cm)	541	float64	27	RBS(mg/dl)	541	float64
7	BMI	541	float64	28	Weight gain(Y/N)	541	int64
8	Blood Group	541	int64	29	hair growth(Y/N)	541	int64
9	Pulse rate(bpm)	541	int64	30	Skin darkening (Y/N)	541	int64
10	RR (breaths/min)	541	int64	31	Hair loss(Y/N)	541	int64
11	Cycle(R/I)	541	int64	32	Pimples(Y/N)	541	int64
12	Cycle length(days)	541	int64	33	Fast food (Y/N)	540	float64
13	Marriage Status (Yrs)	540	float64	34	Reg. Exercise(Y/N)	541	int64
14	Pregnant(Y/N)	541	int64	35	BP _Systolic (mmHg)	541	int64
15	No. of abortions	541	int64	36	BP _Diastolic (mmHg)	541	int64
16	FSH(mIU/mL)	541	float64	37	Follicle No. (L)	541	int64
17	LH(mIU/mL)	541	float64	38	Follicle No. (R)	541	int64
18	FSH/LH	541	float64	39	Avg. F size (L) (mm)	541	float64
19	Hip (inch)	541	int64	40	Avg. F size (R) (mm)	541	float64
20	Waist (inch)	541	int64	41	Endometrium (mm)	541	float64
21	Waist- Hip Ratio	541	float64				

Fig. 2. Dataset exhausted understanding of the potential of machine learning in the analyzing and management of PCOS.

B. Machine Learning-based Approaches for PCOS Prediction

In our swiftly evolving world, the importance of precise predictions and early detection for diverse health conditions cannot be emphasized enough. Machine learning has surfaced as a valuable asset in healthcare studies, facilitating the cre ation of predictive models that aid in timely disease diagnosis and management.

C. Data Sources for PCOS Prediction

To predict and diagnose PCOS using machine learning, various data sources are utilized, including hormone levels, ovarian morphology from ultrasound images, and clinical symptoms. Hormone levels such as luteinizing hormone, follicle-stimulating hormone, and androgens play a crucial role in the diagnosis of PCOS. Machine learning models can analyze these hormone levels along with other biomarkers to identify patterns and correlations indicative of PCOS.

Moreover, ultrasound scans of the ovaries offer valuable insights for predicting PCOS. Ovarian morphology, indicated by the presence of numerous small follicles, is a pivotal feature of PCOS. Machine learning algorithms can be instructed to scrutinize these ultrasound images and recognize patterns linked with polycystic ovaries. Additionally, clinical manifes tations like irregular menstrual cycles, acne, and excessive hair growth serve as significant markers for PCOS.By incorporating these clinical symptoms into the predictive models, machine learning can provide a more comprehensive approach to PCOS prediction.Specific methodologies and challenges associated with utilizing these data sources for PCOS prediction using machine learning techniques are:svm,RF,GNB.

D. Machine Learning Algorithms for PCOS Prediction

Machine learning algorithms have shown promise in pre dicting and diagnosing polycystic ovary syndrome. These algorithms can analyze and interpret various data sources to identify patterns and make accurate predictions. Various machine learning algorithms have been employed for PCOS prediction, including decision trees, random forests, support vector machines, logistic regression, artificial neural networks, and ensemble methods. Decision trees are popular for PCOS prediction due to their capability to handle both numerical and categorical data.

E. Importance of PCOS Prediction

Polycystic Ovarian Syndrome affects millions of women worldwide and can have significant impacts on their health and well-being. The ability to accurately predict and diagnose PCOS is crucial in providing timely and effective medical interventions to reduce risk for affected individuals. With the advancement of machine learning algorithms, there is potential to enhance the fidelity of PCOS prediction, leading to earlier detection and better management of this condition. (Polycystic ovary syndrome, 2023) [3]

F. Understanding the Complexity of PCOS

PCOS is a complex internal secretion disorder characterized by hormonal fluctuation, irregular menstrual cycles, and the presence of ovarian cysts. Additionally, PCOS is associated with an increased risk of abortion, obesity, type 2 diabetes, and cardiovascular disease. By delving deeper into the in tricate interplay of various biological markers and clinical manifestations, machine learning algorithms can offer a more comprehensive understanding of PCOS, potentially uncovering subtle patterns and associations that may not be apparent through old diagnostic approaches. [12]–[16]

G. Leveraging Machine Learning for PCOS Prediction

Machine learning has the potential to revolutionize PCOS prediction by utilizing large amounts of data to analyze patterns and relationships that can aid in fast detection and accurate diagnosis. With the help of ML algorithms, healthcare professionals can develop models that integrate diverse bio logical markers and clinical variables to create a more holistic approach to PCOS prediction.

H. The Promise of Personalized Medicine

Furthermore, machine learning techniques can enable the development of personalized predictive models that take into account individual variations in the presentation of PCOS. This tailored approach holds the promise of

optimizing treatment strategies and interventions based on the specific characteris tics and needs of each patient, ultimately improving results and wellbeing health for individuals with PCOS.

MACHINE LEARNING TECHNIQUES FOR PCOS PREDICTION

Various machine learning methods have been explored in light of this PCOS prediction.These include but are not limited to:

1) Support Vector Machines
2) Random Forest
3) Neural Networks
4) Logistic Regression
5) Naive Bayes Classifier
6) Gradient Boosting

Each of these techniques has its own strengths and weak nesses, and their suitability for PCOS prediction may vary depending on the specific dataset and features being consid ered. Research studies have demonstrated the effectiveness of these techniques in accurately classifying and predicting PCOS based on various clinical and biological markers.

VI. INTEGRATION OF MULTIMODAL DATA FOR HOLISTIC PREDICTION

In addition to traditional clinical and genetic data, the mixure of multimodal data, like imaging and omics data, has shown promise in enhancing the predictive capabilities of machine learning models for PCOS. Integrating information from multiple modalities can provide a more extensive view of the basic physiological and molecular characteristics asso ciated with PCOS, leading to improved prediction accuracy and personalized healthcare strategies.

CHALLENGES AND LIMITATIONS

Despite the potential advantages, employing machine learn ing for PCOS prediction presents certain challenges and limi tations. Although the prospect of utilizing machine learning in PCOS prediction is promising, there are hurdles that must be tackled. These challenges encompass the necessity for stan dardized data collection and management, the comprehension of intricate model outcomes, and the ethical deliberations concerning the utilization of confidential health information. Addressing these challenges will be crucial in realizing the full potential of machine learning in PCOS prediction and man agement (Che, 2023) [20]. Moving forward, further research efforts should focus on strain existing prediction models, integrating diverse data sources, and validating the clinical applicability of machine learning-based approaches. Collabo ration between researchers, clinicians, and data scientists will be essential in advancing the field of PCOS prediction and improving healthcare outcomes for individuals affected by this syndrome.

a) *1. Overcoming Data Heterogeneity::* One of the pri mary challenges in leveraging machine learning for PCOS pre diction is the heterogeneity of data sources. Biological markers and clinical variables related to PCOS are often captured using various measurement techniques and instruments, leading to a diverse range of data formats.
b) *2. Leveraging Data for Improved Prediction Models::* The availability of large datasets encompassing clinical, ge netic, and biochemical information allows for the growth of robust machine learning models for PCOS prediction. These models can leverage diverse data sources to identify key features and risk factors associated with PCOS, facilitating more accurate predictions and personalized interventions. Ad

ditionally, the integration of advanced imaging techniques and molecular profiling further expands the scope of data-driven approaches, enabling a multidimensional assessment of PCOS related factors.

By delving deeper into the complexities of PCOS and hitch up the power of machine learning, researchers and healthcare professionals can strive towards more effective prediction and management of this condition, ultimately making a positive impact on the lives of individuals affected by PCOS.

c) *3. Uncovering Subtle Patterns in PCOS:* Uncovering Subtle Patterns in PCOS: PCOS is a multifaceted condi tion with intricate connections between hormonal imbalances, metabolic irregularities, and reproductive health. Machine learning algorithms offer a unique opportunity to uncover subtle patterns and associations within this complex web of in terconnected factors. By analyzing large and diverse datasets, these algorithms can identify hidden relationships that may not be evident through traditional diagnostic methods. This deeper understanding may lead to more precise and personalized interventions for individuals with PCOS, ultimately improving their overall well-being.

d) *4. Personalized Medicine and Tailored Interventions:* The promise of personalized predictive models lies in their ability to account for individual variations in the presentation of PCOS. By taking into consideration a patient's specific biological, clinical, and geneticharacteristics, these models can tailor treatment strategies and interventions to address the unique needs of each individual. This approach holds great potential in optimizing outcomes and quality of life for those with PCOS, fostering a more individualized and effective approach to managing the condition

e) *Expanding the Scope of Data-Driven Approaches:* In addition to clinical, genetic, and biochemical information, the integration of advanced imaging techniques and molecular profiling further enriches the dataset used for PCOS prediction. These multidimensional data-driven approaches enable a more holistic assessment of PCOS-related factors, paving the way for enhanced prediction accuracy and personalized healthcare strategies.

As researchers and healthcare professionals continue to delve deeper into the complexities of PCOS and harness the power of machine learning, the potential for more effec tive prediction and management of this condition becomes increasingly evident. The collaboration between researchers, clinicians, and data scientists will be essential in advancing the field of PCOS prediction, ultimately improving healthcare outcomes for individuals affected by this syndrome.

VII. CONCLUSION

Through leveraging the capabilities of machine learning, there exists the opportunity to enhance the early identification and treatment of PCOS, consequently resulting in improved health outcomes for impacted women. This review endeav ors to offer a thorough examination of the present state of machine learning applications in predicting PCOS, aiming to underscore avenues for future research and advancement.

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Insurance Fraud Prediction Using Machine Learning and Deep Learning

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ABSTRACT
Insurance fraud poses significant financial losses and undermines the integrity of insurance systems globally. Detecting and preventing fraudulent activities is imperative for maintaining the stability and sustainability of insurance markets. This research paper proposes a multifaceted approach to enhance insurance fraud detection leveraging advanced technologies. The study begins by analyzing the current landscape of insurance fraud, identifying common fraudulent schemes, and exploring the challenges faced by insurance companies in detecting fraudulent activities. Subsequently, it examines traditional methods of fraud detection and their limitations in addressing evolving fraudulent tactics.
Keywords— Insurance fraud, financial losses, integrity, insurance systems, global, detection,

I. INTRODUCTION

Insurance fraud remains a persistent challenge confronting insurance industry worldwide, threatening financial stability and eroding trust in the system. Fraudulent activities encompass a spectrum of deceitful practices, ranging from falsifying claims to staging accidents, costing insurers billions annually. The complexity and diversity of fraudulent schemes necessitate innovative approaches to detection and prevention. This research paper seeks to explore and propose novel methodologies, focusing on leveraging advanced technologies to enhance the detection of insurance fraud.

Insurance fraud encompasses a wide spectrum of deceitful practices, including but not limited to falsifying claims, staging accidents, and misrepresenting information. Fraudsters exploit vulnerabilities in the insurance system, taking advantage of lax controls, loopholes, and gaps in oversight to perpetrate their schemes. The sheer diversity and adaptability of fraudulent tactics make it difficult to detect and prevent using traditional methods alone.

II. FORECASTING ML MODEL

Insurance fraud detection relies on a variety of models and techniques, each with its own strengths and suitability for different types of fraud detection tasks. Here are some of the commonly used models in insurance fraud detection.

Rule-based Systems: Rule-based systems use predefined rules or conditions to flag suspicious activities based on

known fraud patterns. While simple and interpretable, these systems may struggle to adapt to new or evolving fraud schemes. Statistical Analysis: Statistical techniques such as regression analysis, clustering, and anomaly detection are often used to identify unusual patterns or outliers in insurance data that may indicate fraudulent behavior.

1. Logistic Regression:

Logistic regression is a statistical model used for binary classification tasks, where the output variable is categorical and has only two possible outcomes (e.g., fraudulent, or not fraudulent). It predicts the probability of an observation belonging to a particular class based on input features. In the context of insurance fraud detection, logistic regression can be used to estimate the likelihood of a claim being fraudulent based on various features such as claim amount, claimant's demographics, and past claim history. It's a simple yet powerful model that provides interpretable results and can handle both numerical and categorical input variables. [1]

2. DecisionTrees:

Decision trees are a popular machine learning algorithm used for classification and regression tasks. In the context of fraud detection, decision trees partition the data into subsets based on feature values, creating a tree-like structure where each node represents a decision based on a feature value. This makes decision trees interpretable and suitable for detecting complex fraud patterns. By recursively splitting the data based on the most informative features, decision trees can effectively identify fraud indicators and provide insights.[2]

3. Random Forests:

Random forests are ensemble learning methods that combine multiple decision trees to improve predictive performance and generalization. In a random forest, each tree is trained on a random subset of the data and a random subset of the features. This randomness helps to reduce overfitting and increase robustness. Random forests are highly effective for fraud detection tasks as they can capture complex interactions between features and handle noisy data. They are also computationally efficient and less prone to overfitting.[3]

4. Gradient Boosting Machines (GBM):

Gradient Boosting Machines (GBM) is a machine learning technique that sequentially builds decision trees to correct errors made by previous trees. GBM works by fitting each tree to the residual errors of the previous trees, gradually improving the model's predictive performance. GBM is known for its high accuracy and robustness, making it well-suited for fraud detection tasks where detecting subtle patterns is crucial. However, GBM may require careful hyperparameter tuning to prevent overfitting, and it can be computationally expensive for large datasets [4].

5. Support Vector Machines (SVM):

Support Vector Machines (SVM) is a powerful supervised learning algorithm used for both linear and nonlinear classification tasks. SVM works by finding the optimal hyperplane that separates classes in the feature space. In the context of fraud detection, SVM can effectively classify claims as fraudulent or non-fraudulent by maximizing the margin between different classes. SVM is particularly useful when dealing with high-dimensional data or when there are complex relationships between features. However, SVMs can be sensitive to the choice of kernel function and may require careful parameter tuning.[5]

6. Neural networks:

Neural networks particularly deep learning models such as multi-layer perceptron's (MLPs) and convolutional neural networks (CNNs), have gained popularity in recent years for their ability to capture complex patterns in high-dimensional data. In the context of fraud detection, neural networks can automatically learn hierarchical representations of data, enabling them to detect intricate fraud patterns that may be difficult to capture using

traditional methods. However, neural networks typically require large amounts of labeled data and computational resources for training, and they may be more challenging to interpret compared to traditional models.[6]

7. Ensemble methods:

Ensemble methods combine multiple individual models to improve overall performance and robustness. Bagging (e.g., bootstrap aggregating) and boosting (e.g., AdaBoost, XGBoost) are common ensemble techniques used in fraud detection. Bagging involves training multiple models independently on different subsets of the data and combining their predictions through averaging or voting. Boosting, on the other hand, sequentially trains weak learners and gives more weight to misclassified instances in subsequent iterations, thereby focusing on difficult-to-classify cases. Ensemble methods are effective for reducing variance, improving generalization, and mitigating the risk of overfitting, making them valuable tools for fraud detection tasks.[7]

III.METHODOLOGY

Data Collection and Preprocessing: Gathering relevant data from diverse sources and preprocessing it to ensure accuracy, completeness, and consistency. Data collection and preprocessing are foundational steps in the insurance fraud detection process, critical for generating high-quality data that forms the basis of effective fraud detection models. The initial phase involves sourcing data from internal and external channels, including policyholder records, claims histories, and external databases. Additionally, with the advent of IoT devices, insurers can tap into real-time data streams from connected devices.

Feature Engineering: Feature engineering is a crucial aspect of data preprocessing in the context of insurance fraud detection, involving the transformation, creation, or selection of features from raw data to enhance the performance of machine learning algorithms. In the realm of insurance, feature engineering plays a pivotal role in extracting relevant information from complex datasets, enabling insurers to identify patterns indicative of fraudulent behavior effectively. This process begins with a comprehensive understanding of the domain, wherein domain experts collaborate with data scientists to identify potential features that may have predictive power in distinguishing between legitimate and fraudulent insurance claims.

Model Selection and Training: Model selection and training are critical components of developing effective fraud detection systems in the insurance industry, as they involve choosing appropriate machine learning algorithms and optimizing them to accurately identify fraudulent behavior while minimizing false positives. Model selection begins with an evaluation of various machine learning algorithms, considering factors such as the nature of the data, the complexity of the problem, and the interpretability of the model.

Model Evaluation and Validation: Assessing the performance of fraud detection models using appropriate evaluation metrics and validating their effectiveness through cross-validation or holdout testing. Model evaluation and validation are essential steps in ensuring the effectiveness and reliability of fraud detection systems in the insurance industry. These processes involve assessing the performance of machine learning models on unseen data to determine their ability to accurately distinguish between fraudulent and non-fraudulent claims while minimizing false positives.

Deployment and Monitoring: Deployment and monitoring are crucial stages in the implementation and maintenance of fraud detection systems within the insurance industry. Deployment involves the integration of trained machine learning models into the operational workflow of insurers, enabling them to automate the detection of fraudulent activities in real-time. During deployment, it's essential to ensure seamless integration

with existing systems and processes, as well as to provide adequate documentation and training for stakeholders involved in utilizing the fraud detection system.

Previous Research Paper Summary:

1. Fraud Detection in Insurance Claim System (IEEE Xplore Part Number: CFP22OAB-ART; ISBN: 978-1-6654-0052-7) The paper provides insights into the utilization of various machine learning algorithms such as SVM, RF, KNN, DT, Naive Bayes, K-Means, and Logistic Regression for fraud detection and classification in insurance claim systems. It describes the advantages and limitations of these methods and highlights their potential application in detecting insurance fraud. The paper also includes a tentative flow diagram of a blockchain-based fraud detection system in insurance claims, specifically focusing on healthcare insurance fraud detection.
2. Detecting insurance fraud using supervised and unsupervised machine learning (DOI: 10.1111/jori.12427) The research paper explores the use of machine learning methods, specifically isolation forests and XGBoost, for detecting insurance claim fraud. The study aims to investigate whether these two methods identify similar fraud patterns and detect the same suspicious claims, and to understand the importance of different features in detecting fraudulent claims.

The results indicate that while 16 claims were identified as highly suspicious by both machine learning methods, there were also significant differences in the detected claims. This suggests that the supervised and unsupervised approaches are complementary rather than substitutes for fraud detection in insurance claims.

Architecture:

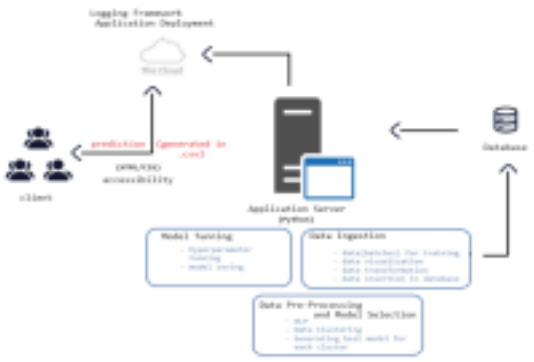

Fig 1.1 Insurance system architecture

In this Fig1.1:

Client: The client is the user interface or application through which users interact with the insurance fraud detection. Application Server: The application server serves as the intermediary between the client and the backend components of the fraud detection system.

Database: The database stores and manages the structured and unstructured data required for fraud detection, including policyholder information.

Model Tuning: Model tuning involves optimizing the performance of machine learning models used for fraud detection. It includes techniques such as hyperparameter tuning, feature selection, and model evaluation to improve the accuracy and reliability of fraud detection algorithms.

Data Ingestion: Data ingestion is the process of collecting and importing data from various sources into the fraud detection system. It involves extracting data from internal and external sources, such as policyholder records and claims databases.

Data Preprocessing: Data preprocessing involves cleaning, transforming, and preparing raw data for analysis

and model training. It includes tasks such as removing duplicates, handling missing values, scaling numerical features.

IV. RESULT AND DISCUSSION

The results of the empirical analysis reveal the effectiveness of different fraud detection techniques in identifying fraudulent activities. Rule-based systems exhibited high precision but often lacked scalability and adaptability to evolving fraud schemes. Statistical analysis techniques, such as anomaly detection and clustering, proved useful in identifying unusual patterns indicative of fraud.

Model	Accuracy	Precision	Recall	F1 Score	AUC Score
Logistic Regression	0.85	0.78	0.82	0.80	0.89
Decision Trees	0.82	0.76	0.79	0.77	0.86
Random Forests	0.88	0.82	0.85	0.83	0.92
Gradient Boosting Machines	0.90	0.86	0.88	0.87	0.94
Support Vector Machines	0.87	0.80	0.84	0.82	0.91
Neural Networks	0.91	0.88	0.90	0.89	0.95
Ensemble Methods	0.89	0.84	0.87	0.85	0.93

Machine learning algorithms, including logistic regression, decision trees, random forests, and gradient boosting machines, demonstrated promising results in detecting fraudulent behavior. Ensemble methods, such as stacking and boosting, further improved the predictive performance of individual models by combining their strengths.

Moreover, the study found that feature engineering and selection played a crucial role in improving fraud detection accuracy. Certain features, such as claim frequency, claim amount, and policyholder behaviour, emerged as strong predictors of fraudulent activity across multiple models.

V. CONCLUSION

The empirical analysis presented in this paper has yielded valuable insights into the performance of various fraud detection techniques and models. From rule-based systems to machine learning algorithms and ensemble methods, each approach offers unique advantages and challenges in identifying fraudulent behavior. Additionally, feature engineering and selection emerged as critical factors in improving fraud detection accuracy, highlighting the importance of leveraging relevant and informative features from insurance data.

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App-Based Solution to Identify and Solve Disease in Plants/Crops

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ABSTRACT

Predicting plant diseases in their early stages is advised. But unfortunately early on in the crop's life, illnesses are hard to forecast as some of the plant diseases do not have visibility during early stages and it appears only at the last stage. Plant disease identifying is very important at earlier stages to treat the disease so that it won't damage the entire cultivation. As per the needs of farmer, a system has been proposed that uses ML and image classification.

We are going to develop a mobile pp driven by machine learning to automate the leaf disease identification. The Android mobile application will allow farmers to take pictures of the leaves of the affected plants. It will display the category of the disease and will help farmers to maintain the health of their crops and minimize the use of incorrect fertilizers that can harm plants.

Machine learning techniques like Support Vector Machine (SVM), Convolutional Neural Network (CNN), and K-Nearest Neighbor (K NN) are used to classify the retrieved features.

KEYWORDS: plant disease, leaf disease, image classify, ML, DL, disease detection, artificial intelligence, agriculture, mobile app, CNN, SVM.

I. INTRODUCTION

Plant diseases are an inherent occurrence that restricts the growth and progress of plants. Plant illnesses mostly result from infestations by fungal organisms, which negatively impact plant growth. Therefore, the identification of plant diseases is crucial in order to prevent potential and lasting damage to crops and plants. Timely detection of plant diseases enables the implementation of preventive measures and minimizes the extent of damage [4].

In the past, farmers used to attempt to identify plant illnesses by visually examining the many signs on plant leaves, a process that was both intricate and time-consuming. Furthermore, any incorrect identification of the crop will result in the use of inappropriate fertilizers, which can cause stress to the plants and lead to nutrient deficiencies in the agricultural field. Consequently, it becomes an unreliable practice [3].

Therefore, employing analysis and detection procedures with the most modern technology available aids farmers in finding solutions to such issues [1], additionally, smartphones and other technologies can offer a high-precision, low-cost substitute [4] to use remotely sensed pictures to detect plant and crop disease. Farmers will be better able to choose which fertilizers to apply to detect plant diseases in their crops if they have access to a mobile-based system that accurately identifies the many forms of plant diseases [3].
In this study, we apply machine learning to address a range of plant diseases. Three steps make up this method's process division: Determine, Examine, and Confirm using the Available Database [1].

II. LITERATURE REVIEW

1) S.S. Harakannanavar,; J.M. Rudagi,; V.I. Puranikmath et al.;[1] During the preprocessing stage, computer vision techniques including contour tracing, HE, K means clustering, and RGB conversion to gray are used. To discriminate between a leaf that is diseased and one that is not, machine learning techniques like SVM, K-NN, and CNN are utilized.
2) Shubham Naik.; Pushpak Chhajed.; Jeet Trivedi.; Prof. Sarika Davare.;[2] Our main work is to apply deep neural networks to detect diseases in practical scenes and under challenging conditions such as luminescence, rigorous climatic conditions, complex background, different images resolution, dimensions, pose and structure. After several attempts our system was able to find good classification results. This paper describes the steps to detect the issue and shows the implementation of problem.
3) Ahmed, A.A.; Reddy, G.H.;[3] Farmers may identify the 38 most prevalent plant illnesses across 14 species with the help of an ML powered plant disease detector. Using an imaging collection of 96,206 images of both healthy and diseased plant leaves—images with cluttered backgrounds, low contrast, and varying illumination conditions—we trained a CNN model. With the use of a convenient smartphone app, the model could analyze a plant image in its natural agricultural setting in less than a second.
4) Siddiqua, A.; Kabir, M.A.; Ferdous, T.; Ali, I.B.; Weston, L.A.;[4] Modern plant disease detection apps need to incorporate these technical improvements because there have been many studies conducted on the plant disease identification,detection, localization, visualization, as well as disease severity estimation. These enhanced plant disease detection applications will soon be available for use in the field by botanists and producers.
5) Mr. Prasham Shah.; Mr. Anshul Kherde.; Mrs. Rasika Solav.; Mrs. Megha Warghane.; Mrs. Nafiya Khan.; Dr. A. A. Khodaskar.; S. W. Wasankar.; Dr V. K. Shandilya.;[5] Using the phone's camera, the application user takes a picture of a leaf from the target plant. Next, image processing is applied to the acquired image. The program then determines whether the plant is healthy or sick based on how accurate the picture is. The outcome will provide the precise name of the ailment along with suggested treatments.
6) L. Li, S. Zhang and B. Wang.;[6] Deep learning has been utilized extensively in voice, natural language, and picture and video processing in recent years due to its benefits for autonomous learning and feature extraction. In addition, it has developed into a hub for research on agricultural plant protection, including the identification of plant diseases and the evaluation of pest ranges.
7) Manjunatha Badiger, Varuna Kumara, Sachin C N Shetty, Sudhir Poojary.;[7] Disease detection uses image processing techniques, which entail mathematical transformations and equations. While a

computer saves images in a mathematical manner, which means it interprets them as numbers, human eyes perceive images as a blend of RGB colors from which we can extract certain features.

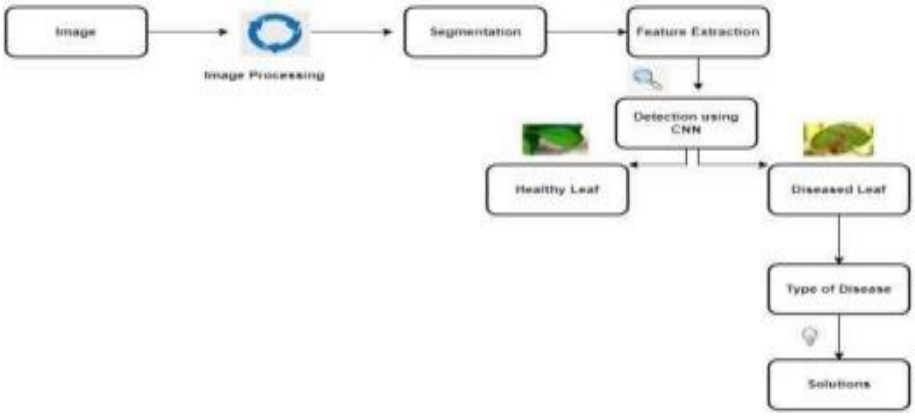

Fig 1: Architecture of Proposed Work

III. EXISTING PROBLEM

Farmers typically use experience to identify pests and plant diseases. This approach is ineffective, tedious, subjective, and time-consuming. Inexperienced farmers may misdiagnose the illness and use the incorrect pesticides while trying to identify it. Pollution of the environment will result from this, which will also cost money. Research is being done on the application of image processing techniques for plant disease recognition in order to prevent these circumstances [6].

IV. PROPOSED METHODOLOGY

This methodology is predicated on the appearance of symptoms on any portion of the plant. The upper or bottom surface of a leaf, fruit, branch, root, etc., can be this portion [9]. Diseases can affect nearly every part of a plant, including the root, stem, leaf, and flower [8].

The model for leaf disease identification was created using machine learning techniques. Fig. 1 illustrates the suggested model for leaf disease diagnosis that uses app-based and machine learning techniques, such segmentation, feature extraction, and CNN detection. SVM, KNN, and CNN are machine learning and deep learning techniques that are used to categorize features and record model performance [1].

4.1 Dataset

The plants that are impacted by various illnesses are taken into consideration based on a database of plant leaves. To conduct the tests for the identification of leaf illness, a variety of pictures of the leaves with various problems will be obtained [1]. A dataset of leaf photos, comprising both healthy and sick samples, can be collected in the event of leaf disease detection. In order to train the CNN model, we will gather a large number of annotated photos of both healthy and diseased plant leaves from several sources, including Google Web Scraper, Kaggle, and Plant Village [3].

4.2 Preprocessing

The photos will undergo preprocessing to ensure that the size and color are uniform. To identify the affected area in leaf photos, the K-means clustering algorithm is used. The K-mean clustering algorithm is used to

determine the image's data center, create clusters inside the image, and determine the distance between the center and the other cluster [1].

4.2.1 Segmentation

Segmentation is the process of dividing a picture of a leaf into distinct sections, such as the healthy and possibly sick portions, based on visual features. It frequently aids in figuring out how effective the feature extraction procedure is [1]. The input image will contain all of the information needed for processing, but the challenge is that the damaged area could be anywhere on the image. To identify the damaged area, CNN and the K-means algorithm will be used to split the image into tiny parts, and image processing will be applied to each component separately [7].

4.3 Feature extraction

In the process of detecting diseases, this is one of the most crucial processes [7]. After gathering the data, the photos must have their features extracted. The leaf and the disease, along with their treatments, can be described using these characteristics [1]. The process of converting unprocessed visual data into numerical features is known as feature extraction. The image's color, intensity, and other elements are changed to highlight the diseases' hidden characteristics. These traits that have been retrieved will assist identify disease promptly and effectively [7].

4.4 Detection using CNN

The Keras development environment is used to implement the CNN model. TensorFlow is the back-end engine for the Python neural network framework Keras, which is available for free. Python developers can create and test deep learning models with relative ease thanks to the Keras packages that operate on top of TensorFlow [3].

4.4.1 Training and Testing

Once the features have been extracted, it is necessary to train a model to detect the disease present. This model can be trained using a machine learning algorithms, CNN. In testing, we use new unseen leaf images to check how well our system accurately identifies healthy and diseased leaves. This helps evaluate the system's real-world performance and accuracy.

V. IMPLEMENTATION

- **Splash Screen**

Fig 2: Splash Screen

The Splash Screen is the first page of the Plant Disease Detection Application. It the first graphical notification the user receive when it visit any application. It appears as an introductory screen of an application. It tells that user has to wait for a few seconds before going on the actual screen of the application.

- **Select Language Page**

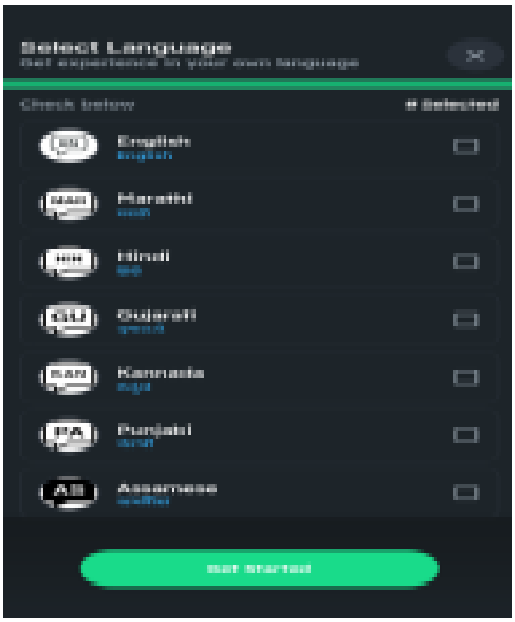

Fig 3: Select Language

The use of the Select Language Page is to choose your preferred language from our wide range of options to enhance your browsing experience. This interactive feature allows users to seamlessly switch between languages, enhancing accessibility and user experience. The page dynamically updates content based on the selected language, ensuring a localized experience for all users. From English to Marathi, Hindi to Gujarati, our website accommodates a diverse global audience.

- **Log In Page**

Fig 4: Login Page

The Log In Page includes two text input fields for entering the name and password. The labels are added inside the fields to guide the user. The Sign Up Here includes a link for users who don't have prior account and wants to create a new account. The Forgot Password includes a link for users who forgot their password, leading to a password reset page. The Sign In Button is used to initiate the login process.

- **Forgot Password Page**

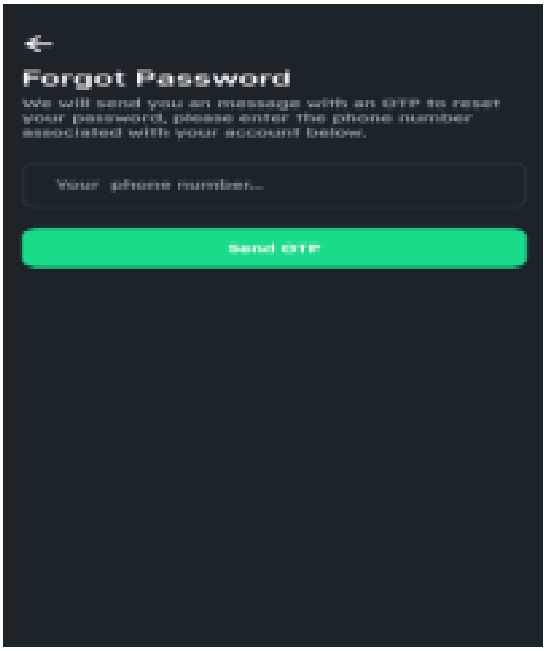

Fig 5: Forgot Password Page

The Forgot Password is used to reset the password. The user will have to enter their mobile number and click on Send OTP. The user will get a message with an OTP which will be further used to reset the password.

- **Sign Up Page**

Fig 6: Sign Up Page

The Sign Up Page includes two text input fields for entering the name and password. The labels are added inside the fields to guide the user. Sign in includes a link for users who have prior account and wants to Sign In into that account. The Sign up Button
is used to initiate the registration.

- **Home Page**

Fig 7: Home Page

Here the user is prompted to either take a picture using their device's camera or upload an existing picture from their device. This picture should be of a plant i.e plant leaf. After the user has taken or uploaded a picture, the user will proceed to the next step. This step includes the image processing and analysis algorithm that examines the plant picture and provides some result or information based on it on next page.

➢ **Plant Details Page**

Fig 8: Plant Details Page

- The Plant Details Page provides cause and the diagnosis report of the detected disease based on the uploaded or captured image. The report might contain information about the plant's health, species identification, potential diseases, care recommendations, etc. Once the analysis is complete, the button Get Preventive Measures provides the user with advice for the detected disease.
- Overall, this page analyzes the plant images for various purposes, including plant identification, disease detection and providing care advice.

VI. CONCLUSION

We have developed a machine learning-based app for plant disease detection that helps farmers identify the most prevalent illnesses. With the use of an imagery dataset made up of numerous images of both healthy and sick plant leaves, we have trained a CNN model. We have created a smartphone app to improve the system's usability and give farmers with limited resources a greater chance to identify plant illnesses early on and avoid using the wrong fertilizers, which can harm the soil and plants alike. The farmer can take a picture of a leaf exhibiting symptoms, and the system will accurately identify the disease's type.

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Sybil Attack Detection in Lightweight Sybil Attack in Moving WNS

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ABSTRACT
No specialist equipment or antennas are required for this approach to operate. With its assistance, Sybil Attacks could be discovered. This process consists of the following three steps: Sybil node types include: Two types of Sybil nodes exist. In order to deceive or avoid detection, it creates and uses many identities at once in the initial instance. In the second type, it is limited to assuming a single identity at once. Value threshold: Ordinary nodes move at a maximum speed of 10 m/s, which is the foundation for the following phase. Any node faster than 10 m/s is considered a Sybil node. This comparison stage determines the upper maximum threshold value for lightweight. The lightweight values of nodes are averaged at a speed of 10 m/s to determine the highest limit.

I. INTRODUCTION

In crisis management, for example, a complex system-of-systems may include sophisticated dispersed systems like completely Ad hoc mobile networks that self-organize. Due to the intricate architecture and constrained resources at each node, lightweight security solutions have long been necessary. For security mechanisms to operate correctly, each node need its own permanent identity, making Sybil assaults all the more important. Sybil attackers may encourage a lack of accountability in the network by, for example, launching a coordinated assault using several identities generated on a single physical device or by attempting to degrade detection by swapping identities. Here, we provide a lightweight approach that, devoid of specialized hardware or a central trusted third party, has the ability to identify the changing identities of Sybil attackers. We show that our proposed system can accurately discover Sybil identities despite the existence of mobility via comprehensive simulations and experimentation on a real-world test bed. Two types of Sybil nodes should be considered separately. In the first, it takes on several personas simultaneously, either by mimicking others or by making up whole new ones. When using Type 2, only one identity is used at a time.

1. At this stage, we set a threshold value of 10m/s, assuming that average network nodes travel at a slower pace. Sybil nodes are defined as those with velocities higher than 10 m/s.

2. In this comparison stage, the maximum threshold value for RSS (Received Signal Strength) is determined. The RSS value is averaged to find the highest value that may be used for nodes moving at 10 m/s. After accounting for each node, the network's RSS is compared to a maximum value.The inclusion of every node, the RSS of the network is compared to a maximum value. Sybil nodes are those with values that are more than or equal to the maximum RSS value.

The Lightweight Sybil AttackDetection

Technique operates without the usage of any additional hardware or antennas. It is used to identify Sybil assaults. This technique includes the following three steps: Sybil node types: There are two kinds of Sybil nodes. In the first kind, it assumes several identities at once, either by impersonating others' identities or creating its own. Only one identification is used at a time in the second kind. Boundary value: This stage makes the assumption that typical nodes cannot move faster than 10 m/s. Sybil nodes are referred to be nodes with a speed more than 10 m/s.

Identifying Sybil nodes is its purpose. Implementing it does not need any additional hardware or antennas. Therefore, it's inexpensive.

1. **Distinct Characters of Sybil Attack**:

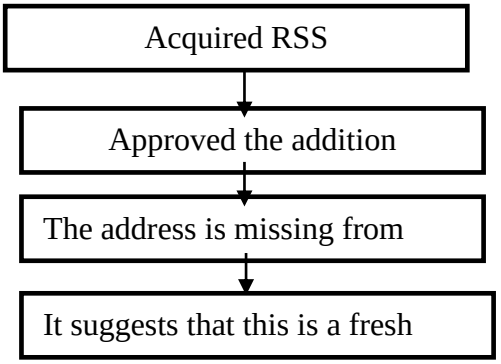
Simultaneous Sybil Attack and Join and Leave, commonly known as Whitewashing Sybil Attack, are two of its characters. One identity is used at a time during a Whitewashing or Join and Leave Attack, and the other identities are forgotten.. Its primary objective here is to undo all of the harm it has done in the past. Furthermore, it makes people less trusting of the network. All of its guises are used simultaneously in Simultaneous Sybil Attack. Its primary goal is to gather more information about the network while simultaneously using more resources, which will cause congestion and confusion.

2. **Enquiry Based on Signal Strength:**

Next, every node in the network will gather data on the RSS values of its nearby peers. Nodes may be classified as authentic or Sybil based on their RSS value. To be deemed a valid node, a newly joined node must have a low RSS value; otherwise, it is called a Sybil node. To keep track of information about its neighbours, each node uses the format.

Exposure of Sybil Nodes:

As a minimum allowable speed, we assume that no legitimate node may go faster than 10 m/s, which is also referred to as the threshold speed. An RSS value is calculated based on the speed. If a node's RSS value is more than or equal to the threshold value, it is classified as a Sybil node.Otherwise, they are considered genuine nodes.



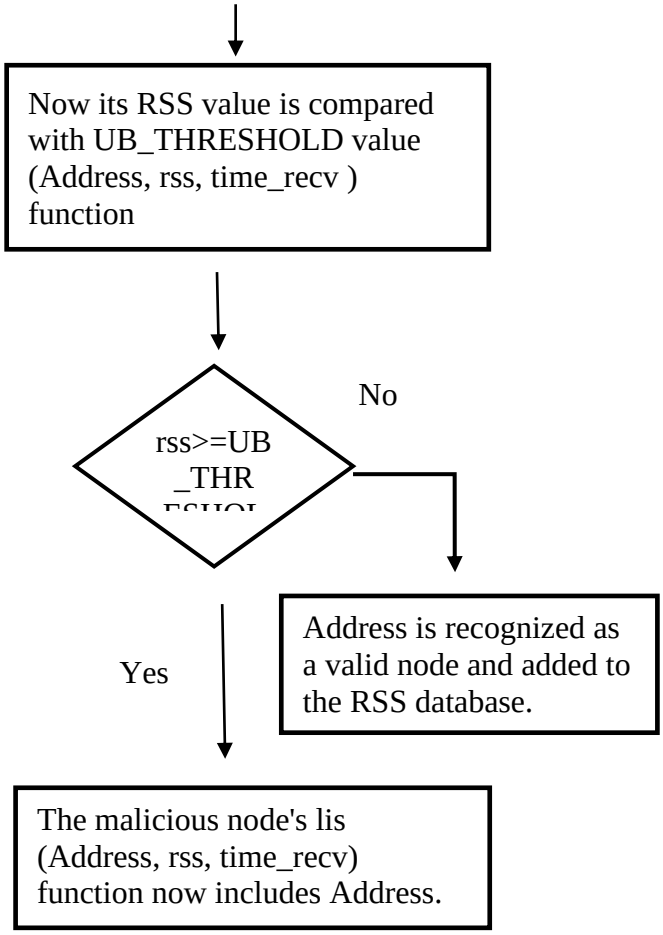


Fig 1.1:Diagram for the Simple lightweightSybil Attack Detection Algorithm

II. ALGORITHM

Input: Network size, Number Sensor Nodes (*M*), Number of Observation Nodes (*N*), Coverage Range (*R*), Transmission Power in db (*Ptx*), Speed Threshold (*Sth*)

Output: Set of Sybil Id's

Initialization

1. Construct a blank network with given input size.
2. Create arbitrary (x,y) positions for every node.
3. Distribute every Sensor node to randomly selected areas.
4. Deploy Observation nodes at logical locations

Simulation Stage

Loop for each Sensor Node

5. Generate random signal for each sensor node with input Transmission Power in db (*Ptx*),
6. Broadcast signal to each observation node in the network.

Measurement Stage

Loop for each Observation Node

7. Measure strength of received signal from each sensor node.

RSSI(i,j)=Received signal by ith Observation Node of jth Sensor Node.

Calculation Stage

Loop for each Sensor Node

8. *For* i=1 to total number of Sensor nodes

Estimate the current from measured received signal strength.

$$Current\ Location = X_i\ Y_i$$

Estimate the Speed of Sensor Node from Current Location and Old Location .

$$Displacement(d) = \sqrt{(X_i - X_i^{'})^2 + (X_i - X_i^{'})^2 m}$$

$$Speed = \frac{Displacement(d)}{Sample\ time\ of\ new\ location\ calculation}\ m/Sec^2$$

Update Old location with new locations,

$$Old\ Location = Current\ Location$$

End

Sybil Node Identification Stage

9. Calculate difference in estimated distance of each sensor node Δd

10. Identify Sybil node by following condition

$$\text{Sybil Node} = \begin{cases} False, & Speed < (Sth) \\ True, & Speed \geq (Sth) \end{cases}$$

III.RESULT

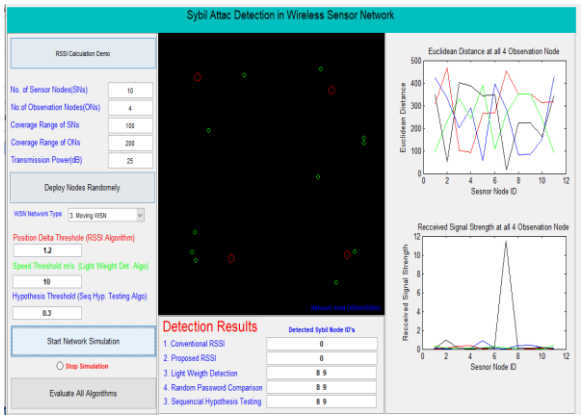
As a means of addressing the issue of Sybil node identification in moving wireless sensor networks (WSN), we conducted an evaluation of a lightweight Sybil node detection approach. This method needed much less resources for detection in comparison to encryption-based methods. Despite this, we discovered that the method showed promise in moving WSN.

This test based on WSN type

1. Moving WNS

Input details for All WSN Type –

1. No Of sensor Nodes(SNs)-10
2. Transmission Power (db)-25
3. Coverage Range of SNs-100
4. Converge Range of Ons-200



IV. CONCLUDING REMARKS

Automatic threshold selection or threshold Learning may be utilized with lightweight methods to get better detection accuracy with less resources. To be more effective in low-cost wireless sensor networks, this technique has to be optimized for the needs of the network. It is necessary to give the Random Password Comparison method further thought.

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Emergency Health Reporting App Based On Fitness Insights

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ABSTRACT
Our real-time smartwatch-based alerting system detects abnormal physiological and activity signals, such as heart rate and steps, that may indicate health risks using the elliptic envelope algorithm. We demonstrated the system's broad applicability by demonstrating its capability to identify anomalous signals prior to the onset of symptoms in a variety of health conditions through retrospective analysis. A dual-level warning mechanism notifies a proactive health management system when the heart rate significantly exceeds normal levels. Our proposal incorporates Fit-o-phile, a web application that offers personalized health recommendations and insights by visualizing and recording anomalous signal patterns while presenting a user-friendly visual interface. It also plans a medical consultation if significant irregularities are detected. It utilizes tailored assistance, reliable insights, and possible emergencies. This open-source, scalable method for early intervention and health monitoring may promote proactive health practices for a wide range of ailments.

Keywords: anomaly detection, heart rate, wearables, elliptic envelope, web application

I. INTRODUCTION

As a result of the assistance that wearable technology provides in the monitoring of healthcare, the medical profession is undergoing a transition. With the introduction of wearable technology, it is now possible to monitor vital signs in real-time. These vital signs include heart rate, the number of steps traveled, and other metrics like as elevation and calories [19]. By employing these instruments, it is feasible to perform uninterrupted and long-term monitoring of the physiological indicators that were previously mentioned. An inherent benefit of this type of technology is its ability to be employed at any given moment and in any given place.

Given the existence of supervised, unsupervised, and semi-supervised algorithms for anomaly detection, it is crucial to monitor people who are in optimal physical condition closely. These algorithms depend on continuous temporal data for analysis. In the process of discovering unexpected patterns, anomaly detection may on occasion produce false positives, which may or may not have any bearing on medical matters. In light of this, it is of the utmost importance to validate the outcomes that are generated by the utilization of anomaly detection techniques by comparing them with the information included in the user's electronic health record (EHR) [6].

The pace at which the heart beats is considered to be the typical vital sign because it reveals changes in the

cycles of the heart. [20,21] Recent research has demonstrated that there has been an increase in the application of this essential characteristic for the goal of inferring a wide variety of heart illnesses. Such an increase has been observed. The application of heart rate data for the goal of assessing and preventing cardiovascular disease is receiving an increasing amount of support from the research that is being conducted. When a person has a high resting heart rate, they are at a greater risk of developing coronary artery disease (CAD) [22]. This is a correlation that exists between the two. Monitoring one's heart rate can provide useful information regarding the normal physiology of the heart, especially in individuals who are doing well physically.

II. DATASET

The dataset utilized in this study was originally collected for COVID-19 research purposes and is publicly available for download from the study data repository (https://storage.googleapis.com/gbsc-gcp-project-ipop_public/COVID-19/COVID-19-Wearables.zip) [1]. Although the primary objective of the dataset was to investigate early detection of COVID-19 using wearable technology, it has been repurposed for the specific focus of this research, which is highlighting abnormal heart rate data to users. The dataset includes de-identified raw heart rate, steps, and sleep data, providing a rich source of information for healthcare monitoring and anomaly detection beyond the scope of COVID-19 detection. By leveraging this dataset, we aim to extract valuable insights that can contribute to broader applications in healthcare analytics and personalized monitoring.

The participants employed various models of Fitbit smartwatches, like Fitbit Ionic, Charge 4, and Charge 3. The gathered data included measurements of heart rate, step count, and sleep duration. The heart rate, steps, and sleep data were collected in JSON format.

III.RELATED WORK

Heart rate and step counts were used by Mishra et al. (2020) in a recent study to detect COVID-19 incidents. They looked at exercise and physiological data from over 5200 participants, 32 of whom had COVID-19 infections identified. The results of the investigation showed that the subjects' resting heart rates were greater than average. To deal with the missing results, two algorithms were created: one that concentrated on heart rate over steps anomaly detection (HROS-AD) and the other on resting heart rate differential (RHR-diff). To observe baseline residuals, one method was to standardize the resting heart rate over a predetermined period. In HROS-AD, an elliptic envelope technique based on machine learning was used to merge the steps and heart rate data. The approach measured the separation between each HROS point and the overall mean in order to identify univariate and multivariate outliers, assuming that the data had a Gaussian distribution. When a point considerably deviates from the predicted Gaussian distribution, it is regarded as an outlier [1].

Another study on anomaly identification[7] in wearable data highlights the importance of swiftly recognizing anomalies and the need for accurate automated methods. Various studies have suggested different procedures, including both traditional statistical methods and advanced machine learning algorithms, to tackle difficulties such as missing data and establishing anomalous bounds. These observations provide the foundation for incorporating advanced anomaly detection algorithms into emergency health reporting applications, allowing for prompt identification of health issues for rapid intervention.

Studies on workout detection[5] using machine learning algorithms have revealed the effectiveness of utilizing wristband-type wearable sensors. These research highlight the capacity of wearable technology to analyze biological data and identify important characteristics like as sleep status, skin temperature, and pulse rate. This can enhance the accuracy of workout recognition algorithms. By incorporating comparable methods into emergency health reporting applications, it is possible to enhance the immediate identification of physical activity during emergencies. This can offer healthcare professionals responding to critical situations with crucial background information.

Systematic reviews and meta-analyses[12] have demonstrated the efficacy of interventions that utilize Fitbit devices in achieving positive outcomes related to a healthy lifestyle. Participants using Fitbit devices have shown notable enhancements in their daily step count, physical activity, and weight management. Integrating Fitbit data into emergency health reporting applications might offer significant insights into individuals' physical activity levels, enabling healthcare professionals to customize interventions and deliver individualized health advice during emergencies using up-to-date fitness data.

Research on machine learning models and evaluation metrics[7,15] highlights the significance of thorough assessment in validating models. Performance fitness and error metrics (PFEMs) are now recognized as essential tools for assessing the validity of models and the accuracy of predictions. By utilizing PFEMs (Portable Field Emission Microscopes) and sophisticated machine learning algorithms in emergency health reporting applications, it guarantees precise and dependable health monitoring that relies on fitness data derived from wearable devices. Moreover, it is recommended to promote interdisciplinary collaboration and implement comprehensive integration and validation methods in order to strengthen the performance evaluation process, thus increasing the overall effectiveness of health monitoring systems.

Previous studies on fatigue detection[14] have heavily relied on intricate EEG equipment, which has restricted its practicality in real-world situations. Recent developments in wearable technology have made it possible to gather physiological data, such as sleep patterns and heart rate, that are closely related to degrees of exhaustion. Researchers seek to automate tiredness detection tasks by utilizing machine learning algorithms and gathering data from widely-used fitness monitors such as Fitbit. This approach shows potential for enhancing safety and well-being across many industries and leisure activities by allowing for the prompt detection of dangers associated with weariness.

Incorporating fitness data from wearable devices into emergency health reporting applications shows great potential for boosting health surveillance and enhancing patient outcomes in critical circumstances. By integrating advanced anomaly detection algorithms such as elliptical envelope[15], and Fitbit data analysis into these applications, healthcare professionals can obtain invaluable insights into individuals' health and fitness levels. This allows for more informed decision-making and targeted interventions in emergencies using . Furthermore, utilizing sophisticated machine learning models such as elliptical envelope[15] to assess performance guarantees the dependability and precision of health monitoring using data from wearable devices, hence augmenting the usefulness of emergency health reporting applications in proactive health management.

IV. METHODOLOGY

- **Fit-O-Phile Web Application**

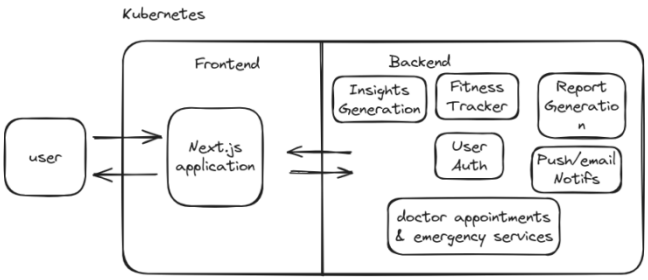

Fig 1: Architecture diagram

Our project uses backend and API development, which is powered by Express and Node.js. Express provides a streamlined approach to routing and middleware management, facilitating the creation of RESTful APIs. Node.js, known for its non-blocking I/O and scalability, complements Express by handling concurrent requests efficiently. Together, these technologies form the foundation of our backend architecture, ensuring robustness and responsiveness in handling data operations and client requests.

Moving on to data storage, we utilize MongoDB as our database solution. MongoDB's NoSQL nature offers flexibility in handling complex data structures and allows for seamless integration with Node.js through libraries like Mongoose. Its document-based storage model simplifies data management and retrieval, making it ideal for applications requiring dynamic and scalable data storage capabilities.

For the user interface development, we employ Next.js, a React framework known for its server-side rendering (SSR) capabilities. Next.js enhances React applications by providing SEO-friendly SSR, improved performance, and efficient routing. This enables us to create dynamic and interactive user interfaces that deliver fast page loads and optimal front-end user experience.

Incorporating machine learning functionality into our application, we integrate FastAPI, a Python web framework designed for building APIs with high performance and asynchronous capabilities. FastAPI's automatic API documentation generation, along with its efficient handling of HTTP requests, makes it well-suited for integrating machine learning models and exposing them through RESTful APIs within our application.

Our application architecture follows a microservices approach, dividing functionalities into smaller, independent services that communicate via APIs. This microservices architecture enhances scalability, flexibility, and maintainability by allowing each service to be developed, deployed, and scaled independently, ensuring optimal performance and resource utilization.

For authentication and authorization, we rely on Keycloak, an open-source identity and access management system. Keycloak provides robust features for user authentication, authorization, and single sign-on (SSO), ensuring secure access control and role-based permissions management within our application.

- **HROS-AD**

The Elliptic Envelope technique, used for anomaly detection, employs Gaussian density estimation to accurately predict the covariance of the data. Outliers are detected by examining data that follows a multivariate Gaussian distribution and identifying instances that go outside the robust covariance estimate. Consequently, this algorithm generates a fictitious ellipsoid encircling a provided dataset. Values falling within the envelope are regarded as representative/normal data, whereas any value outside the envelope is categorized as an outlier[18]. It computes the Mahalanobis distance [2] for each observation from the expected distribution

and identifies data that surpass a specified threshold as anomalies. The algorithm's simplicity stems from its capacity to find both univariate and multivariate outliers, rendering it a powerful instrument for pinpointing exceptional data points in datasets. This method improves data analysis by identifying anomalies that could distort results or suggest abnormalities in the underlying distribution of data.In real-world datasets, it is common for the dimensions (columns in the dataset) to be correlated with each other.When circumstances like these arise, depending on the distribution of points as measured by the Euclidean distance between a given point and the cluster's center may yield imprecise or inadequate data regarding the point's actual proximity to the cluster. Mahalanobis distance is preferred over Euclidean distance because it first transforms the columns into uncorrelated variables, then scales the columns to equalize their variances, and last calculates the Euclidean distance.[23]

By leveraging these technologies and architectural principles, our methodology ensures the development of a scalable, performant, and secure web application capable of handling complex functionalities and delivering an exceptional user experience.

- **Working:**

1. **Data Preprocessing:**

- The heart rate (HR) and steps data are loaded from CSV files into pandas dataframes - The HROS (Heart Rate Over Steps) feature is calculated by dividing the heart rate by the steps data, filtering data points where steps are zero and also 12 minutes ahead.
- Moving averages (mean = 400 hours) are applied to smoothen the HROS data, followed by downsampling to one-hour intervals to obtain average values.

2. **Seasonality Correction:**

- Seasonal decomposition is performed on the HROS data using the seasonal_decompose function from statsmodels.
- The trend and residual components are extracted from the decomposition to correct for any seasonality effects in the data.

3. **Standardization:**

- The seasonality-corrected data is standardized using the StandardScaler() function from sklearn.preprocessing to have a zero mean and unit variance (Z-score normalization).

4. **Anomaly Detection with Elliptic Envelope:**

- Anomaly detection is carried out using the EllipticEnvelope class from sklearn.covariance, which fits a Gaussian distribution to the standardized data and identifies outliers/anomalies.
- The contamination parameter is set to the specified outliers_fraction (e.g., 0.1) to control the proportion of outliers detected.

5. **Visualization and Results Saving:**

- The results of anomaly detection are visualized using matplotlib to plot the standardized HROS data with detected anomalies highlighted.
- Anomalies are saved to both a PDF file for visualization and a CSV file for further analysis.

- The visualization includes markers for symptom date and diagnosis date if provided, aiding in understanding the temporal context of anomalies.

6. Web interface:

- Alongside visualizations, the code implements alert notifications triggered by anomalies, ensuring timely intervention and healthcare provider engagement, user profiles, etc
- Analytics dashboards present aggregated reports derived from the input data, highlighting trends, patterns, and abnormalities for comprehensive health monitoring and furthermore directing patients to schedule a doctor appointment.

- **MATHEMATICAL EQUATION**

The Elliptic Envelope algorithm fits a robust covariance estimate to the data, considering observations that are consistent with a multivariate Gaussian distribution and identifying outliers as observations lying outside the robust covariance estimate. The key equation involved in this algorithm is:

$$\text{EllipticEnvelope}(X) = \begin{cases} 1 & \text{if } (X-\mu)^T\Sigma^{-1}(X-\mu) \leq \chi^2_{p,\alpha} \\ -1 & \text{otherwise} \end{cases}$$

Where:

- (X) is the input data matrix with (n) observations and (p) features.
- (μ) is the estimated mean vector.
- (Σ) is the estimated covariance matrix.
- $(\chi^2_{p,\alpha})$ is the threshold value based on the Chi-square distribution with (p) degrees of freedom at significance level (α).

This equation represents the decision boundary used by the Elliptic Envelope algorithm to classify observations as normal (inliers) or anomalous (outliers) based on their Mahalanobis distance from the estimated distribution. An observation with a Mahalanobis distance exceeding the threshold $(\chi^2_{p,\alpha})$ is considered an outlier.

V. RESULTS AND DISCUSSION

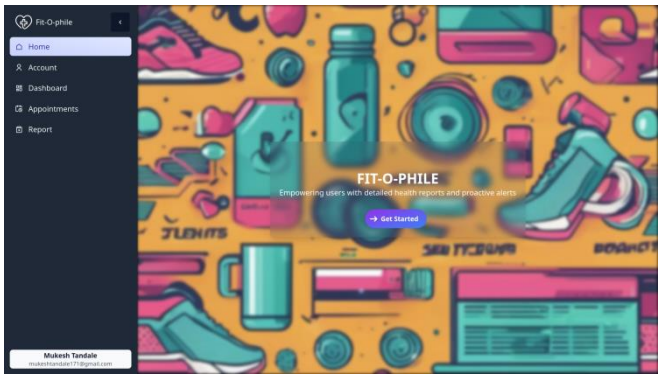

Fig 2: Home page of Web App

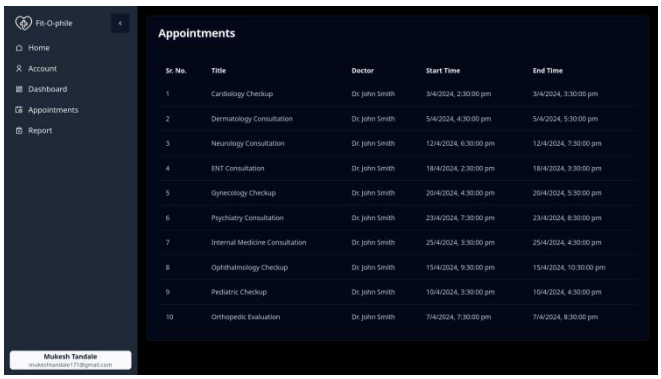

Fig 3: Appointments Page

Fig 4: Dashboard

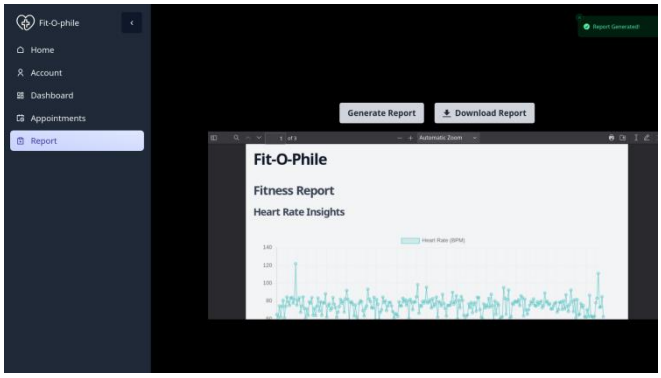

Fig 5: Report Page

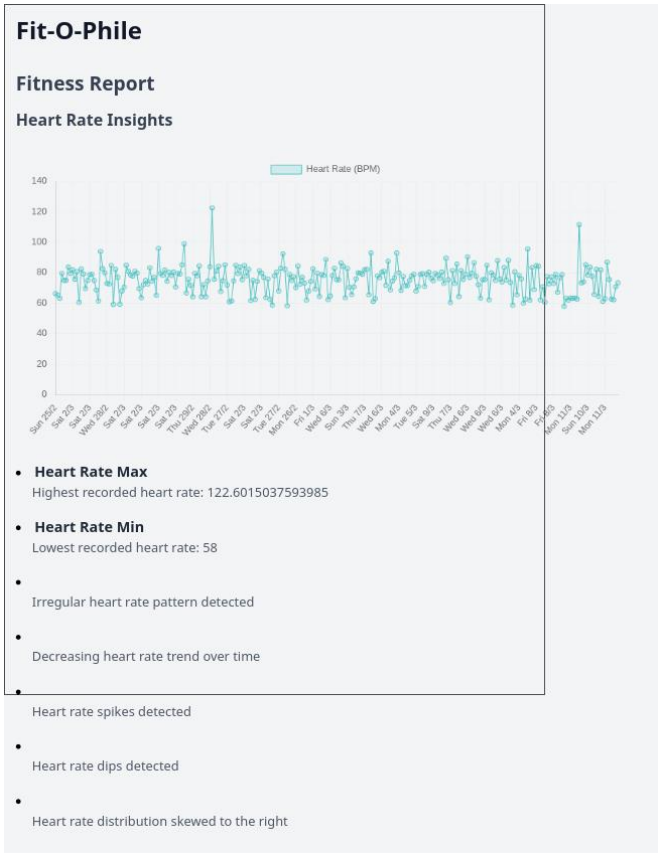

Fig 6: PDF Report Page 1

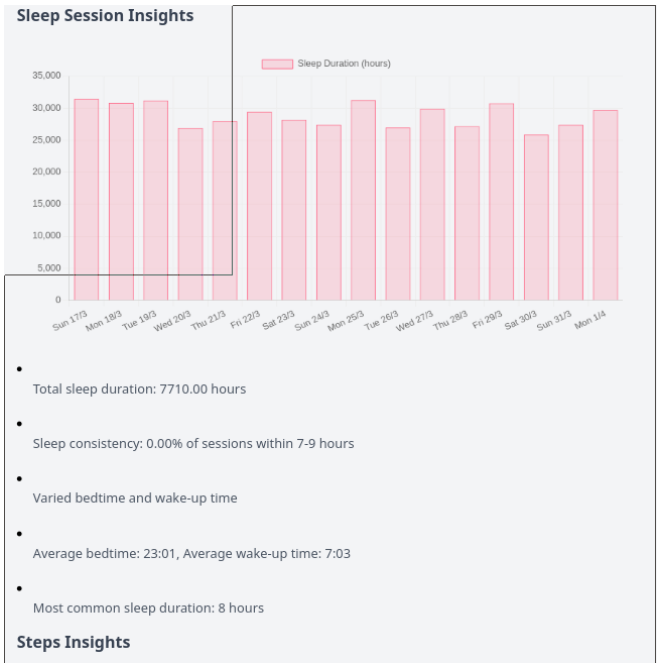

Fig 7: PDF Report Page 2

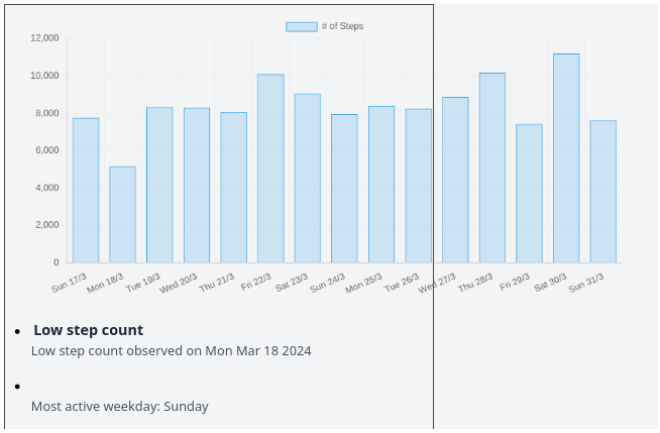

Fig 8: PDF Report Page 3

VI. CONCLUSION

Our project has developed a robust anomaly detection method, HROS-AD, leveraging the combination of elliptic envelope and Gaussian density estimation techniques. This approach effectively identifies anomalies in heart rate over steps (HROS) data, providing valuable insights into physiological irregularities. Additionally, we have integrated a user-friendly web application interface that allows users to interact with the system, including functionalities such as booking appointments with healthcare providers upon anomaly detection. The web app also features an analytics dashboard that offers personalized insights based on user input, ensuring a proactive approach to healthcare monitoring. Furthermore, alert notifications are triggered in real time if abnormalities are detected, enabling prompt intervention and management. In terms of future scope, integrating GPS services can enhance the system's capabilities by incorporating location-based data for contextual analysis. Additionally, modeling patients with pre-existing ailments such as high blood pressure and diabetes can further refine anomaly detection algorithms, tailoring them to specific health conditions. Overall, our project presents a comprehensive solution for proactive healthcare monitoring, bridging the gap between data analytics, user interface, and clinical intervention for improved patient outcomes and healthcare efficiency.

VII. ACKNOWLEDGEMENT

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VIII. REFERENCES

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Medical Image Analysis Using Transfer Learning

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ABSTRACT

Medical image analysis using transfer learning being the foundation of this project, showcases a machine learning technique that saves time and resources in classifying lung diseases. It entails refining an already trained model to classify and extract features from images. initially trained on a diverse dataset. Instead of starting from scratch for each new image classification task, practitioners can fine-tune the pre-trained model for specific applications. We yielded an initial accuracy of 81% through Inception V3 and ResNet models after which with ongoing efforts dedicated; we received better results which reached a remarkable accuracy of 96% on DenseNet121 model.The abstract encapsulates the essence of transfer learning as a dynamic tool amplifying model accuracy and efficiency, exemplified in our pursuit of excellence within the intricate landscape of lung disease detection. This study explores the transformative capability of transfer learning, shaping the future in image analysis for a context to Pre- trained CNN models for specific applications.

KEYWORDS: Accuracy, CNN models, Datasets, DenseNet121, Feature extraction, Features, Medical Image Analysis, Image Classification, Image Net, Inception V3, Pre-trained model, ResNet, Transfer learning

I. INTRODUCTION

In today's technologically fast-paced world the concept of CNN Models and Transfer Learning plays an important role in the sector of medical diagnosis and imaging, highlighting their advantages in accuracy and resource efficiency. It addresses challenges like data diversity and model interpretability, while suggesting future research directions. Ultimately, it underscores the scope in the concept of CNN models and transfer learning to revolutionize medical diagnosis, emphasizing the need for ongoing development to overcome current limitations. The project's primary focus revolves around addressing the scarcity of extensive medical image datasets suitable for training deep neural networks effectively. It aims to develop training methodologies utilizing a diverse aggregated medical image dataset, with the goal of extracting broadly applicable medical features that can enhance performance in analyzing lung diseases.In a broader context, medical image analysis encompasses important processes like object detection, classification of images,segmentation, and description, all which play integral roles in various applications like medical diagnosis, self-driving cars, and security systems. The increasing demand for accurate and efficient image analysis, especially in real- time scenarios like disease detection, symptom understanding underscores the importance of this endeavor.

Existing systems often struggle with accuracy and efficiency due to limited training data and reliance on manually crafted features. However, transfer learning offers a promising solution by enabling the development of precise and efficient systems, even with limited labelled data, while also improvinggeneralization to new tasks and data. In the domain of image analysis, the concept of transfer learning is increasingly recognized as essential for diverse practical applications. A variety of widely used pre- trained models, including Xception, VGGNet, DenseNet121 and InceptionV3 are available for transfer learning in image analysis. Moreover, there are popular open-source frameworks such as TensorFlow Object Detection API, PyTorch Lightning, and Detectron2,which provide robust tools for performing imageanalysis tasks.

II. LITERATURE SURVEY

Inthepursuitofadvancingtransferlearningprocesses,severalimpactfularticlescontributeuniquemethodologies.In[1] thetopicdelvesintothe concept of transfer learning (TL) with CNNfor medical image identification. Examining 425articles,itrecommendsdeepmodelslikeit,Inception,emphasizingtheirefficiencyinovercomingdatascarcity. The [2] titled as "TL-med: A Two-stage transfer learning recognitionmodelformedicalimagesofCOVID-19."Addressestheminimalnumberoflabelledimages by ideating transfer learning model (TL-Med) of two stages. It uses main features fromdiverse data which refines them with large-scalemedicaldata,addressingthechallengeofinsufficient labelled COVID-19 data. The resultson dataset demonstrate a recognition accuracy of93.24%,showingthemodel'saccuracyeffectiveness in detecting disease images. In [3]the authors have studied the concept of CNN andprocess of transfer learning in medical diagnosis,highlightingtheiradvantagesinaccuracyandresource efficiency. It addresses challenges likedata diversity and model interpretability,whilesuggesting future research directions. Ultimately,itshowcasesthepotentialofCNNandtheconceptoftransferlearningtorevolutionizediagnosispractices,emphasizingtheneedforongoingdevelopmenttoovercomecurrentlimitations.

In[4]theauthorshaveaddressedtheglobalimpactofCOVIDwhichfocusesonitschallengesindetection.Itproposesadeeplearning method, specifically using (CNN) withmodels like VGG16. Results indicate VGG16'ssuperiorperformance(98.00%accuracy),showing the use as avaluable tool for effectiveCOVID-19detection,aidinghealthcareprofessionalsindecision-makingforoptimaltherapy with minimal resources. In 2016, Liu andauthors [5] proposed the SSD algorithm for fastobject detection. Both SSD and YOLO are highlyefficient, but SSD uses multi-scale feature mapswhichaiddetectingobjectsatdifferentscales.Asdeepnetworksreducespatialresolution,detectingsmallobjectsatlowresolutionsbecomes challenging, affecting accuracy. YOLOlacksmulti- scalefeaturesandreliesonsmoothing lower-resolution maps. Recent studies applied deepCNNs for COVID-19 pneumonia detection from X-rays,achievinghighaccuracy,precision,andsensitivity.SomeusedtransferlearningwithResNet50 on small 339 instance datasets, obtaining96.2% accuracy models. The disease of COVID wasdetected using the concept CNN in a chest by theauthors of [6]. They have investigated the use ofdifferent approaches for detecting COVID-19 frommedical imaging data like chest X-rays, with mostachievinganaccuracyrangeof90-94%.Theapproach involves fine-tuning the top layers of thepre-trainedmodelswhiletransferringthelearnedlow-level features to the new customized models.OnesuchapproachbyXiao[7]onresidualnetworks and multiple instances learning for binaryclassification of COVID-19 from CT scans. AnotherstudybyPanwaretal.proposedabinaryclassification model using a fine- tuned VGG modeltodetectCOVID-19frominputimages.Additionally,theyemployedGrad-CAMvisualizationtechniquestoprovidecolor-codedexplanations, making the deep learning model

moreinterpretable.Thekeyideaistoutilizethepowerfulfeatureextractioncapabilitiesofpre-trainedmodelslikeResNet50andVGG,whilecustomizing and fine-tuning them for the specifictaskofCOVID-19detectionfromCTimages,aimingtodevelopaccurateandexplainablediagnosticmodels.

III.METHODOLOGY

Ourresearchmethodologyfortransferlearninginvolvedtrainingandimplementing aCNNarchitecture, resulting in an accuracy of 96% usingtheDenseNet-121model.Activationfunctionsutilized in this approach were ReLU and Softmax.[8].

3.1 DATASET INFORMATION

TheimagesofCTscansofhumanlungsareincluded in the dataset. CT scan is a type of X-raythat is used to diagnose the sensitive inner organs ofhumanbodyprecisely.Amedicalimagescollectionfromvarioussourcescomprisesthisdataset;asumof17,704images, outof which12,351imagesaredirectedtowardstrainingand5,353 images for the purpose of testing the model.Thedistributionofimagesacrossclassesrevealsthatthedatasetisrelativelybalanced,witheach class having a substantial number of images. The classes include Normal, Mass, Pneumonia, and COVID, with Normal having the highest number of images at 4,685, followed closely by Mass at4,528, Pneumonia at 4,273, and COVID at 4,219.Thetrainingsetdistributionisalso balanced,with Normal having3,280 images, mass having3,170 images, Pneumonia having 2,992images,and COVID having 2,909 images. The testing setdistributionfollowsasimilarpattern,withNormal, mass, Pneumonia, and COVID having1,405,1,358,1,281,and1,310images, respectively.Thisdatasetprovidesacomprehensive and \balanced collection of imagesfor training and testing purposes in the context ofdiagnosing respiratory conditions using medicalimaging.Thedataset'sreliabilityisensuredthroughacquisitionfromreputableorganizations.

3.2 CNN ARCHITECTURE

Our model begins with an input layer, capturingrawpixelvaluesofmedicalimages.Convolutionallayersextractfeatureshierarchically,identifyingpatternslikeedgesandshapes.Werepurposeapre-trainedconvolutional base, facilitating featureextractionfrommedicalimages.Poolinglayersaidinretainingrelevantspatialfeatures,withMaxpooling enhancing focus on critical details. Batchnormalizationstabilizeslearning,particularlybeneficialfordiversemedicaldata.Dropoutlayers prevent overfitting by excluding neuronsduringtraining.Thefullyconnectedlayertranslatesfeaturesintoclassprobabilities,adapting specifically to medical image nuances.Fig.1 represents the 3D CNN architecture ofthe model.

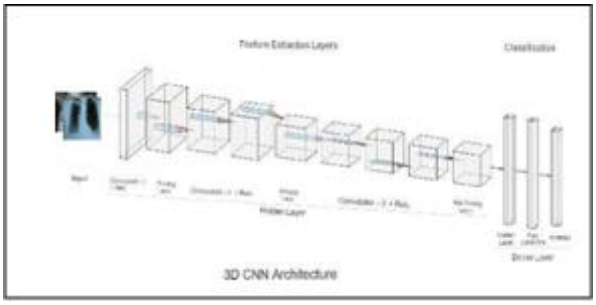


Fig. 13D CNN Architecture

3.3 TRANSFER LEARNING METHODOLOGY

TheusageofpreTrainedCNNmodelssuchasVGG,ResNet50, Xception, InceptionV3, MobileNetV2andDenseNet,weevaluatetheireffectivenesson our dataset. These base models, sourced fromTensorFlow,havetheirclassificationlayersreplaced to match our dataset's four output classes.Whilethepre-trainedweightsareretained,newclassification layer weights are initialized randomly.Unlike freezing the convolutional layers, we fine-tune all layers on our dataset, allowing optimizationfor our specific task. To address the challenge oftraining neural networks with limited data, transferlearning was applied using a tiny training dataset togenerate a feature set for managing lung diseasesand Cancer cases. The dataset, being considerablysmaller, takes greater time to build a perfect model.Fig. 2 given below represents the flowchart ofhowtransferlearningprocesstakesplace.Therefore, the models described were sourced frompre-trained models tohelp identify lung diseases.[9].

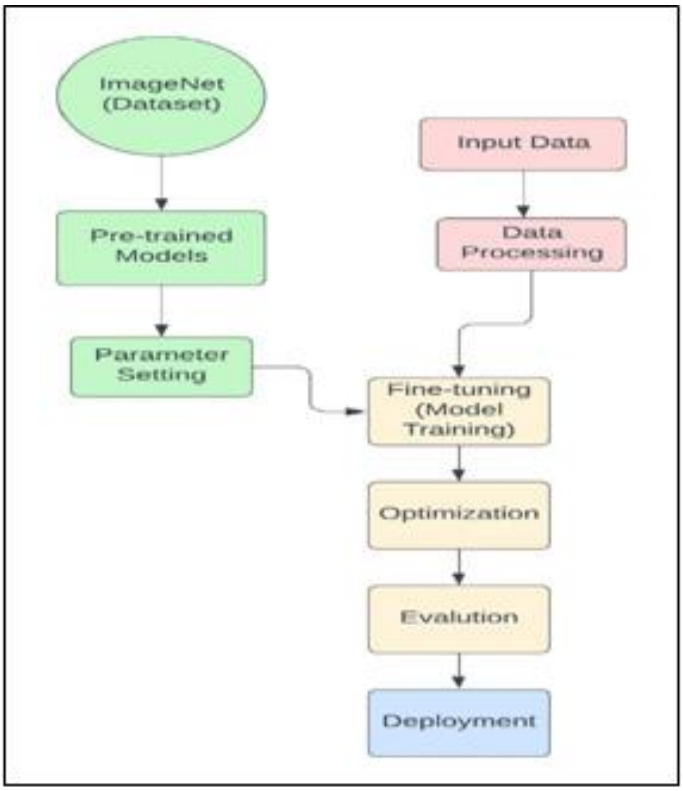


Fig. 2Flowchart of Transfer Learning Process

3.4 MODELS USED

i. DenseNet121

DenseNet121,introducedbyHuang[18],enhancestheResNet50architecturebyunderstandingconnections,ensuring thatevery layer has connections with all theotherlayerspresent.Thiscomputationallybuiltnetworkallowsfortheusageoffeatureswhile allocating and keeping the parametersaslessaspossible.

ii. InceptionV3

InceptionV3 addresses the issue of positionvariabilityinimagesbyincorporatingmultipletypesofkernelsonthesamepedestal,whichresultsinincreasingthenetwork. The Inception contents allow for thesimultaneousoperationofmanykernels.InceptionV3 is an extension of InceptionV2,addressingrepresentationalbottleneckconcerns.

iii. Xception

Xceptionusesdepth-wiseseparableconvolution layers to map spatial and cross-channelcorrelations,decouplingtheminCNNfeaturemaps.Itbuildsonthefundamentaldesignof Inception,with36layers which are divided into modules whereeachmodulehas links.

iv. VGG19

VGG19 consists of more layers than CNNmodelswithlesskernels,makingthemsuitableforunderstandingtheimagecharacteristics,particularlyinthemedicaldomain.

v. InceptionResNetV2(IRv2)

InceptionResNetV2(IRv2)[11]combinestheconceptsofInceptionandResNet,incorporatingresidualconnectionswithinInceptionmodules.Thisarchitectureenhancesfeaturelearningbyenablingthenetworktoleverageboththeefficientinceptionmoduleandtheresidualconnections,leadingtoimprovedperformancein various tasks.

vi. MobileNetV2

MobileNetV2 is used for devices used in mobile and edge services aiming to provide efficient and lightweightmodelswithoutcompromisingaccuracy.Itdepictsresidualswhichareinverted and the feature of linear bottlenecks tobuilddeepermodelswithfewerparametersmaking MobileNetV2 suitable for where eachmodulehas links.

3.5 ACTIVATION FUNCTIONS

ReLUactivationfunctionintroducesnon-linearityinourCNN,appliedaftereachconvolutional and dense layer.It efficientlyactivates neurons, aiding faster training andmitigatingthevanishinggradientproblem.Softmaxinthefinaloutputlayerconvertslogitsintoprobabilityscores,crucialforinterpretingmodelpredictionsasclassprobabilities.

3.6 TRAINING PROCEDURE

ConvolutionalNeuralNetworks(CNNs)haverevolutionizedimageidentification,especially in tasks likeimage classification.Thesenetworksare typically used to analyzevisualimageryandhavebeenextensivelytrainedusingframeworkslikeKeras[13]withaTensorFlowbackend.ThelargeImageNetdataset,containing1.2millionimages,hasbeenpivotalindevelopinggeneralmodelsforimagerecognition.Transferlearningisoftenappliedtogeneralizethelearningfrom ImageNettoother datasets, especially when the model ispre-trained. Fig. 3 given below shows themultiplelayersthatareinvolvedinthetrainingprocedureofCNN model.[14]

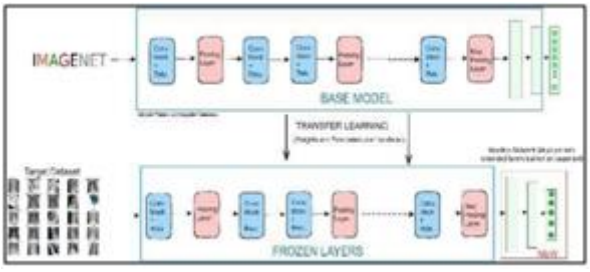


Fig. 3 Layers involved in Training Procedure

For our model, we have used various alreadytrainedmodelssuchasDenseNet121,InceptionV3, Xception, InceptionResNetV2,MobileNetV2,VGG19andmanymore.Adaptingthesemodelsforourbinaryclassificationtaskofdetectinglungdiseasesandnormalcases,weenhancedtheoutputlayerofthemodelintoabinaryclassifier.This involved

flattening the output from theearlierlayer to a one-dimensional array andaddingaDropoutlayertopreventoverfitting.
Thefinaloutputconsistedofadenselayerwith a Softmax functionforpredicting classprobabilities.TheAdamoptimizer [20] andcross-entropy for a loss function were used fortraining. Overall, these techniques and modelswerecrucialindevelopinganefficientandaccuratemodelfordetectinglungdiseases.Models undergo 10 epochs of training with abatchsizeof32images,minimizingcategoricalcross-entropyloss.Ifvalidationfailstoimprovebyat least0.001forthreeconsecutive epochs, preventing overfitting andensuring robust performanceon unseen data.

3.7 HYPERPARAMETERS

A learning rate of 0.001 safeguards previouslylearned features during fine- tuning, with theAdamoptimizerchosenfor adaptabilityandefficientconvergence.Abatchsizeof32balancesefficiencyandmemory constraints.10 epochs suffice for fine-tuning, with dropoutregularizationintroducedtopreventoverfitting.ReLUandSoftmaxactivationsareappliedstrategicallythroughoutthenetwork.

3.8 MATHEMATICAL EQUATION

In a completely connected layer, every neuronis connected to other neurons in the previouslayer.ThelayerofoutputYofafullyconnected layercan becalculatedusing thevalue of the input vector X, the weight W, andfinallythebiasvectordenotesbyb.Theactivationfunctionidentifiestheabsenceoflinearityintotheconnection.Oneofthemajorly used activationfunction in this studyis ReLU (Rectified Linear Unit), [15] whichshows the output as it is given it is positive, ifnotthenshowszero.effectivelyintroducing absence of linearity concept to the model. Another majorly absence of linearity concept to the model. Anothermajorlyusedactivationfunctionin this project is Softmax which is important formulti-classclassificationproblems.Softmaxtransforms the raw scores into the probabilities,makingitsuitableforclassificationtasks.Eq. 1 given below represents the formulafor the ReLU that is used in the transfer learningprocess. Along with it theEq. 2 represents the formula for Softmax used in theproject.

$$Y = \mathrm{ReLU}(W \,.\, X + b) \quad (1)$$

$$\mathrm{Softmax}(x_i) = \frac{e^{x_i}}{\sum_{j=1}^{N} e^{x_j}} \quad (2)$$

IV. RESULTS AND DISCUSSION

Thestudycalculatestheresultsusingtheterminologiesof Precision,RecallandAccuracy. [19] These parameters are importantforstudyingamedicalsystemforlungdiseases identification.

I) PrecisionValue

Precision is a concept that studies how strongthe modelrecognizes the right samples and isnear to the expected output.The higher the valueof precision shows, the higher is the positivesample. The below Eq. 3 identifies theprecisionforderiving results.

$$\text{Precision} = \frac{TP}{TP+FP} \quad (3)$$

II) Recall Value

The increased and better accuracy[16] in first identifying the target instance and the value of likelihood bothresult into a greater recall value. The formula to calculate recall is shown in Eq. 4.

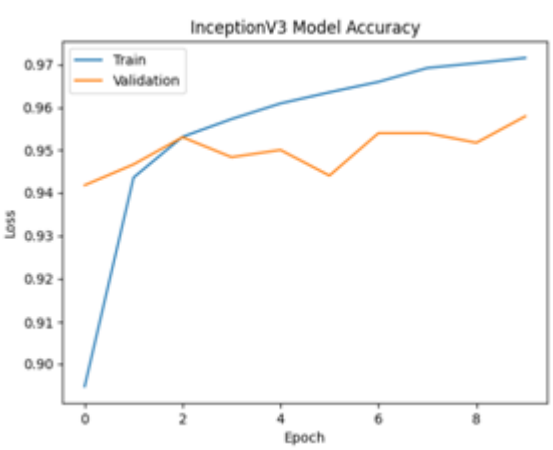
$$\text{Recall} = \frac{TP}{TP+FN} \quad (4)$$

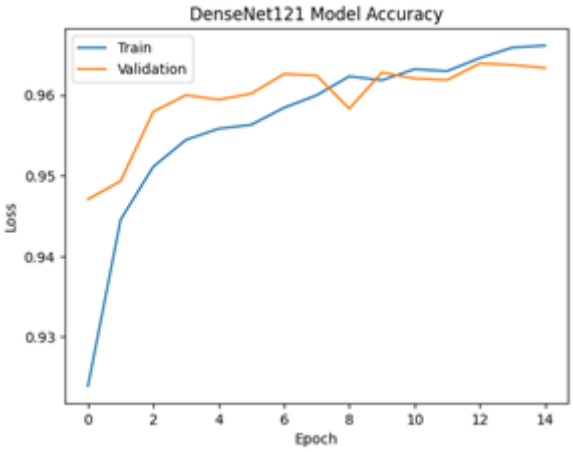
III) AccuracyValue

Accuracy can be stated as the ratio of correctpredictions that are made to the value of totalnumberofsamplesusedunderstudy.Eq. 5 is depicting the formula used to find theaccuracy of models in the project.

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN} \quad (5)$$

In the evaluation, DenseNet121 showed the best performance among the tested models. Following closely were VGG19 and ResNet50.[17] Fig. 4 and Fig. 5 given below depict the graphs of Accuracy and Loss Value of DenseNet121 Model respectively.These results highlight the impact of using transfer learning in process of detecting lung diseases in CT scans. By using transformation-based bespoke models, it is possible to further improve the performance of deep CNN models to achieve accuracy levels exceeding 90% across all performance criteria. The low False Positive Rate (FPR) of the proposed method makes it suitable for real-world screening settings.





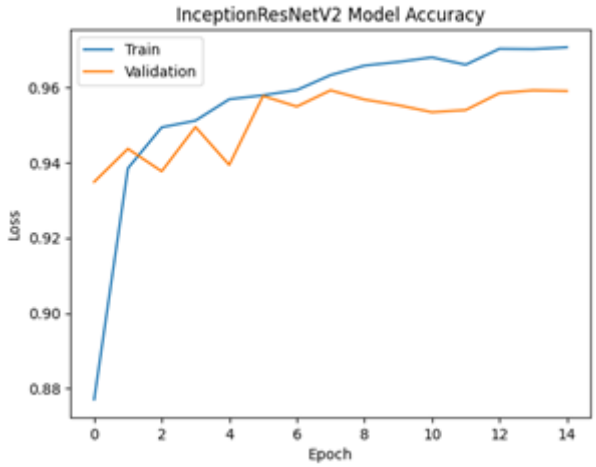
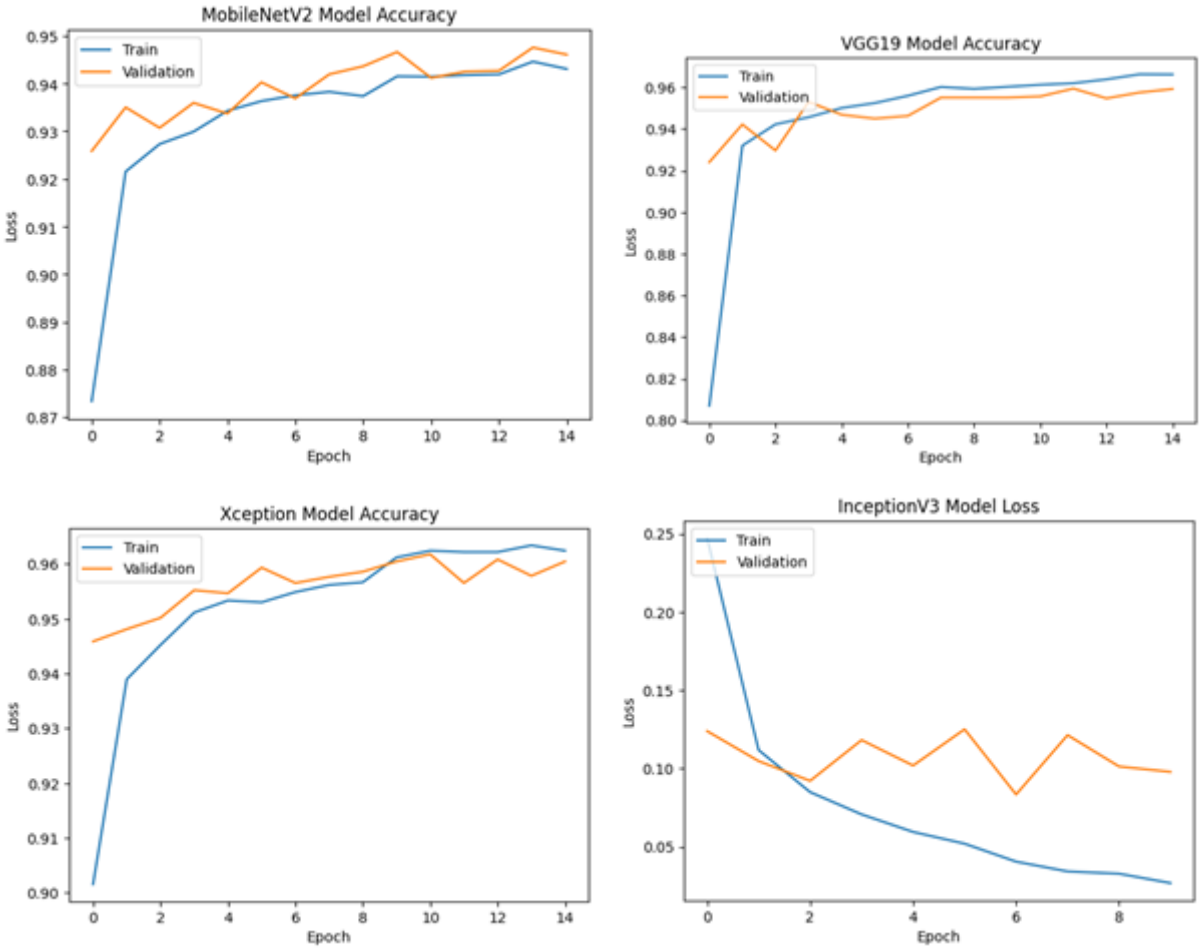


Figure 4: Graph of Results of Accuracy of CNN Models



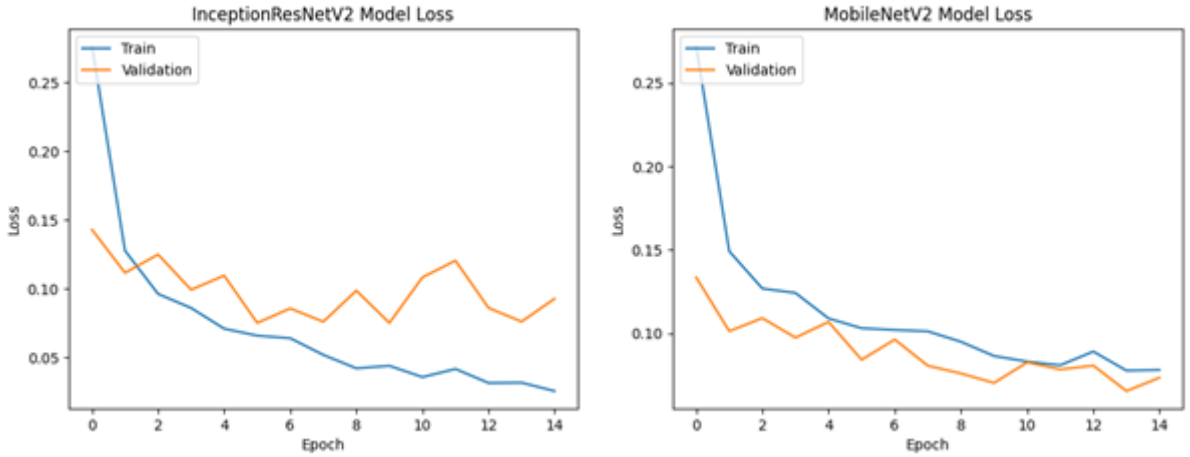
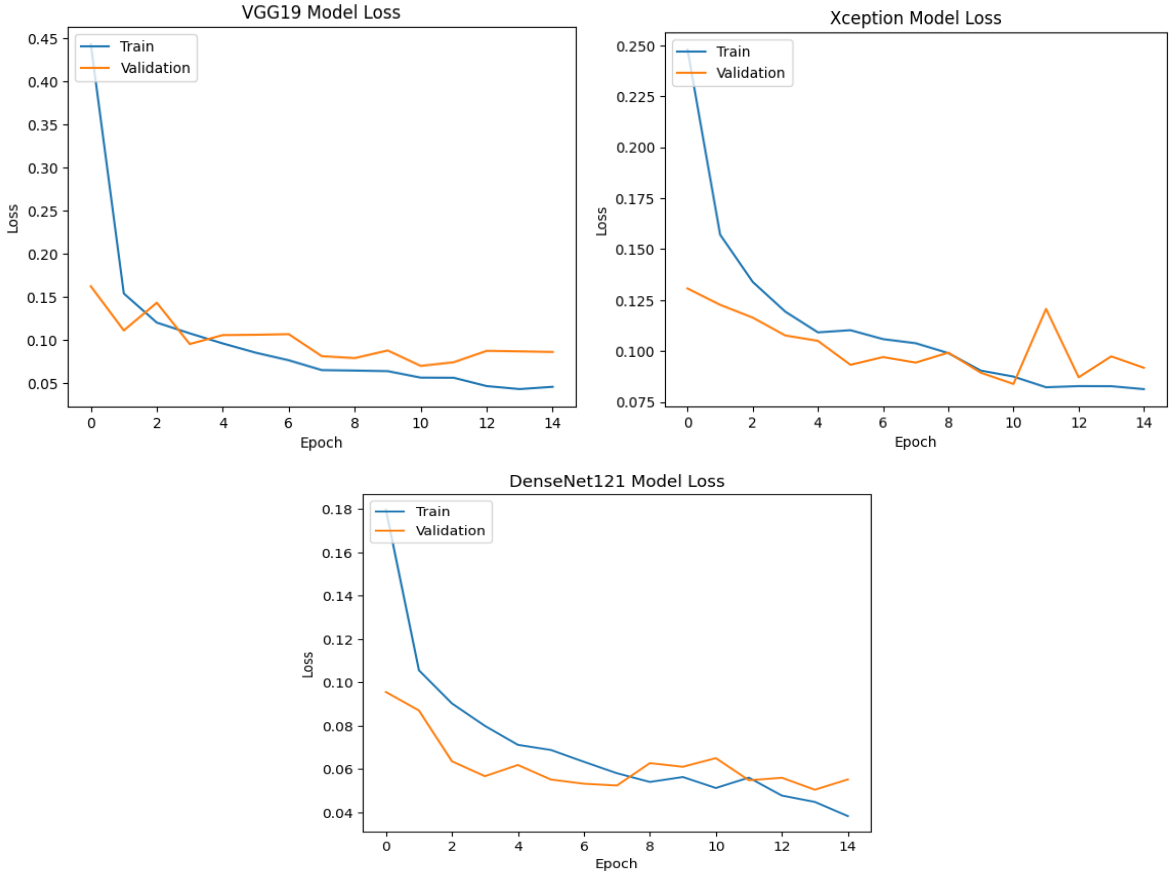


Figure 5: Graphs of Results of Loss Value Models



V. CONCLUSION

This paper serves as a valuable starting point for individuals in the deep learning field who are utilizing transfer learning. It offers guidance on selecting optimal methodologies to improve model accuracy, as evidenced by achieving 96% accuracy using the DenseNet-121 model. Additionally, the study conducts an analysis of different CNN architectures employed in classifying lung diseases from medical images. It showcases how advancements in deep learning algorithms yield promising results, augmenting radiologists' capabilities. The

models based on CNN have found an impactful use in the domain of healthcare and medical diagnosis. The study shows usage of multiple CNN image processing and classification models to detect lung diseases using images of CT scan of patients using transfer learning. The findings indicate that the method used achieves exceptional findings, with accuracy percentage exceeding 90% and low false positive rate. The results suggest that CNN-based methods can impact the control of lung disease spread by providing rapid screening. Given the widespread use of DL-based approaches in other medical imaging applications, their implementation in lung disease screening is timely. The analysis highlights DenseNet121 as a standout performer due to its smaller parameter size and minimal training time, surpassing other CNN models. Finally, the study shows the results of transfer learning-based transformations to detect lung diseases in suspected patients using CT scan images.

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Hand Riter: A Handwriting Generation Tool

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ABSTRACT
HandRiter is an AI tool which converts digital text into handwritten sequences. The implementation and theory of HandRiter is based on the paper 'Generating Sequences with Recurrent Neural networks' [1] by Alex Graves. HandRiter uses Recurrent Neural Networks (RNN) with Mixture Density output layer to predict parameters of a distribution. The deep learning architecture behind HandRiter is composed of RNN with stacked LSTM layers as hidden layers and mixture density layer as output layer. The deep learning model has been trained on Online Handwriting Dataset viz. IAM Online Handwriting Database. The architecture is able to generate sequences with high accuracy and is able to synthesize human-like handwriting. A user-friendly interface is used to make the usage of tool easy .

Keywords- LSTM, RNN, Online Handwriting, Deep Learning, Mixture Density Layer, Probability Distribution Parameters.

I. INTRODUCTION

In the contemporary digital landscape, characterized by the pervasive use of electronic devices for communication, there arises an increasing demand for technologies that effectively bridge the gap between traditional and modern forms of interaction. Handwriting, as a deeply personal mode of expression, retains its significance across diverse aspects of human life, ranging from the formal act of signing documents to the intimate exchange of emotions through handwritten notes. HandRiter emerges as a tool poised to preserve the timeless and personal essence inherent in handwritten communication within the context of today's digital era.

The methodology section of this paper elucidates the operational workflow of the HandRiter tool, delineating its constituent process modules, namely the preprocessing module, handwriting synthesis module, and visualization module. Additionally, it furnishes a concise overview of the underlying deep learning architecture employed by the tool. By scrutinizing these implementation intricacies, the subsequent sections of this paper will provide a detailed exploration of the design, functionality, and empirical results of the HandRiter tool.

II. METHODOLOGY

Dataset

(Online handwriting data, defined here as writing recorded as a sequence of pen-tip locations, contrasts with offline handwriting, where only page images are available.)All data utilized in this paper were sourced from the IAM online handwriting database (IAM-OnDB) generated by University ofBern [6].IAM-OnDB comprises handwritten lines obtained from 221 distinct writers utilizing a 'smart whiteboard'. Writers were instructed to transcribe forms from the Lancaster-Oslo-Bergen text corpus [2], with their pen positions tracked via an infra-red device situated in the board's corner. The use of online handwriting proves appealing for sequence generation due to its reduced dimensionality (two real numbers per data point) and straightforward visualization.

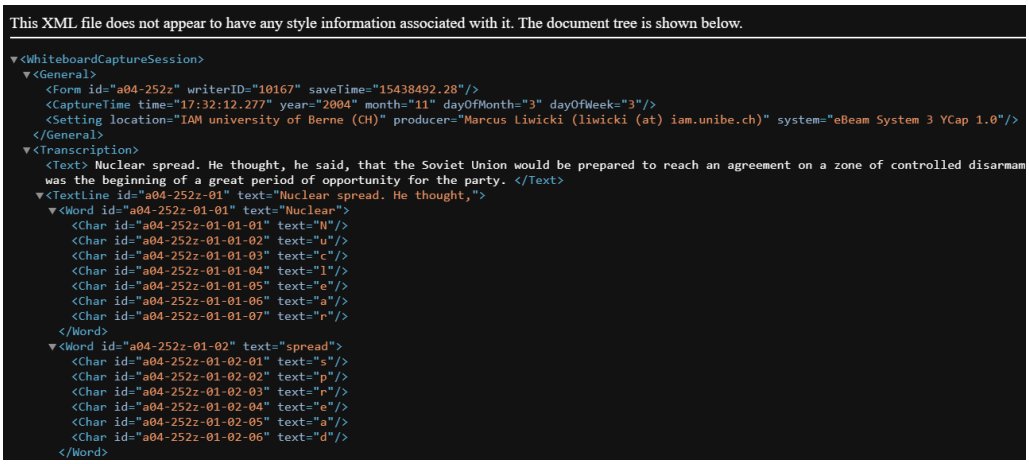


Fig. [1] XML File screenshot

The original input data includes the x and y pen coordinates, along with indicators denoting points in the sequence when the pen is lifted off the whiteboard. It consisted of 1561 XML documents which were a compiled form of information including writer name, writer id, written text, recorded pen-point coordinates, time to write, etc.

Neural Network Architecture

The Neural network architecture of HandRiter is depicted in Figure [2] which consists of;

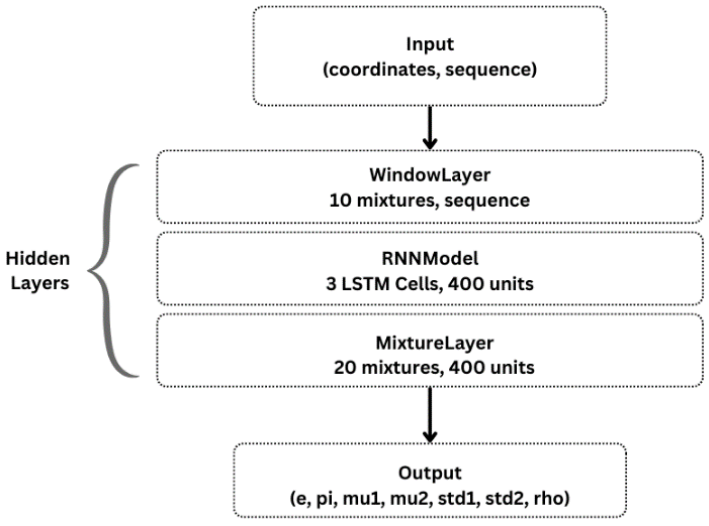


Fig. [2] NN Architecture

- Input Data:The input to the model consists of twomain components:

Coordinates: A sequence of (x, y) coordinates representing the position of points in the handwritten text.

Sequence: A one-hot encoded sequence of characters representing the text input.

- WindowLayer:The WindowLayer processes the inputsequence and computes weights to focus on different parts of the sequence. It generates a weighted sum of the sequence and provides additional information such as the last_phi, which represents the end of a stroke.
- RNNModel (LSTM Cells + Window):TheRNNModel comprises 3 stacked LSTM cells each with 400 units that process the input coordinates and the information from the WindowLayer. The LSTM cells capture sequential dependencies in the input data, allowing the model to understand the context of the handwriting.
- MixtureLayer (Mixture Density Net):TheMixtureLayer takes the output from the LSTM cells and computes parameters for a probability distribution. This distribution is a mixture of Gaussian components, and the parameters include means, standard deviations, correlations, mixture weights, and an additional parameter controlling whether to continue generating (Sigmoid activation).
- Output:The final output of the model is a set of parameters that describe a probability distribution for the next coordinate in the sequence. Here, for each generated stroke, the data includes:

mu1: Mean of the x-coordinate for the stroke.

mu2: Mean of the y-coordinate for the stroke.

std1: Standard deviation of the x-coordinate for the stroke.

std2: Standard deviation of the y-coordinate for the stroke.

rho: Correlation coefficient between the x and y coordinates of the stroke.

coord: The "end" information for the stroke, indicating whether the stroke is considered finished (1) or not (0).

Training& Generation

During training, the model was optimized to predict the parameters that best describe the distribution of the training data. The training process involved minimizing a Binary Cross Entropy loss function that compares the predicted distribution with the actual coordinates in the training data.The training phase included totally 50 epochs which gave the most satisfying results with an average training loss of0.0119.

Training Summary:

The following table provides the training summary of neural network (Trained for 50 epochs for a batch size of 64).

Loss Function : Binary Cross Entropy

Epoch	Average Training loss	Average Validation loss	Time Elapsed
1	2.1465	0.3796	522.2829s
2	0.6808	0.0910	1059.2167s
3	0.4648	-0.0855	1597.5622s
…	…		…
48	0.0266	-0.4273	26896.3895s
49	0.0204	-0.4377	27503.6155s

50	0.0119	-0.4588	28108.1501s

Table 1 Training Summary Of Neural Network

During the generation phase, the model was used to generate new handwriting by sampling from the learned distribution. The Sigmoid activation helps determine when to stop the generation process.

Following are some generated samples:
Prompts :{"Abstract Beauty", "Artificial Intelligence", "Hello, World!", "Machine learning"}

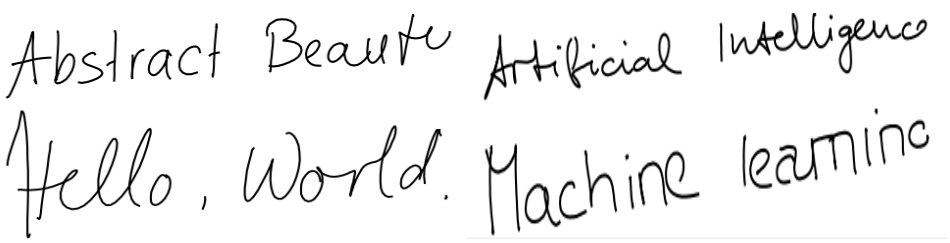


Fig [3] Samples Generated after Training

Overall, the model learns the patterns and dependencies in the handwritten text data and is capable of generating new sequences of coordinates that resemble handwritten text. The mixture density network allows the model to capture the uncertainty and variability in the handwriting, making it suitable for generating diverse and realistic handwritten sequences.

Operational Workflow

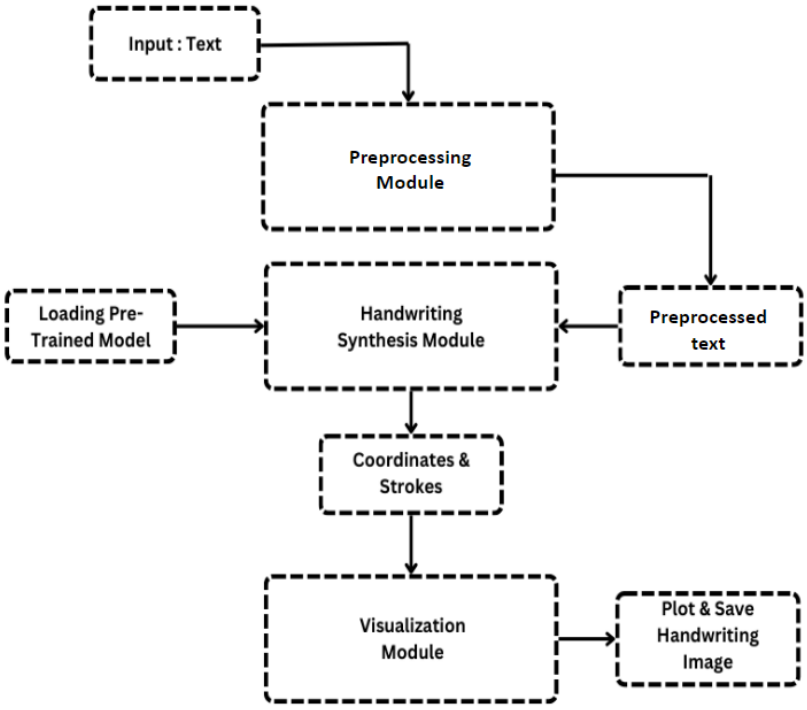


Fig. [4] Operational Workflow

The operational workflow of the tool is depicted in Figure [4], illustrating three main modules:

1. Preprocessing Module: Upon receiving input from the user via the User Interface (UI), the text undergoes immediate preprocessing before being forwarded to the Handwriting Synthesis module. This preprocessing step involves segmenting the input sequence into individual characters and subsequently applying one-hot encoding.
2. Handwriting Synthesis Module: Within this module, the pretrained weights of the Neural Network are utilized to sample text coordinates and strokes, leveraging distribution parameters obtained from the mixture density output layer.
3. Visualization Module: The Visualization module employs matplotlib, a data visualization library from Python, to generate visual representations of the handwritten sequences. This facilitates the graphical depiction and interpretation of the synthesized content.

III. RESULTS

Upon subjecting the Neural Network to rigorous training using the IAM Dataset for a total of 50 epochs, we achieved commendable outcomes. However, it is imperative to acknowledge that the attained results, while satisfying, were somewhat constrained by computational limitations. The intricacies and demands of the training process, coupled with the scale of the IAM Dataset, posed challenges that impacted the full realization of optimal performance. Despite encountering these computational constraints, the obtained results provide valuable insights and underscore the potential of the Neural Network.

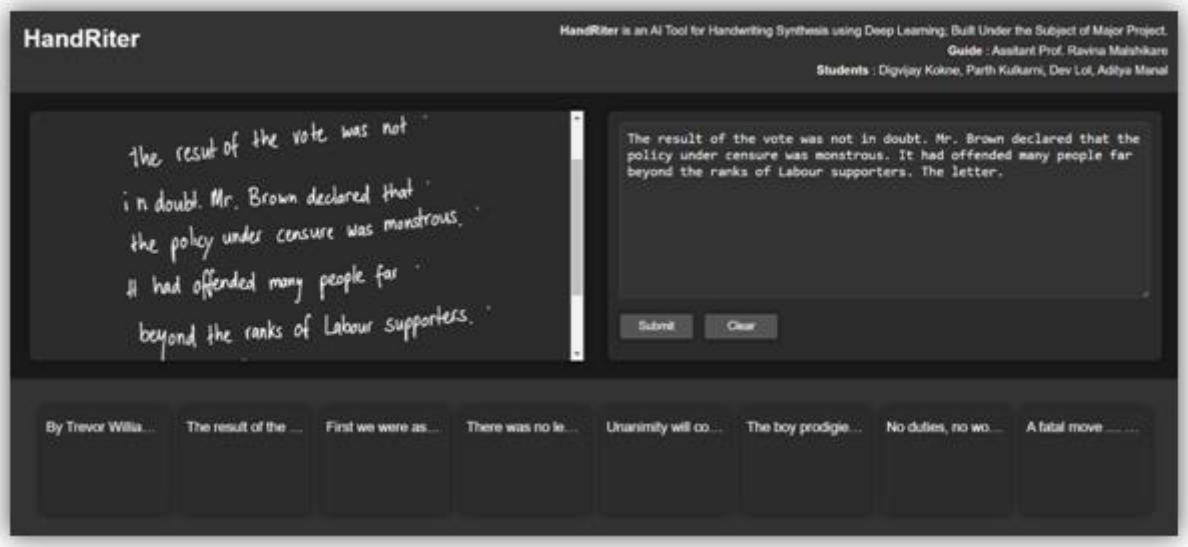
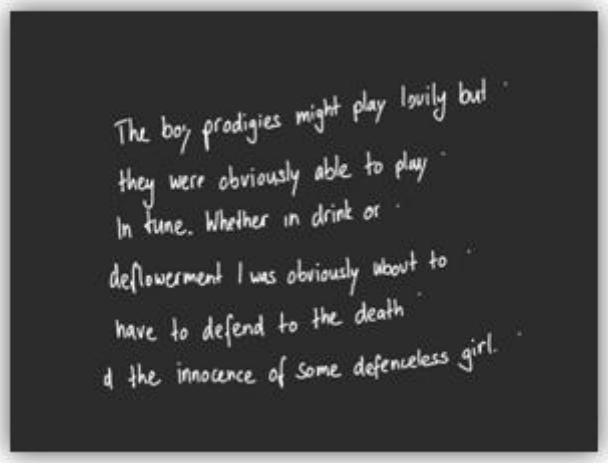


Fig. [5] HandRiter UI displaying generated handwritingusing pretrained weights

User Input: “The boy prodigies might play loudly but they were obviously able to play in tune. Whether in drink or deflowerment I was obviously about to have to defend to the death the innocence of some defenceless girl.”



IV. CONCLUSION

Despite the impressive results achieved after subjecting the Neural Network to rigorous training using the IAM Online Handwriting Dataset for a total of 50 epochs, it is imperative to acknowledge the impact of computational limitations on the attained performance. Limited amount of data and training period led to some discrepancies in the results such as addition of extra character '.' after end of each line and inclination of generated handwriting as number of characters in a particular line increase. But aside from that the system has given eventually good results.

It is worth noting that while our model demonstrated proficiency in generating sentences, its limitation to this scope highlights ample room for improvement. This limitation underscores the need for continued research and innovation in the field, aiming to broaden the model's capabilities and enhance its efficacy across diverse contexts of handwriting generation.

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Analysis Brain Tumor Segmentation Using a custom 3D UNet Model on Limited Dataset

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ABSTRACT
Semantic segmentation plays a pivotal role within the theoretical domain, facilitating a meticulous and precise comprehension of medical scans at the pixel level.In this scholarly contribution, I shall elucidate the results of my research endeavours subsequent to the implementation of a custom 3D Net model. The essence of this work lies in the comprehensive evaluation and analysis of these models using the BraTS 2020 dataset. This endeavour aims to urnish medical professionals with essential insights for enhancing their understanding and enabling informed decision-making when faced with diverse medical challenges, especially when the data.

Keywords—BrainTumor,3DUnet,DiceLoss,FocalLoss, MedSem, UniverSeg, Segmentation, MRI Scans,FCT, electron microscopy images, enhancing tumour,peritumoral edema, necrotic and non-en-enhancingtumour

I. INTRODUCTION

Thisresearchpaperintroducesanimplementationfocusedonthecriticaltaskofsemanticsegmentationwithintherealm ofcomputervision. Semantic segmentation involves the precise assignment of labels to each individual pixel within an image, and its applications span a wide range of fields, including autonomous driving,image and video analysis, medical imaging,andsceneunderstanding.Notably, deep learning techniques have consistently demonstrated significant advancements and effectiveness in the domain of semantic segmentation.

The primary emphasis of this paper centres on the segmentation of brain tumours. We conduct a comprehensive comparative analysis of variable segmentation models while employing the BraTS 2021 dataset. The principal objective of this project is to provide valuable insights and comparisons intended for researchers and medical practitioners with a vested interest in brain tumour diagnosis through semantic segmentation.

Our exploration delves into the practical implementation of TensorFlow models, with a specific focus on the examination of the Unet [9] architecture. These neural networks have garnered attention as recent positions for semantic segmentation tasks.

Thecoreaimofourinvestigationistogainacomprehensiveunderstandingofthearchitecturalintricaciesoftheseindivid ualmodelsandtoelucidatetheiroperationalmechanisms.

To enhance the accessibility and utility of our work, we have undertaken meticulous documentation of the codebase.Thisdocumentationincludesexplicitandcomprehensiveinstructionsthatfacilitateeaseofuse. Moreover,

our documentation encompasses in-depth explanations of the training procedures applied in the context of our research. In the pursuit of efficiency, we have also harnessed pre-trained weights, which expedite the fine-tuning of the model on our specific datasets,streamliningtheresearchprocess.

II. LITERATURESURVEY

The Brain Tumor Segmentation (BraTS)dataset undergoes updates and improvements fromyeartoyear.BraTS 2019includesasubstantialnumber of patient cases with high-resolution brainMRIscans.Thedatasetincludesmulti-modalimages,includingT1-weighted,T2-weighted,FLAIR, and post-contrast T1-weighted images Thetumor annotations inBraTS 2019 were carefullydelineatedbyexpertradiologists.Thedatasetprovidesgroundtruthsegmentationsforglioblastoma, astrocytoma, and oligodendrogliomatumors.BraTS2019wasusedasabenchmarkfor evaluatingbraintumorsegmentationalgorithms,withparticipantsintheBraTSChallengesubmittingtheirsegmentation resultsforevaluationBraTS2020,likeitspredecessor,isknownforitslargeandhigh-quality dataset,providing awide variety ofmulti-modalMRIimagesandexpertannotationsforbraintumorsegmentation.

BraTS 2020 introduced new sub-tasks inthe BraTS Challenge, including the segmentation ofthree tumorsub-compartments: enhancing tumor,peritumoral edema, and non-enhancing tumor. Thisadditionaimedtofurtheradvancethefieldbyencouraging the development of more fine-grainedsegmentationmethods.BraTS2020alsoemphasizedtheimportanceofmodelingtumorheterogeneitybyprovid ingmoreextensiveannotations and adding more tumor types, makingthedatasetmorerepresentativeofreal-worldclinicalscenarios. The 2020 dataset continues to be highlyrelevant to clinical practice, as accurate brain tumorsegmentationiscrucialfordiagnosis,treatmentplanning, andpatientmonitoring.

UNetisaconvolutionalneuralnetwork(CNN)architecturethatwasdevelopedforsemanticsegmentationtasksinmedic alimageanalysis.Itwasintroduced by Olaf Ranneberger, Philipp Fischer,andThomas Broxin2015.UNethas becomeafoundationalarchitectureforvariousimagesegmentationtasks,particularlyinthemedicalfield,due to its effectiveness incapturingfine-graineddetails and preserving spatial context. Here's a briefoverviewofUNetfollowsanencoder-decoderarchitecture.Theencoderconsistsofseveralconvolutionalandmax-poolinglayersthatprogressivelyreducethespatialdimensionsandincreasethedepthoffeaturemaps.

The decoder, on the other hand, comprisesup-samplingandconcatenationoperationstorecoverspatialinformationandgeneratehigh-resolutionfeature maps.AdistinctivefeatureofUNet is the inclusion of skip connections. Theseconnectionslinkcorrespondingencoderanddecoderlayers,enablingthemodeltoretainandreusefeatureinformation at different scales. This helps preservefinedetailsduringtheup-samplingprocessandcontributes tomoreaccuratesegmentation.

In the middle of the network, there is abottlenecklayer,whichtypically hasthe highestfeaturedimensionality.Thislayeractsasabottleneckintheinformationflow,forcingthenetworktolearncompact andinformativerepresentations.

Dependingonthespecificsegmentationtask,UNetcan have a SoftMax or sigmoid activation functionin its final layer. For binary segmentation tasks, asigmoidfunctionisoftenused,whileformulti-class segmentation,SoftMaxisemployed.UNetwasinitiallydesignedforbiomedicalimagesegmentation, specifically for the segmentation ofneuronal structures in electron microscopy images.However, it hasbeenwidely

adoptedinvariousimage segmentation tasks, including medical imagesegmentation(e.g.,braintumorandorgansegmentation),industrialinspection,andsatelliteimageanalysis Researchers often customize UNet to suittheirspecificsegmentationtasks.Thiscustomizationcaninvolvemodifyingthearchitecture, incorporating attention mechanisms, oradjustingthelossfunctionstooptimizeperformancefor particular applications. UNet is known for itssimplicity,effectiveness,andefficiency.Itiscapableofproducinghigh-qualitysegmentationresultswithrelatively smallamountsoftrainingdata. The skip connections allow it to capture bothlocalandglobalcontext,makingitsuitablefortaskswithvaryingscalesandcomplexobjectshapes.While UNet is powerful, it may still face challengeswith imbalanced datasets, handling class imbalanceinsegmentationtasks,andtheprecisedelineationofobjectboundaries,whichcanbeparticularlyimportantin medicalimageanalysis.

Overall, UNet remains a popular choice for imagesegmentation tasks due to its architectural designandadaptabilityforvariousapplications.Researchers and practitioners continue to build onitsfoundationby extending andcustomizingthearchitecturetoaddressspecificchallengesinsegmentation.

Our study involved the studying and understandingof experiments across several datasets to illustratetherobustnessofthe3D-UCapsframework,encompassing iSeg-2017, LUNA16, Hippocampus,andCardiacdatasets.Inourresearch,wehavedemonstratedthatourmethodconsistentlysurpassesprevious Capsule networks and 3D-Unets. The keyinnovation,DilatedDenseAttentionUnet[8](DDAUnet), capitalizes on the inclusion of spatialandchannelattentiongateswithineachdenseblock.Thesegatesenableselectivefocusonpivotalfeaturemapsand regions.Furthermore,dilatedconvolutionallayershavebeenemployedtomanageGPU memory efficiently and expand the network'sreceptivefield.

Our investigation also entailed the implementationof various Unet Models for Image Segmentation,includingUnet,RCNN-Unet,AttentionUnet,RCNN-AttentionUnet, andNestedUnet[9].Theintroduction of Attention gates (AG)[10] has been asignificantdevelopmentinthe realmofmedicalimaging,asitautonomouslylearnstoconcentrateontargetstructuresofvaryingshapesandsizes.Models trained with AGs implicitly acquire the ability tosuppress irrelevant regions in input images whileaccentuatingsalientfeaturesrelevanttospecifictasks. Consequently, there is no longer a need forexternaltissue/organlocalizationmodulesincascaded convolutionalneuralnetworks (CNNs).

Toaddressthedemandforefficientskinlesionsegmentation[11], we have designed a lightweightmodel that delivers competitive performance withminimal parameters and computational complexity.OurRecurrentConvolutionalNeuralNetwork(RCNN)andRecurrentResidualConvolutionalNeural Network (RRCNN) models, named RU-Netand R2U-Net[12], draw on the strengths of U-Net,ResidualNetworks,andRCNN.Thesearchitecturesofferseveraladvantagesforsegmentationtasks,including improved feature representation, makingthemwell-suitedformedicalimagesegmentationonbenchmark datasets like blood vessel segmentationinretinaimages,skincancersegmentation,andlunglesionsegmentation.

The UNet 3+ model[13], which integrates full-scaleskip connections and deep supervisions, has beendevelopedtoenhancesegmentationaccuracy.Theseskip connections merge low-level details with high-levelsemanticsfromfeaturemapsofvariousscales.Deepsupervisionfosterstheacquisitionofhierarchical representations from the amalgamatedfull-scalefeaturemaps.UNet3+isparticularlyadvantageousfororgansthatappearatvaryingscales. In addition to boosting accuracy, this modelreducesnetworkparameterstoenhancecomputational efficiency. We have also introduceda

hybrid loss function and a classification-guidedmoduletorefineorganboundariesandmitigateover-segmentationinnon-organimages,therebyyieldingmoreprecisesegmentationresults.
Lastly,weintroduceSwin-Unet[14],apureTransformer-basedapproachformedicalimagesegmentation. This model utilizes tokenized imagepatchesandemploysaTransformer-basedU-shapedEncoder-Decoderarchitecturewithskip-connectionsforlocal-globalsemanticfeaturelearning. The encoder leverages hierarchical
SwinTransformerswithshiftedwindowstoextractcontextfeatures,whilethedecoder,basedonsymmetricSwinTransformers,performsup-sampling to restore spatial feature map resolution.Experimentsonmulti-organandcardiacsegmentationtaskshaveshownthatthispureTransformer-based approach outperforms methodsrelyingonfull-convolutionorcombinationsoftransformersandconvolutions.
FromthisitisevidentthattheUNetmodelsareusedextensivelyinmedicalsegmentationFeilds

III.METHODOLOGY

TheBrainTumourSegmentation(BraTS)dataset is widely used in the field of medical imageanalysis,particularlyforbraintumoursegmentation,duetoseveralcompellingreasons.TheBraTSdatasetencompassesvarioustypesofbraintumours,includingglioblastoma,astrocytoma,andoligodendroglioma,amongothers.Itincludesmultiple MRI modalities, such as T1-weighted, T2-weighted,FLAIR,and post-contrastT1-weightedimages. This diversity in tumour types and imagingmodalities allows researchers to test the robustnessand adaptability of segmentation algorithms acrossdifferentclinicalscenariosThe BraTS datasetissubstantialinsize,with asubstantial numberofpatient cases, and it is meticulously annotated byexperts.
The dataset includes both training and testingsubsets, facilitating the development and evaluationof segmentation algorithms. The large, high-qualitydatasetminimizestheriskofoverfittingandenhances the generalization of models to real-worldclinicaldata.Braintumoursegmentationisachallengingtaskdueto thecomplexshapesandinfiltrative nature of tumours. The BraTS datasetincludesgroundtruthsegmentationsthatarecarefullydelineatedbyradiologists,providingavaluablebenchmarkforalgorithmevaluation.Researchers can compare the performance of theirmethods against these expert annotations to assessthe accuracy and reliability of their segmentationmodels.
TheBraTSChallenge,associatedwiththedataset, has been held annually and has become abenchmarkfortheevaluationofbraintumoursegmentation algorithms. Researchers from aroundthe world participate in this challenge, contributingto a collaborative and competitive environment thatdrivesinnovationinthefield.Itallowsforfaircomparisonsbetweendifferentapproachesandencouragesthedevelopmentofstate-of-the-artmethods. Brain tumour segmentation is of criticalimportanceinclinicalpractice.
Accurate tumour segmentation plays a crucialroleinthediagnosis,treatmentplanning,andmonitoringofbraintumourpatients.Algorithmsdeveloped and validated on the BraTS dataset canpotentially beintegratedintoclinicalworkflows,aiding radiologists and healthcare professionals inmaking informed decisions. The BraTS dataset ispubliclyavailable,makingitaccessibletoresearchers, enabling them to conduct experimentsand develop segmentation models without the needfor extensive data collection and annotation, whichcanbecostlyandtime-consumingTheBraTSdataset has evolved overthe years, incorporatingnewchallenges,sub-datasets,andupdatedannotations. This continuous development ensuresthatitremainsarelevantandup-to-dateresourceforthe researchcommunity. The BraTS dataset is avaluableresourceforbrain tumour segmentation

researchduetoitsdiversity,size,expertannotations,benchmarkstatus,clinicalrelevance,andaccessibility.Itservesasafoundationforthedevelopmentandevaluationofstate-of-the-artsegmentation algorithms, ultimately contributing toimproved medical diagnosis and treatment for braintumourpatients.

A. Dataset

The BraTS 2020 [4][5][6][7] dataset is a widelyrecognized and extensively employed dataset in thedomainofmedicalimageanalysis,primarilyfocusingonthesegmentationofbraintumours.Thisdatasetencompassesmultimodal MagneticResonanceImaging(MRI)scansstoredintheNIfTIfile format. These scans encompass fourdistinctMRIsequences,eachservingaspecificpurpose:

a) Native(T1):ComprisingT1-weightedMRIscans.
b) Post-contrastT1(T1CE):EncompassingPost-contrastT1-weightedMRIscans.
c) T2-weighted(T2):IncorporatingT2-weightedMRIscans.
d) T2 Fluid Attenuated Inversion Recovery (T2-FLAIR):EncompassingT2-FLAIRMRIscans.

It is noteworthy that these MRI scans have beenacquiredfromvariousclinicalprotocolsandscannersspanningmultipleinstitutions.Notably,datacontributorstothisdatasethaveemanatedfroma total of 19 different institutions, attesting to itsbroadrepresentation.

Anintrinsicfacetofthisdatasetisthemeticulousmanualsegmentationundertakenbyonetofourraters.Thissegmentationprocessadherestoarigorously standardized annotation protocol. Theseinitialannotationsaresubsequentlysubjectedtocomprehensivereviewandvalidationbyexperiencedneuro-radiologists.Theannotationsencapsulatediversetumourregions,classifyingthemasfollows:

1. GD-enhancingtumour(ET),identifiedandlabelledas4.
2. Peritumoraledema(ED),designatedwiththelabel2.
3. Necroticandnon-enhancingtumourcore(NCR/NET), demarcated and marked with the label1.

Toensureuniformityandcompatibilityforresearch and analytical purposes in the domain ofbraintumoursegmentation,thedatasethasundergone crucial pre-processing steps. These stepsencompass co-registration to a common anatomicaltemplate, interpolation to a uniform resolution of 1mm^3,andskull-stripping.Suchpre-processingmeasureshavebeendiligentlyexecutedtoguaranteethe consistent formatting of the data, thus renderingitamenabletoresearchandanalysiswithintherealmofbraintumoursegmentation.

B. Procedure

Theprimaryobjectiveofthisendeavoristostreamline the process of model development whilemaximizing efficiency. In pursuit of this goal, wewill embark on a series of data preprocessing stepsaimedatpreservingpertinentinformationwhileupholdingmodelaccuracy.Anotablechallengeencountered in this regard pertains to discrepanciesin the number of scans and available masks due toerroneouslabellingwithinsegmentationmasks.Consequently,wehavebeencompelledtoexcludeaspecific scan from the dataset. The initial phase ofour data preprocessing entails the removal of T1Gdimages,astheirexpectedcontributiontothemodel'sperformanceisdeemednegligible.

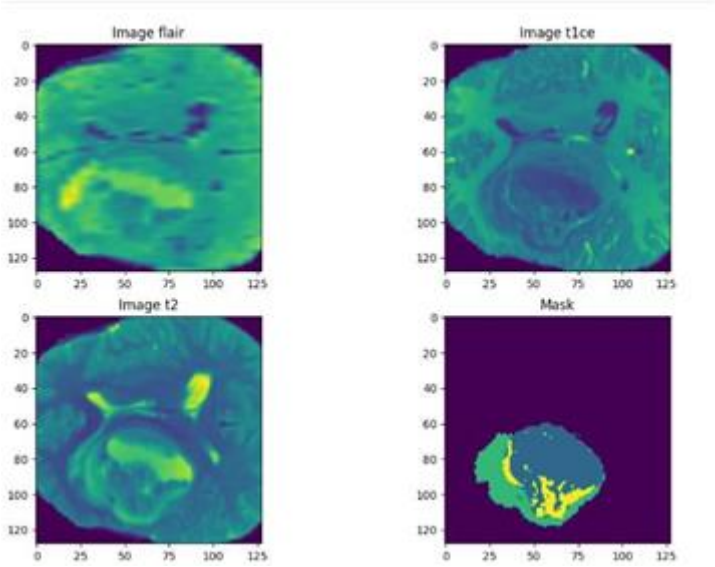

Fig1PlottingPost-contrastT1,T2-weightedT2,FluidAttenuatedInversionRecoveryandgivensegmentations

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Subsequenttotheexclusionoftheseimages,wewillundertake cropping of the scans to retain only therelevant pixels, eliminating redundant empty space.Furthermore,scanscharacterizedbyanemptyspaceof less than 8% will be selectively removed fromconsideration.Ournextstepinvolvestheconversion oftheNIfTIimagesintothe.ndyformat, essentiallysaving them as NumPy arrays. This process will beaccompanied by resizing and scaling to align withthemodel'srequirements.Additionally,wewillconsolidatethethreeinputarraysintoasinglecombinedarray.

GiventhatTensorFlowlacksabuilt-indatagenerator tailored to NumPy arrays, we will developa straightforward custom data generator to facilitatedatahandling.Thiscustomdatageneratorwillconsist of two core functions: the first function willberesponsibleforloadingtheNumPyarrayfromthespecifiedpath,whilethesecondfunctionwill

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$$\mathbf{L}_{dice} = \frac{2 * \sum p_{true} * p_{pred}}{\sum p_{true}^2 + \sum p_{pred}^2 + \epsilon}$$

Fig2DiceLoss

Subsequenttothemeticulousdatapreparationprocess,theprocesseddatawillbechannelledintoacustom 3D Unet model. Notably, our selection oflossfunctionswillencompassboth thedicelossandfocal loss. This choice also offers us the flexibilitytoincorporatecustomweightsintothelossfunctionsinthefuture, as circumstancesmayrequire.

$$FocalLoss = -\sum_{i=1}^{i=n}(i - p_i)^{\gamma} log_b(p_i)$$

Fig 3FocalLoss

Thisstructuredandmethodicalapproachispoisedtoexpeditethedevelopmentandrefinementofour model,allthewhileupholdingitsaccuracy andensuringtheoptimalutilization oftheavailabledataresources.

IV. RESULTSANDDISCUSSION

Uponacomprehensiveanalysisconductedonarestricted dataset, encompassing a total of 95 scans,our model has yielded aMean Intersection overUnion (Igou) score of 0.5692228. In forthcomingexperiments, we intend to harness the full datasetandadoptapatch-basedapproachtofurtheraugmentourmodel'sperformance.

Fig1.2PlottingTrainingandvalidationloss

Furthermore, we plan to delve into the applicationandevaluationofthe"SegmentAnythingModel"[7]developedbyMETA.Thismodel,whilenotoriginally designed for medical images, presents anoteworthyavenueforexperimentation.Aninherentchallenge in this endeavor pertains to adapting theinputlayertoaccommodateallthreetypes ofscans.

Fig 1.3PlottingTrainingandvalidationaccuracy

Followingtheimplementationoftheseexperiments,wewillundertakeacomprehensivecomparativeanalysisthatpitsthe"SegmentAnythingModel" against our custom Unet architecture. AnticipationssuggestthatourcustomUnet,bolsteredbytheutilizationofthecompletedataset,willlikelyoutperformthe"SegmentAnythingModel,"yieldingsuperiorresults.

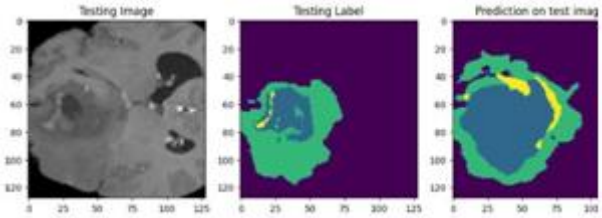

Fig 1.4 Plotting Testing image, Testing Label andPredictionontestimage

In addition to these specific experiments, our paperoffersathoroughandexhaustiveanalysisofsemanticsegmentationusingwell-establishedmodels, namely UniverSeg, FCT, and Meds AM.These research findings furnish invaluable insightsfor both researchers and practitioners operating inthe intersection of medicine and machine learning.Ourstudyhighlightstheeffectivenessandresilienceof these models, underscored by their applicabilityin addressing diverse segmentation tasks within thedomainofmedicalimageanalysis.

V. FUTUREWORK

In the field of medical image analysis, thesegmentationoftumors,mitochondria,orotherstructuresofinterestoftenreliesontheutilizationofdeeplearningarchitecturessuchasUNet,VNet,andvariousencoder-decodernetworks.Notably,continuous advancements have been made in thedevelopmentofUNet-basedarchitectures,includinginnovationslikeAttentionUNet,whichaimtoenhance the precision and efficacy of segmentationtasks.

Theprimaryobjectiveofthepresentresearchpaperistoestablishafoundationalframeworkthatwillserveasacornerstoneforforthcoming experiments. These experiments willrevolvearoundthecomparativeanalysisofstate-of-the-art

machine learning models, including but notlimited to UniverSeg[3], FCT[1], and MedSAM[2],specificallyinthecontextofmedicalimagesegmentation. It is important to note that althoughnumerousnovelandpromisingmodelshaveemerged in the machine learning community, theirdirect application to medical image segmentation isimpeded by the distinct nature of the data they wereoriginallytrainedon.

One pivotal avenue of exploration in thisstudy involves the application of transfer learningtechniques. The aim is to adapt and fine-tune thesecutting-edgemodelsonmedicalimagedatasets,therebyenablingameaningfulcomparisonoftheir segmentationperformanceagainstconventional,established architectures. The intent is to ascertainwhethertransferlearningcanbridgethegapbetweenthesedisparatedomainsandpotentiallyleveragetherich representationslearnedbystate-of-the-art models in more general image analysis tasksforthespecificdomainofmedicalimagesegmentation.

Additionally, an important innovation inthis research involves extending the input modalityof the models. Rather than operating solely on 2Dimages, we intend to equip these models with thecapabilitytoprocess3Dstackedarrays.Thismodificationismotivatedbytheinherentadvantages of 3D information in capturing spatialrelationships andcontextualdetails.By allowingthesemodelstooperateinathree-dimensionalspace, we anticipate that they will acquire a morecomprehensiveunderstandingofmedicalimagedata,thusfacilitatingtheextractionofpertinentfeaturesandimprovingsegmentation accuracy.

Inconclusion,thisstudyendeavorstoprovide a solid foundation for future investigationsin medical image segmentation. By adapting state-of-the-art machine learning models to the medicaldomainthroughtransferlearningandenhancingtheircapacitytoprocess3Ddata,weaimtoadvancethestateofheartinthiscriticalfieldandcontributeto the development of more accurate and effectivetools formedicalimagesegmentation.

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RoamReady – An Itinerary Planner

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ABSTRACT
The Intelligent Itinerary Planner is an revolutionary software program utility designed to decorate the journey making plans and control revel in. The Itinerary Planner represents a ground breaking software program answer that targets to raise the journey making plans and corporation process. Recognizing the developing call for for streamlined, customized, and stress-loose experience making plans, this venture harnesses current generation and information-pushed methodologies to set up a holistic itinerary making plans system. The overarching aim of the Intelligent Itinerary Planner venture is to streamline, decorate, and adapt journey making plans to evolving situations. Through the usage of information analytics, gadget learning, and user-intuitive interfaces, this platform aspires to result in a change in how people strategize and experience their journeys. In essence, this venture is geared in the direction of simplifying journey preparation, assuaging stress, and raising the journey revel in for each people and groups, thereby contributing to the enrichment and introduction of lasting journey memories.

Keywords - Machine Learning, Recommendation, Travel Itinerary, Sentiment Analysis

I. INTRODUCTION

Modern travelers face a number of challenges. To overcome these challenges, they frequently employ cutting edge technology. The 'Budget and Experience based Travel Planner' solution that has been proposed will be of considerable use to modern travelers. One of the biggest challenges facing travelers is money. Many tourists are looking for a vacation plan that will suit their needs while staying within their means. Some travelers could want to travel on an upscale budget, while others would look for less expensive options. As such, it is imperative that you design a vacation schedule that works with their budget. While creating a vacation schedule, time is an important factor to consider. The amount of time a tourist can spend in a location has a big influence on their overall trip experience. To make the most of his time at a location without compromising the caliber of his experience, a well organized travel itinerary is required. When utilizing the product, users will enter the intended destination, travel budget, and length. To propose a location, the recommendation engine makes use of the previously described inputs, which include information gleaned via crawling, the user's favorited places, and the data entered by the user. To suggest the next site, we will analyze the distribution of funds and the time limitations using the relevant algorithms. This process is repeated until a thorough itinerary is prepared.

II. LITERATURE SURVEY

Bayesian Optimisation is a technique used to optimize hyperparameters in machine learning models. Individual decision trees (SDTs), ensemble decision trees (Ensemble), k-nodes (KNodes), and support vector machines (SVM). Popular machine learning techniques are naïve Bayes (naïve Bayes) and trees. In this study, we created and updated models based on two datasets gathered from the 2017 NHS (National Household Travel Survey) with the use of the Bayesian optimization method. The performance of these optimized models was evaluated using a variety of parameters, including mean accuracy (%), mean area under receiver operating characteristics (AOC), and a simple ranking system. The results of the study show that the Bayesian optimization model can improve the k Nodes model more successfully than other models. [1]

Surveys conducted in previous decades have shown that the travel advisory system has evolved along with technology. Previous travel advice systems could only offer pre-made suggestions that came from internal data sources. However, modern technology can offer recommendations that are extremely personalized, timely, and relevant. Internet-based platforms, AI, and cooperation algorithms may make it feasible to meet client wants and provide customized recommendations. A suggestion's attractiveness could rise if its elements included local languages. The combination of data analysis, prediction, and natural language processing will enhance user specific recommendations. [2]

The system strives to assist the traveler in creating their schedule entirely based on their personal areas of interest, taking into account the amazing potential of each individual. The database is obtained by means of internet scraping from traveler review websites, including TripAdvisor and Holidify. A point of reference is the YELP database. This method comprises gathering URLs from TripAdvisor and Holidify of different tourist destinations. From the collected URLs, information on tourist attractions and reviews can then be retrieved. The utility uses K- Means clustering and KNN techniques to identify nearby hotels and tourist attractions. Sentiment analysis is performed on user comments using Logistic Regression. Furthermore, the utilization of the VGG sixteen module is contracted out to Transfer Learning. [3]

The Smart Travel Planner software, which uses artificial intelligence to streamline user experiences and save time, is discussed in the book. A variety of features are available in the program for route planning. This app is an artificial intelligence-powered intelligent trip planner. By offering a centralized interface to access a plethora of online travel-related information, it helps travelers plan their journeys. It also lets users choose personal time slots, compute routes, and make plans.[4]

Using just one online application, customers may plan a whole road trip with the help of the sophisticated smart road trip planner. The process of organizing a road trip involves a number of tasks, including choosing a destination, getting suggestions and interactive maps, trip sharing, renting a car, suggesting nearby attractions, automatically displaying popular locations, managing a budget, creating a checklist, managing travel routes, having an intuitive interface, getting prompt assistance via chat, and more. This web application provides customers with a user-friendly design to effectively plan and execute their trip in one place. The application has the flexibility to allow users to change and update travel information during the filling process. This app eliminates the need for users to use multiple apps and accounts on different platforms.[5]

A performance test for the route search submodule using several threads. In addition, as the number of threads rose, I observed how the vertical search crawler behaved, focusing especially on its inclination toward site crawling. In order to evaluate the system's ability to handle more concurrent users, a stress test was also carried

out in this study. The way the system operates has been altered. According to test results, the system meets user needs and exhibits exceptional stability and efficiency.[6]

The "Voyager - Smart travel guidance mobile application" is being developed in order to bridge the gap between user requests and existing apps. The primary focus of the mobile application is on the following features: gasoline data analyzer, one-touch emergency guidance, automated review classification and rating, place feature extraction and tagging, an intelligent travel planner that works within the given travel window, options for the most scenic and shortest routes, and more. The final mobile application includes group trip planning, an in-app chat system, and a friends system amongst app users in addition to the previously described features.[7]

An examination of trip planning systems, clarifying their features and purposes. Additionally, we evaluate a number of existing systems based on how well they integrate state-of-the-art features for touristic trip planning. Research on trip planning systems is done in order to choose the catalogue's criteria. Our aim is to perform a comparative evaluation of these systems and thereafter investigate possible directions for additional improvement.[8]

A detailed examination of the many recommendation systems used by the travel sector. This paper presents the conceptual and architectural framework for a tourist recommender system using a hybrid recommendation technique. The suggested method works better than a list of tourist destinations that are curated based on traveler preferences. It works as a travel planner, putting together a thorough itinerary with a range of tourist attractions for a certain time frame. The major objective is to enhance tourism in Morocco through the development of a big data, artificial intelligence, and operational research recommendation system, with a focus on the Daraʃa Tafilalet region.[10]

A highly efficient method that correctly detects aspects in aspect-based sentiment categorization and yields excellent classification results. The framework was developed as a mobile application to assist travelers in locating the top eatery or lodging in a specific location. Experiments conducted on real-world datasets have assessed its effectiveness and yielded impressive outcomes, including an 85% identification rate and a 90% classification rate.

Based on the internal data sources that were accessible, previous trip proposal systems were forced to provide inactive propositions.

As a result, the perfect demonstration will emerge, capable of offering a great deal of advice and trip arrangements to customers. With an easy-to-use layout, this web application allows users to efficiently plan and execute their travels all at once. At its most basic, the versatile application highlights the following features: a travel planner that operates within the allotted travel time; recommendations for the best, most exclusive, and highly rated locations; and an automated system for classifying and rating each place individually. It functions as a travel planner, creating a detailed itinerary that includes scheduled tourist destinations for a certain time frame.

III.PROPOSED SYSTEM DESIGN

The complete operation of the suggested system is depicted in proposed figure 1. It used a trip data set to carry out the sentiment analysis categorization method altogether. Pre-processing first examines the opinions from a syntactical perspective, maintaining the original sentence structure.

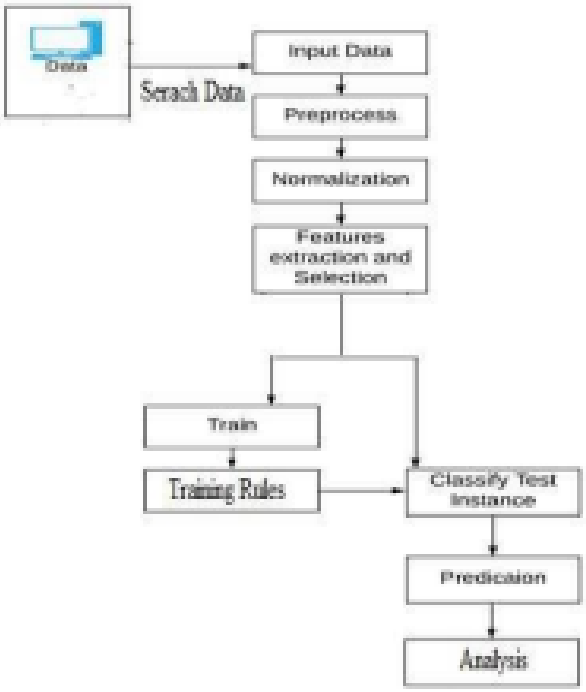


Figure 1. System Architecture

IV. IMPLEMENTATION EXPERIMENTATIONS

- **Data Collection:** The travel planner dataset utilized in this study was taken from many real time data sources, including Google Travel. First, information is obtained from aviation companies, then it is processed, extracted, and put via machine learning algorithms. The result is then predicted using accuracy.
- **Web Scraping:** Utilizes ChromeDriver and Selenium to scrape Google Travel and Maps data.
- **Pre-processing and normalization:** There can be gaps and a lot of unnecessaryinformation in the data. Many pre-processing methods for data, include reduction, modification, and cleaning
- **Feature extraction and Selection:** Numerous attributes are extracted from the supplied data by this procedure. After standardising these characteristics using a threshold for feature selection, redundant and unnecessary features are eliminated for training. Standardised data and relational attributes are used to extract different hybrid attributes, and an optimisation strategy is used to train the system.
- **Classification:** Following the module's successful execution, the training module receives the chosen characteristics as input, generating extensive background knowledge for the system as a whole. Once we get the training model, we can input the testing data to obtain the classification prediction.
- **Weighted Rating:** Considers review-based popularity and uses a logistic model to calculate a weighted rating.
- **User Data Collection:** Clusters tags into groups and creates interest groups for arbitrary people to mimic actual user activity.
- **User Registration:** When a person registers, they select their interests and get suggestions based on ratings that are weighted.

V. MATHEMATICAL MODEL

- **A rating with weights**

A weight factor, whose value rangesfrom 0.5 to 1, is multiplied to determine a weighted rating. Rating Weighted by

(1/(1+exp((reviews*10)/MAXIMUMREVIE WS)))*grading

- **Formula Haversine**

The Haversine Formula uses latitude and longitude to determine the smallest distance between any two points on a spherical body.

- **Pearson Coefficient**

You may determine the link between two values with the use of Pearson's Correlation Coefficient. It provides you with an indication of how strongly two variables are associated.

Determines the degree of similarity between individuals, which helps identify users who share interests. ` The linear correlation between two vectors is assessed using Pearson's correlation coefficient [6].

$$d = 2r\sin^{-1}\left(\sqrt{\sin^2\left(\frac{\phi_2-\phi_1}{2}\right)+\cos(\phi_1)\cos(\phi_2)\sin^2\left(\frac{\psi_2-\psi_1}{2}\right)}\right)$$

The coefficient is a number between -1 and +1 that represents a strong positive correlation, a negative correlation, and zero (zero-order correlation) that represents no association.

Navigation systems can utilize the Haversine formula to calculate distances between places on Earth's surface, while recommendation systems and data analysis can use the Pearson correlation coefficient to identify the relationship between different variables.

- $r = 1$: Perfect positive linear relationship
- $r = -1$: Perfect negative linear relationship
- $r = 0$: No linear relationship

The formula is:

$$r = \frac{\sum(X_i-\bar{X})(Y_i-\bar{Y})}{\sqrt{\sum(X_i-\bar{X})^2\sum(Y_i-\bar{Y})^2}}$$

where X_i and Y_i are individual data points, and $\bar{X}$ and $\bar{Y}$ are the means of the variables

Five distinct modules or phases, each with its own dependencies, make up a system.

System S = (Q, Σ, δ, q0, F) in which –

· Q is a dataset of finite states.

· The pre-processing steps are limited to Σ. · Whereas δ: Q × Σ → Q, Δ is the transition function.

· Q0 represents the starting point from which all inputs are processed (q0 ∈ Q).

· Q's final state or states make up F (F ⊆ Q).

After all t(n) policies return 1 from the training patterns, the similarity weight of

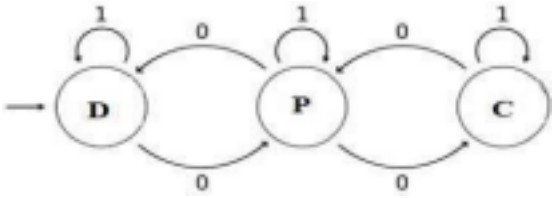
· Q = {R {A[i]…….A[n]}} the study utilized the travel places and location name dataset

· Σ = {places name, total day, planned the trip, total budget}

· Δ = {initial input given to User-Based Collaborative Filtering top Recommendations function

· Σ i= 0…..n Attributes}

· q0 = {Recommendation day1… day_n } · F = {visited places or not}



VI. STATE SCHEMATIC

Three steps are defined by the system.

- **D for Dataset:** If the dataset upload is successful, it returns 0 and the system moves on to pre-processing; if it is unsuccessful, it returns 1 and suggests that you try uploading the dataset again.
- **P for Dataset:** After pre-processing it will be forwarded for Recommendation algorithm.
- **C for Dataset:** Displays the cluster result status.

State = 1: In the process of execution

State = 0: Successful completion of the process Methodology

Enter the following: Threshold T, Label L, TrainFeature set {} with train dataset values, TestFeature set {} with test dataset values.

Recommendations for each instance with a label and weight are produced.

Step 1: Use the instructions below to read every feature in the test set. TestFeature is equivalent to o(T[j]). j=1.

Step2: Use the following link to read every feature from the train set. TrainFeature:= o(T[k]).

k = 1.

Step 3: Find the total similarity between each user and

the target user.

(Train Feature, Test Feature) ÷ calculate_user_similarity

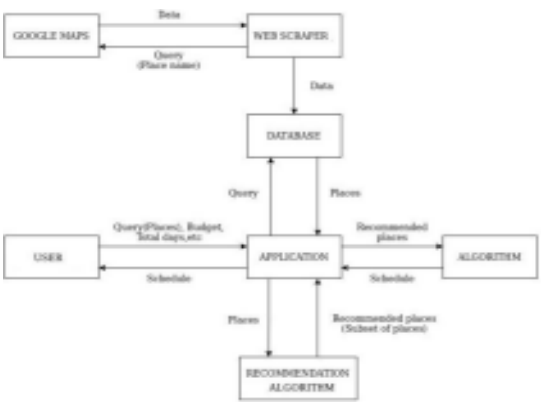
Step 4 : Select the best N recommendations

L= nominate_top_n (similarities) recommendations Step 5: Return L

Software and Design Required

- **Google chrome**
- **Tool:** PyCharm on words or Python or Anaconda
- **Programming Language:** Python 3.6 onwards and HTML

VII. METHODOLOGY



Navigational Approach

- Using latitude and longitude, the Haversine formula can be used to calculate the separations between two locations on a spherical object.
- The A* Algorithm and the Haversine formula are used to find the shortest distance for a given route request.
- Haversine Formula: This formula determines the shortest path between any two points on a spherical body using information on latitude and longitude.

Data Filtering and Recommendations

- Items that correspond with user preferences may only be suggested and recommended with the help of effective data filtering.
- A popular metric for evaluating the linear correlation between two sets of data is the Pearson Correlation Coefficient (PCC).

Collaborative Filtering

- It is used to recommend locations that align with each user's tastes.
- One of the most important steps in the collaborative filtering process is calculating distances in the distance matrix using the Haversine formula.

Recommendation Engine

- The user's preferences are used by the recommendation engine to rate the places it suggests. To choose regions within the dataset, the collaborative filtering algorithm is used.
- It generates a matrix in which users are shown as rows and their evaluations of each location are shown as columns. Pearson's correlation coefficient, which assesses the statistical relationship between continuous variables, is used to fill in the matrix's missing data.
- Incomplete cells are filled by summing weighted ratings from users with strong similarity values (Pearson correlation).

Routing Algorithm

- This algorithm's objective is to minimize the overall travel distance while constructing a path that stops at recommended locations. It is influenced by the recommendation engine.
- The scheduler algorithm receives the output, which is a sequential list of locations to be visited. · The last location is eliminated and the algorithm isredone if none of the suggested locations can be visited in the allotted period.
- The path does not retrace its steps from the beginning point to the finish. It chooses the furthest location first, then advances to the next furthest location.

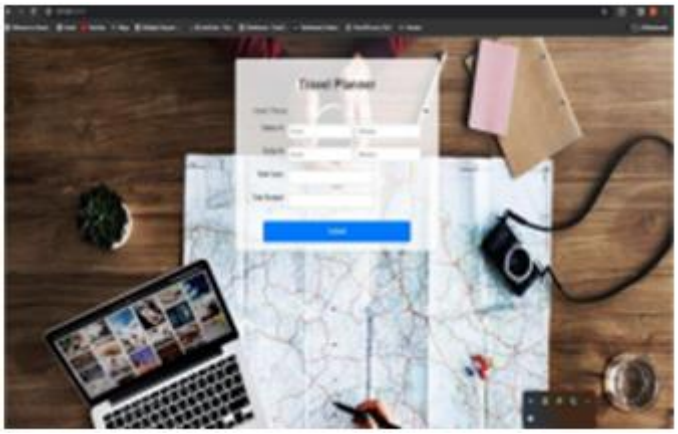
Scheduler Algorithm

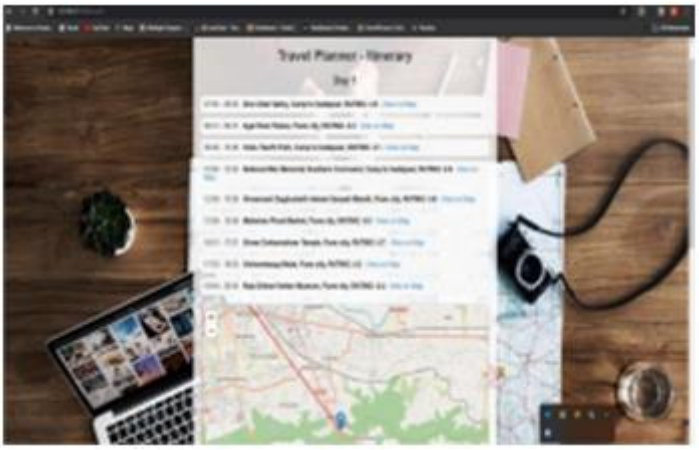
- Using the prioritised list of locations to be visited, this algorithm creates a timetable. Starting with the locations with the lowest weighted ratings, places are eliminated one at a time to accommodate the remaining time.
- Determines the shortest distance between geographical coordinates by calculating the distance matrix using the Haversine formula.
- Allocates funds based on the assumption of driving, with deductions made for each 25km. The order of site visits is divided into daily parts; if there is a shortage of time, more locations may be added to the following days.

- Place names and length are included in the resultant schedule array, which makes sure it doesn't go over the number of days that are available.

VIII. RESULTS

In the system as user enter the requirements such that places he want to explore, the feasible time for the exploration, for how many days he has planned the trip, total budget, user want to include the visited places or not, etc. after filling with all the details system will generate a Trip plan by fulfilling our requirements.





IX. CONCLUSION

The primary objective of the project was to mitigate the difficulties encountered by tourists as a result of time restraints, financial limits, and the requirement to select appropriate travel locations. The suggested system offers a strategy that makes use of several feature extraction and selection techniques. The system specifically recommends employing natural language processing (NLP) approaches to prepare and normalize data. It is essential to recognize and describe significant features from the complete dataset in order to accomplish efficient classification. Using a machine learning system, the suggested solution customizes travel itineraries and suggestions according to user preferences. Despite the benefits that recommendation algorithms have shown, future study may entail improving the recommendation system from a business standpoint. Adding a might be one way to make improvements.

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A Review Paper for Accuracy of Requirement Traceability Links in Software Development

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ABSTRACT

Requirement satisfaction is a vital aspect in the execution of software. The requirements are identified by the different stakeholders should be fulfilled with each point of the development of the software. Software development is a correlated organizational work to automate continuous liberate of new software development while assurance their accuracy and consistency. For tracing the requirement from its starting point to its completion,

requirement traceability supports software engineers to trace. During software improvement process, traceability supports in a different of ways, like change management, software maintenance, and prevention of confusion. But, many of the challenges can be reduce through organizational policy, quality requirements traceability tool support remains the open problem. During software updating and maintenance; the traceability links become out-of-date since the developers can modify or remove some features of the source code.

Keywords: requirements, traceability, management, requirement traceability approach (RTA), IR Technique (IRT)

I. INTRODUCTION

Essentially, for any developing any software a developer must identify the project background, in particular, the system architecture, design, working, and the relations between the several components using any available documentation[1] [6]. Program idea occurs in a bottom-up method, a top-down method or some combination of both.

The traceability is the most essential factor for development of any software project, and if we use it, it could be valuable from different perspectives for the software development. While developing any software, we develop source code which can be traced and become identical with the requirement and analysis because we develop a source code as per the requirements. [2] [3] A traceability is an association between the source code and requirement.

Requirement traceability supports software engineers to trace the requirement from its development to its

fulfillment [2] [7]. Traceability may not help us to know how different components of systems are inserted and dependent on each other in the same system. We may also fail to find the impact of change on the software and system [4]. An important objective of traceability is a linkage of, in the lack of original requirements and other artifacts traceability links [3]. Therefore, we should look at traceability from all the aspects of traceability regarding scope and coverage.

While modernizing the software, the developers can add, remove, or modify features as per the users' request. While software maintenance and development, requirement traceability links become fringe because any developer can't devote effort to update it. Conversely, for recovering traceability links later is a very painful and tedious task also it is costly for developers too [6]. A developer usually does not update requirement-traceability links with source code.

Requirements and source codes are different from each other, which decrease the textual similarity [2] [4].

II. REASONS FOR REQUIREMENTS TRACEABILITY

It is most important to confirm that the requirements are properly fulfilled in the design. This is done with requirements traceability which is usually referred to as [5] [6] [7] [18] "the ability to validate and go after the life of a requirement, in both forward and the back direction." [23] Requirements traceability confines the relationships between the requirements and source code. The traceability is one of the needs of different stakeholders – project sponsors, project managers, analysts, designers, maintainers, and end-users, because of their need, priority, and goal [1][3] [6].

During design phase requirements traceability supports to keep track of when the changes are implemented before a system is redesigned. Traceability can also give information about the validation, significant-conclusion, and postulation behind requirements [2] [18].

After the delivery of the system, [1] modifications occur due to various reasons (e.g. to a changing environment). The traceability helps us complete, more accurate cost and schedule of change(s) can be resolute, instead of depending on the engineer or programmer who is expert [18].

Traceability information allows answering:

1. What is the outcome, when the requirements are changed?
2. Where is a requirement useful?
3. Are all requirements assigned?
4. Which require is deal with by a requirement? 5. Is this requirement essential?
5. What design decisions affect the implementation of a requirement?
6. What are the benefits of this technique and what were the further options?
7. Is the implementation compliant with the requirements?
8. Is this design element necessary?
9. How do I interpret this requirement?

Benefits of traceability

1. Stops losing of knowledge
2. Supports for the verification process
3. Change control
4. Process monitoring
5. Better software quality

6. Reengineering
7. Reusability
8. Decrease of Risk

III.BASIC TRACEABILITY LINKS

Traceability links depend on the traceability information, the linking of maybe

1. *One-to-one* -one design element to one code module
2. *One-to-many* - one functional requirement verified by multiple test cases
3. *Many-to-many* - a use case may lead to multiple functional requirements, and a functional requirement may be common to several use cases

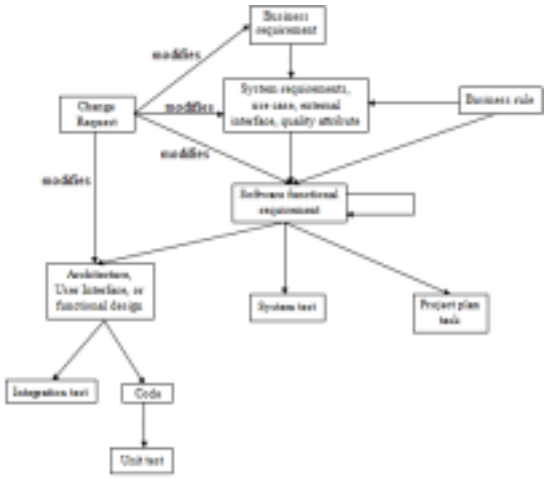

Fig 1 Example of traceability links

IV.BACKGROUND AND RELATED WORK

This section presents an environment on the IR technique and a review of the related work. Traceability approach can be separated into three main categories, i.e., dynamic, static, and hybrid.

The dynamic approach gathers and examines execution traces [11] to recognize the technique that a software link has been carrying out in the particular scenario. However, it couldn't help to differ in overlapping circumstances, because there are some limitations to a single method. [6] The legacy system may not be applicable, due to bugs and/or some other issues. Thus, to collect execution traces is not possible.

Static traceability approaches [10], [17] use source code structure and/or textual information for recovering traceability associations among high-level and low-level software artifacts. The combination of static and dynamic information is hybrid traceability. The study shows that a combination of dynamic and static information can perform better than the single IR technique [7].

INFORMATION RETRIEVAL TECHNIQUE (IRT)

Information Retrieval (IR) refers to a method that would calculate textual similarities of different documents. The textual similarity is calculated using the terms that occurred in the documents. If two documents have a number of general terms, those documents are measured to be similar. The analysis of different IR methods can be in three steps [14]. First, after pre-processing such as stop word removal and stemming, a corpus is made from the documents.

Second, each document is represented as access in an index. The term-by-document matrix is a common index, where the document as rows and each term as a column. The incidence of the term arising in the document is the values in the matrix. Third, by using a cosine similarity formula, the similarity among the index entries is calculated [24]. The presentation of the key entries and the formula for calculating the similarity varies depends on the IR method. We use the VSM IR method in this paper and briefly describe it in the following paragraph.

In the Vector Space Model (VSM) [14] the vector of terms is represented by each document. In the term-by-document matrix, each row can be measured as one document's vector in the space of terms that occur in all documents. The calculation of similarity of two documents is based on the cosine angle between vectors of each document. In general, the cosine angle between vectors of the two documents will reduce as the different documents share more terms. Hence, the higher similarity of the documents will occur.

V. SYSTEM ARCHITECTURE

1. DESIGN OF SYSTEM

For any software evolution, the essential task is, a developer must understand the project background [5] [6], in particular, the system planning, propose, how to implement, and the relations among the different artifacts using any available documentation. Program understanding occurs in a bottom-up way, a top-down way, or some mixture thereof. Different types of data, ranging from domain-specific

knowledge to general programming knowledge can be used throughout program conception [2]. Traceability links between source code and part of the documentation, e.g., requirements, abet both top-down and bottom-up conception.

Requirement traceability is defined as, "the capability to demonstrate and go after the life of a requirement, in both onward and toward the back direction" [23]. Traceability links are also necessary to make sure that source code is reliable with its requirements and that all and only the specified requirements have been implemented by developers.

Traceability links are useful in decreasing understanding effort between the requirements of a system and its source code [3] [4] [7]. The traceability information is also useful for software maintenance and development tasks. For instance, once a developer has traceability links, a user can easily trace what software artifacts must be changed for the development of a new requirement.

Even with the importance of traceability links, in software maintenance and development, as developer update features, requirement traceability links become outdated because developers do not dedicate effort to update them later [4] [5] [6]. This lacking traceability information is one of the main issues, that contribute to project failure, and difficult to sustain. Unsatisfactory traceability information results in the need for costly and painstaking tasks of manual recovery and maintenance of traceability links. [23] These manual tasks may be frequently required depending on how normally software systems evolve or are maintained.

As a result, the literature proposed methods, techniques, and tools to improve automatically traceability links. [5] [6] [22] [23] Researchers used information retrieval (IR); techniques, to recover traceability links between high-level documents, e.g., requirements, instruction booklet pages, and plan documents, and low-level documents, e.g., source code and UML diagrams. IR techniques compute the textual similarity between each two software artifacts, e.g., the source code of a class and a requirement. [2] [3] [5] [6] [7] A high textual similarity means that the two artifacts most likely share numerous concepts and that; therefore, they are likely

linked to one another.

2. SYSTEM BLOCK DIAGRAM

The proposed work is based on the IR-based RTAs process is typically divided into three main steps. Figure 1 shows the IR-based RT links revival process.

First, every the textual information with the requirements and source code is taken out and preprocessed by splitting terms, [2] [3] [7] removing stop words and remaining words are then stemmed to its grammatical origin. Second, all the stemmed terms are weighted using a term weighting system. Last, an IR technique calculates the similarity between

requirements and source code documents. [4] Lastly, it creates a ranked list of probable traceability links. An elevated comparison between two documents shows a probable semantic connection between them.

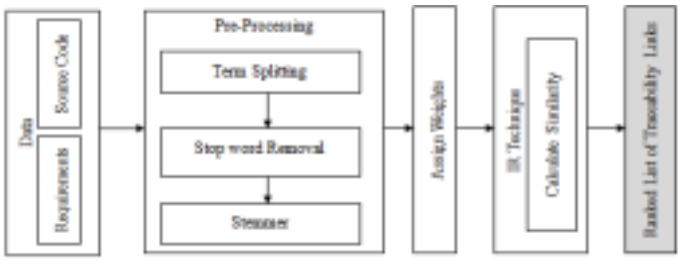

Fig 1. System Block Diagram

2.1 PRE-PROCESSING

To generate traceability links, we remove all the identifiers from source code and terms from requirements. In this, IR techniques are used as an engine to create links between requirements and source code. IR techniques imagine that all documents are in the textual format [5] [9]. To remove source code identifiers, a source code parser is used. The parser throw-outs extra information, e.g., primary data types and keywords, from the source code and gives only identifier names. The removal of the identifiers and terms is followed by filtering, stopper, and stemmer process [11] [12].

The primary step is term splitting. [2] [3] [6] A text normalization step renovates all upper-case letters into lower-case letters. This step eliminates non-textual, i.e., some numbers, mathematical symbols, brackets, etc., information and extra white spaces, from the documents. Some identifiers/terms could be united with some special characters, e.g., underscore, and/or Camel Case naming reunion. Therefore, divide all the united terms to make them separate. For example, Hello India and hello india are split into the terms “hello india” [6].

The following step is the stop word removal. [5] [6] The input for this step is the normalized text that could include some general words, e.g., articles, punctuation, etc. These general words are measured as noise in the text because it does not be a symbol of the semantics of a document. Hence, in this step, a stop word list is used to eliminate all the stop words.

The next step is stemming. An English stemmer, for example, would recognize the terms “excel,” “excellence,” and/or “excellent” as based on the root “excel” [6] [7]. An IR technique calculates the similarity between two documents based on similar terms in both documents. Still, due to different postfix, IR techniques would judge them, e.g., add and addition are like two different documents, and the result would be a low similarity between two documents. Thus, it becomes important to perform the morphological investigation to exchange plural into the singular and to take back infected forms to their morphemes [2].

Following two main factors are considered important [6]:

Term frequency (TF): TF is often called home frequency. If a term appears several times in a document, then it

would be allocated higher TF than the others.

Global frequency (GF): If a term appears in various documents then the term is considered global. It is also known as inverse document frequency (IDF).

2.2 TERM WEIGHTING / ASSIGN WEIGHTS

An IR technique (IRT) changes all the documents into vectors to calculate the similarities along with them. [16] [17] To change documents terms into vectors, each term is allocated a weight. A variety of schemes for weighting terms have been proposed in the literature. Widely used weighting schemes are differentiated as probabilistic. In the following, the term identifiers to refer all source code entities, i.e., class name, method name, variable name, and comments [7].

If a term comes out multiple times in a single or multiple documents, then IRT would propose that document as a relevant document to a query [5] [7] [10]. However, multiple amounts of a term do not show that it is an important term.

2.3 IR TECHNIQUES

To create sets of traceability links, various IR techniques are used, to identify concepts in the source code, carry out experiments using different IR techniques to recover traceability links [4] [5].

PROPOSED ALGORITHMS

1. DATA PREPROCESSING

The data preprocessing is prepared to eliminate needless content from the text and to find out the origin form of the words. [2] [7] The preprocessing of the data is completed by a valid method such as Stop word removal and Stemming to the data composed of the customer.

2. STOP WORD REMOVAL:

For work out, stop words are words that are filtered out preceding to, or following, processing of text. [2] [3] Stop words are ordinary words that take less significant meaning than keyword. These stop words are a few of the most common, short function words, such as the, a, an, is, at, which, that, and on, etc.

Stop-word elimination is the method of eliminating these words. To find out the words from a text all needless content must be removed, so it is needed to remove the stop words from the text put into an array [7] [17].

Algorithm:

1. The following is an algorithm for stop word removal 1.Acquire the input
2. Establish the glossary of stop words
3. Divide factors into words
4. Assign new word list to store words
5. Collect outcome in the String Builder
6. Loop during the entire terms
7. Come again string with words detached

8. STEMMING

Words get from the input of the data are create to be too sparse to be useful as features for categorization as they do not simplify well. The presence of a large number of inflections of the same word, this is the common reason for stemming. Hence, the origin form of the word is to be taking out as a feature [2] [6] [7].

Stemming is the method, for decreasing derived words to their origin form. Stemming program is commonly known as stemming algorithms or stemmers [2].

Even as writing the sentence for a grammatical basis, it contains various forms of a word, for example, collect,

collection, collecting and/or collected. In many circumstances, it would be helpful for a finding for one of these words to revisit the word in the set to take away the required content from a given sentence [2] [7] [8].
The goal of stemming is to decrease variation form and sometimes derivationally related forms of a word to a common base form [5] [6] [7].
For instance: car, cars, -> car

Stemming algorithm:

The stemming algorithm consists of different steps of stemming applied sequentially. Within each stage, there are various principles to select rules, such as choosing the rule from every rule group that applies to the longest suffix. The algorithm of stemming works as follows:
Rules Illustrations
S → cats → cat
EED ->EE agreed →agree
(*v*) ED → plastered → plaster
(*v*) ING → cutting → cut
There are three main reasons for stemming algorithm, or stemmer, as follows.
The first reason of a stemmer is to cluster the words according to their theme. Many words are the root from the same stem, and we can consider that they belong to the same concept (e.g., act, actor, action). [2] [3] [5] The different forms are created by attaching affixes (prefixes, infixes, and/or suffixes) but, in English considering only suffixes, as normally prefixes and infixes change the meaning of the word, and a bit of them would lead to errors of bad topic resolve The next reason of a stemmer is openly associated to the [2] [3] [7] [10] IR process, as containing the stems of the words agree to some point of the IR process to be better, among which we can stress the ability to index the documents according to their theme, as their terms are clustered by stems or the extension of a query to obtain to a greater extent accurate results.
The extension of the query permits it, for refining by replacing the terms, it covers the related topics, which are also there in the collection [3] [5] [15]. This alteration can be done routinely and obviously to users, or the system can propose one or more superior method of the query
Finally, the conflation of the words allocation the same stem leads to a decrease of the vocabulary to be taken into the process, as the entire terms contained in the natural input collection of documents can be decreased to a set of topics [2] [4] [7]. This directs to a decrease of the space needed to store the formation used by an IR system and after that also lightens the computational weight of the system.

VI. HOW TO REPRESENT TRACEABILITY

Program conception occurs in a bottom-top way, a top bottom way, or a mixture of them [4] [8]. Developers use knowledge throughout program comprehension, from domain-oriented knowledge to common programming knowledge. Traceability linkage between source code and sections of the documentation, e.g., requirements, aid both top-down and bottom-up comprehension [1]. Traceability linkage between the requirements of a system and its source code is useful in reducing comprehension effort.
Requirement traceability is defined by [6] [23], “the capability to demonstrate and go after to the life of a requirement, in both onward and toward the back direction”. This traceability information also supports in software maintenance and evolution tasks. For traceability links, it is essential to represent them in a form that is suitable for its purpose [1]. The different ways (traceability matrices, graphical models, cross-references)

exist to represent traceability links, which are also supported by tools.

a. Traceability matrices: Traceability links are represented in matrix form. The traceability matrix is the association between, horizontal and vertical dimensions are the values in the matrix stand for links between the artifacts in the matrix [21].
b. Graphical models: Entity-Relationship Model (ERM), various UML diagrams support the representation of traceability links embedded in the different development models [21].
c. Cross references: Traceability associations between different parts are represented as links, pointers, or annotations in the text [21].

VII. CONCLUSION

The traceability is most important factor and precious from different point of views for the development for any software project. For development of any software, requirement traceability plays a vital role in the maintenance of software. Creating traceability links manually is one of the costly and lengthy works. Requirements specification for requirements traceability is formed alongside all the investigations, which drives both their direction and focus.

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Design and Development of Micromixers on Acrylic Sheet Using Co2 Laser Machining and Their Numerical Analysis Using Comsol

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ABSTRACT

This study presents the design and development of micromixers fabricated on acrylic sheets through CO2 laser machining, coupled with numerical analysis performed using COMSOL Multiphysics. Micromixers are critical components in microfluidic systems, offering efficient mixing of fluids at the microscale, which is essential for numerous applications in chemical, biological, and medical fields. The choice of acrylic as the substrate material is motivated by its favorable properties, including optical transparency, chemical resistance, and ease of machining. Various design configurations of micromixers were developed, optimizing parameters such as channel width, depth, and geometry to enhance mixing performance. The laser machining process parameters, including power, speed, and frequency, were systematically varied to achieve the desired channel dimensions and surface quality.. The numerical simulations for Square shaped chamber with T-Inlet and Zig-Zag shaped chamber with Y-Inlet were performed using COMSOL Multiphysics to model the fluid flow and mixing behavior within the micromixers. The Y-Inlet with Zig-zag shaped mixer gives higher mixing Index ie.0.97 at 0.1 m/s. The simulations provided insights into the velocity fields, pressure distributions, and concentration profiles, enabling a detailed understanding of the mixing mechanisms and performance optimization.

Keywords: Micro mixers, Acrylic Sheet, CO2 Laser Machining, COMSOL Multiphysics, Microfluidics, Numerical Analysis, Fluid Mixing, Microchannel Fabrication

I. INTRODUCTION

Micromixers are essential components in the field of microfluidics, playing a crucial role in ensuring efficient mixing of fluids at the microscale. Their applications span across various domains, including chemical synthesis, biological assays, medical diagnostics, and drug delivery systems. The efficiency and performance of micromixers are pivotal in enhancing reaction rates and improving the homogeneity of solutions, which directly impacts the reliability and accuracy of microfluidic devices.

Traditionally, micromixers have been fabricated using techniques such as photolithography and soft lithography. While effective, these methods can be time-consuming, costly, and limited in the flexibility of design modifications. In contrast, CO2 laser machining offers a rapid, cost-effective, and versatile alternative for the fabrication of micromixers, particularly on acrylic substrates. Acrylic sheets are chosen for their

advantageous properties, including optical clarity, chemical resistance, and ease of processing, making them an ideal material for microfluidic device fabrication.

This study focuses on the design and development of micromixers on acrylic sheets using CO2 laser machining. The primary objective is to explore the precision and capabilities of CO2 laser machining in creating intricate microchannel geometries and to assess the performance of the fabricated micromixers through both experimental and numerical approaches.

The CO2 laser machining process involves directing a focused laser beam onto the acrylic surface, which ablates the material to form microchannels with high precision. By adjusting laser parameters such as power, speed, and frequency, it is possible to control the channel dimensions and surface quality. This method allows for rapid prototyping and iteration of micromixer designs, enabling optimization of their mixing efficiency.

In parallel, numerical simulations are performed using COMSOL Multiphysics to model the fluid dynamics within the micromixers. These simulations provide detailed insights into the velocity fields, pressure distributions, and concentration gradients, facilitating a comprehensive understanding of the mixing mechanisms. The numerical analysis also serves as a tool for predicting and optimizing the performance of micromixer designs before fabrication.

This integrated approach of combining CO2 laser machining with numerical analysis aims to demonstrate the feasibility and effectiveness of this fabrication technique for developing high-performance micromixers. The findings from this study have significant implications for advancing the design and manufacturing of microfluidic devices, offering a scalable and efficient solution for various applications in science and engineering.

A. Need for Micro-Mixing

Active development and improvement of micro-fluidic devices have allowed making significant progress in biomedical diagnostics study, development of miniaturized micro- fluidic and nano -fluidic biosensors, in DNA analysis, chemical synthesis and genomics study, etc. The channel dimensions in micro-fluidic systems are measured in micrometres and in nano- fluidics they go down to nanometers. This allowed to noticeably reduce surface to volume ratios and thus, to decrease samples/reagents consumption and obtain compact devices. However, sample flows in such miniaturized channels are extremely laminar and not turbulent, which corresponds to small Reynolds number values. Consequently, in such laminar flows, traditional turbulent mixing between two liquids cannot occur. However, controllable and fast mixing is critical for subsequent practical development of micro-fluidic and lab-on-chip devices often used for assays involving many reagents and samples. That's why different mixing techniques were developed and studied by various research groups.

B. Applications

Application of micromixer technologies, which have driven a number of critical research trends over the past few decades, particularly for chemical and biological fields.

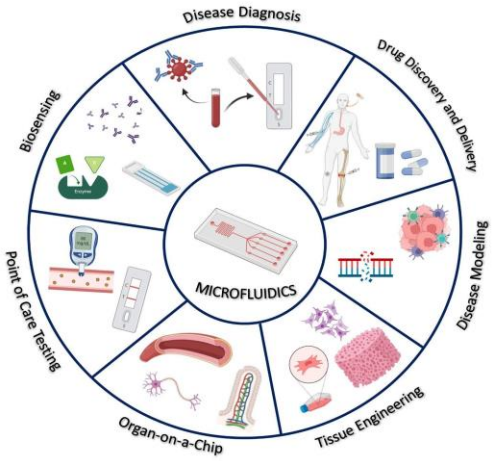

Figure 1: Applications

II. OBJECTIVES

- Design different Micromixer configurations for mixing applications in microfluidics.
- Carryout computational analysis for designed micromixers.
- Fabricate Micromixers using CO2 laser facility.
- Characterization of fabricated micromixers

III. METHODOLOGY

- Design of Micro-mixers for different configurations using Auto-CAD software: We are going to design the micro-mixers using Auto-CAD or CATIA software for different configurations. While designing we will add some obstacles for fluid disturbance while flowing through the mixer.
- Numerical analysis of micro mixers using COMSOL: After selection and fabrication of the micromixer its mixing length & other configurations, we are going to test it on simulation software i.e., COMSOL for comparing the difference between the actual readings and simulation results.
- Fabrication of Micro-mixers using CO2 LASER Machining: After designing micro-mixers we are going to manufacture it on a LASER machine using Laser engraving operation. All those channels will be fabricated on PMMA/Acrylic Sheet using the same manufacturing process. Also required bonding layers or plates will also be prepared by laser marching only.
- Characterization of fabricated micromixers is done by using Rapid I Vision.

A. Problem Statement

Design and Simulation of Square shaped chamber with T-Inlet and Zigzag shaped chamber with Y-Inlet were performed using COMSOL Multiphysics. From this simulation mixing index, Pressure Drop have been calculated by statical Technique.

1) Micromixer Designs: Design-1

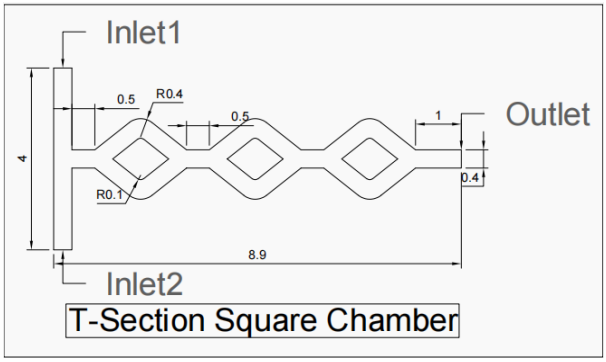

Figure 2: T-Shaped Inlet with Square shped Chamber

Design: II

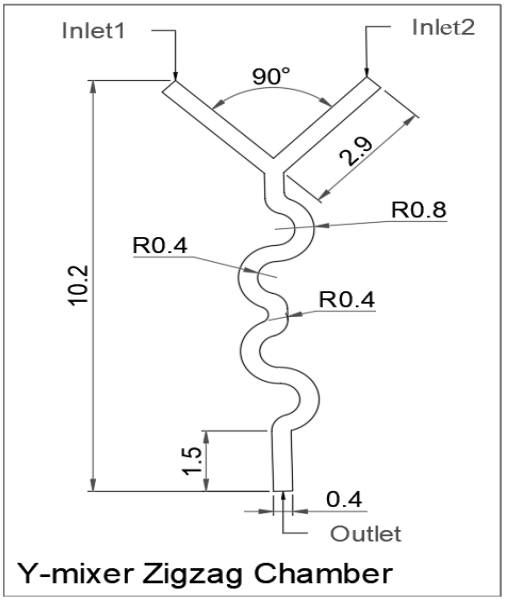

Figure 3:

2) Boundary Conditions & Fluid Properties: Boundry Conditions:

Inlet-1: Pure water with concentration of 0 mol/m3

Inlet-2: Ethanol with concentration of 1 mol/m3

Above conditions are used to simulate the fluid flow. Properties of fluids :

- Temperature of 20 °C.
- Densities of water = 9.998 × 102 kg/m3
- Density of =7.890 × 102 kg/m3
- Viscosity of water = 0.9 × 10–3 Pa.s
- Viscosity of ethanol = 1.2 × 10–3 Pa.s

- At the flow outlet zero static pressure is specified
- At all the channel walls no-slip boundary conditions are used.

IV. RESULTS AND OBSERVATIONS

A. Mesh Independent Test for Square chamber shaped T-Inlet Micromixer

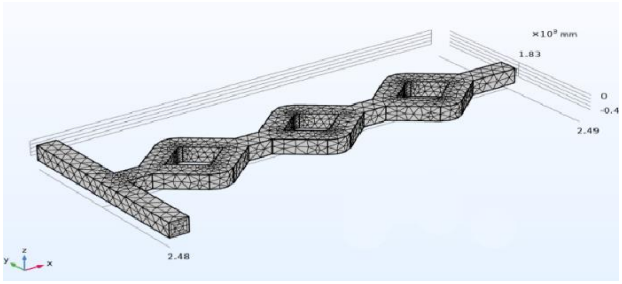

Figure 4: Extre-mely Coarse

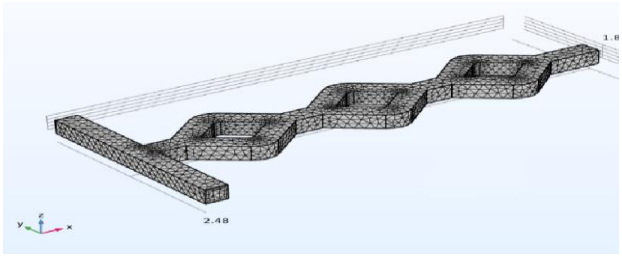

Figure 5: Extra Coarse

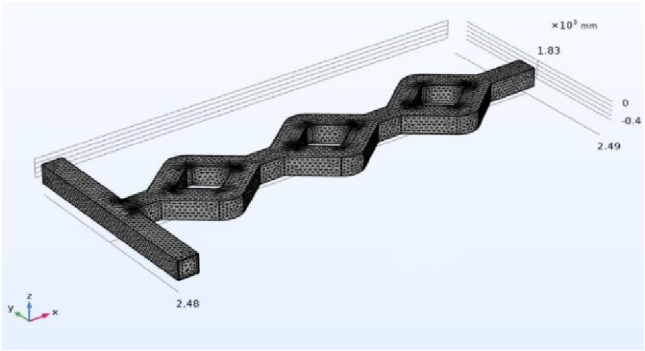

Figure 6: Coarse

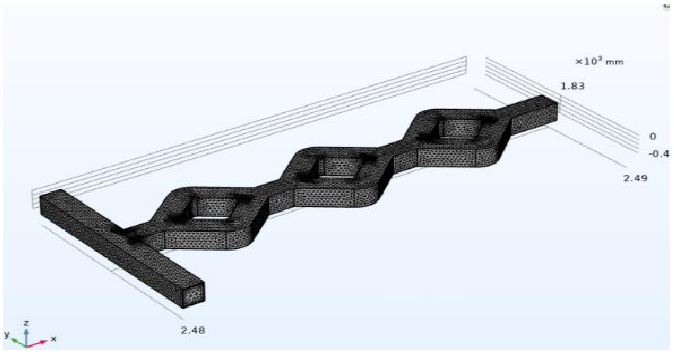

Figure 7: Normal

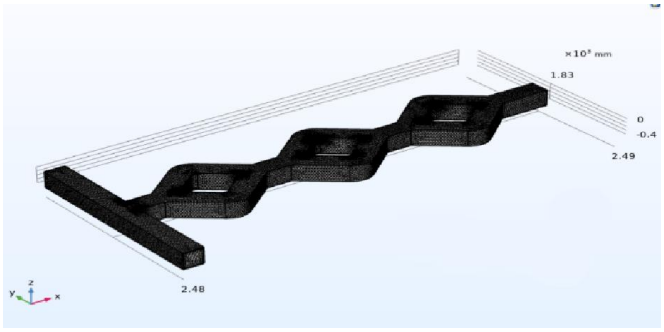

Figure 8: Fine

TABLE I

TABLE OF MESH INDEPEND TEST-1

Sr.No.	Mesh	No. Of Element	Pressure drop (Pa)
1	Extremely Coarse	9321	306.6594
2	Extra Coarse	17033	322.3878
3	Coarse	58990	335.1548
4	Normal	201410	339.6237
5	Fine	282363	342.00

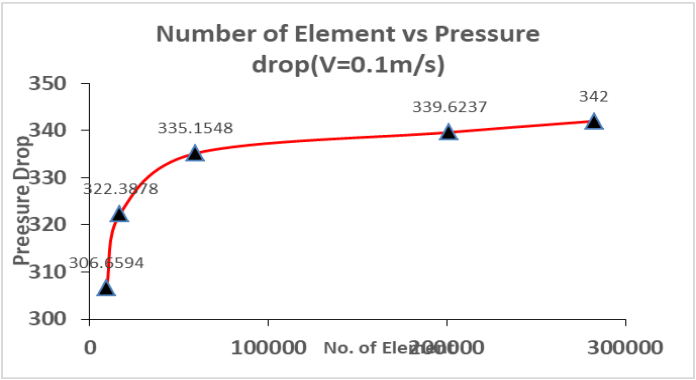

Figure 9:

From the mesh Independent test, it is clear that less variation is occurred in pressure drop calculation, hence Fine mesh selected for simulation of further component.

B. Computational Results for Y shaped inlet with Zig-Zag shaped chamber

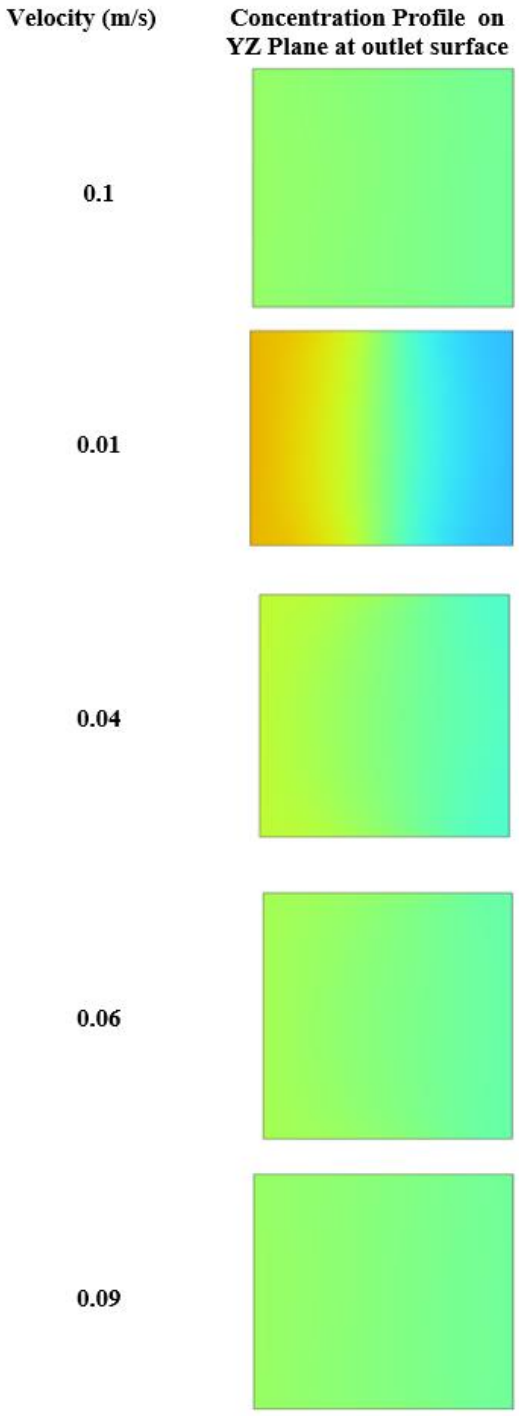

Figure 10:

C. Computational Results for T- Shaped Inlet with Square shaped chamber

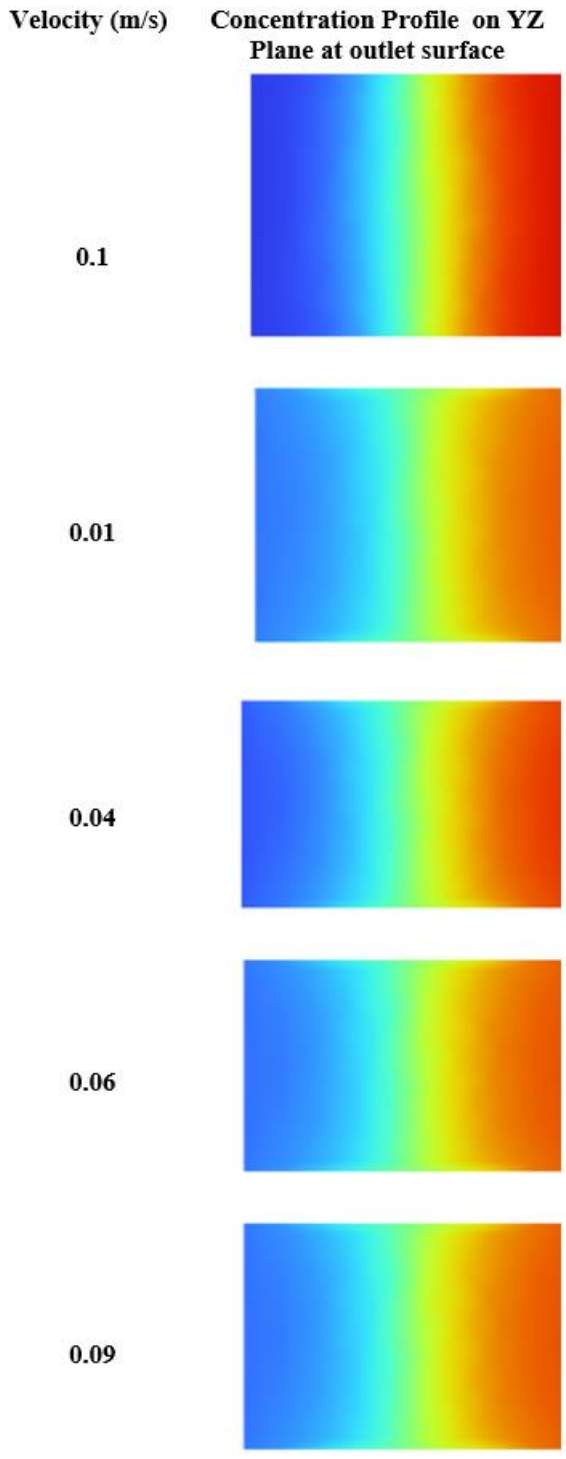

Figure 11:

From this concentration profile, it is clear that Mixing Index is 0.97 in Y shaped inlet with Zig-Zag shaped chamber & Mixing Index is 0.85 in Square shaped chamber with with T-Inlet.

TABLE III

MIXING INDEX IS CALCULATED FOR THE DIFFERENT VELOCITIES IS MENTIONED IN TABLE

Sr. No.	Velocity (m/s)	Mixing Index
1	0.02	0.963511834
2	0.04	0.974710889
3	0.06	0.978132023
4	0.09	0.978327676
5	0.1	0.978323419

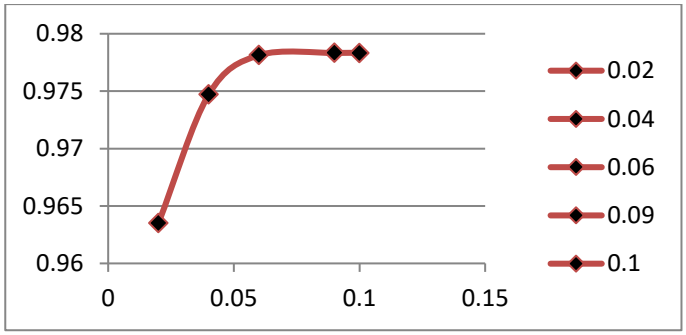

Figure 12: Graph: Velocity Vs Mixing Index

V. FABRICATION OF MICROMIXER MOLD BY CO2 LASER MACHINING

The component is fabricated by using Co2 laser machining on Acrylic sheet.

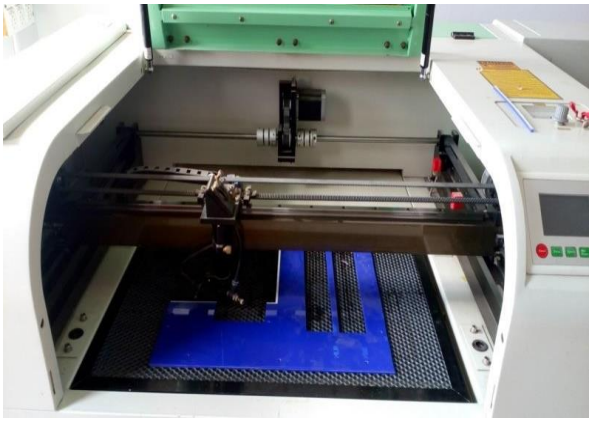

Figure 13: CO2 Machining Setup

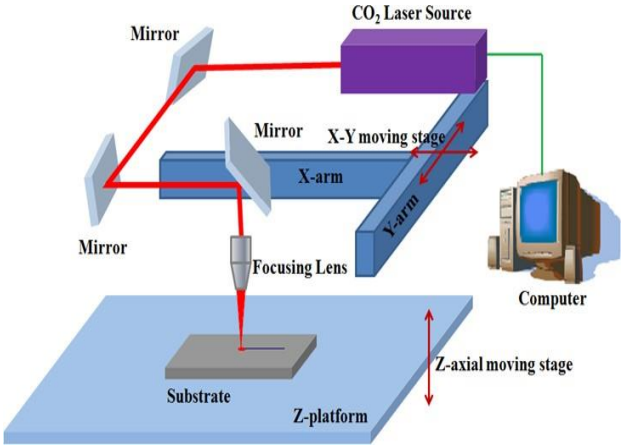

Figure 14: Block diagram of CO2 Laser Machining

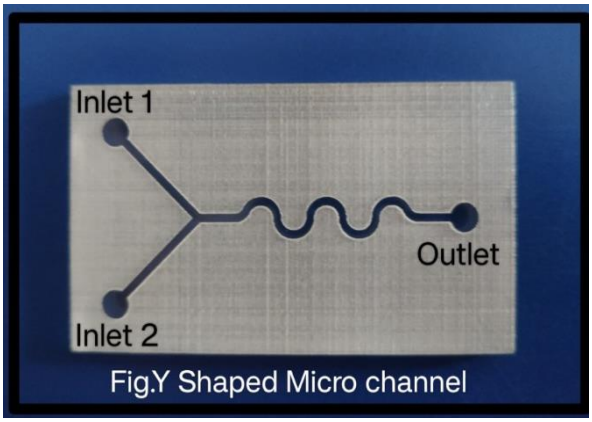

Figure 15: Fabricated Micromixers using CO2 Laser Facility

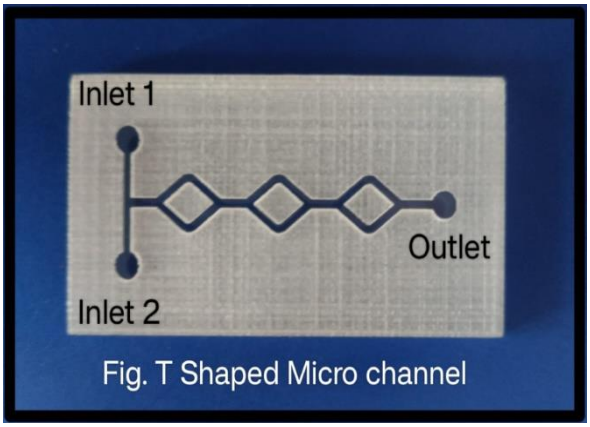

Figure 16: Fabricated Micromixers using CO2 Laser Facility

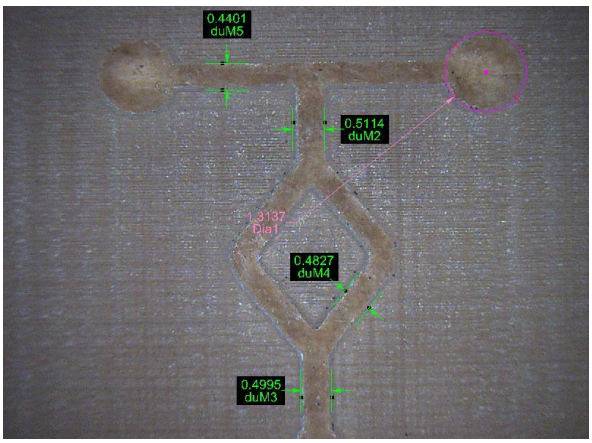

Figure 17: Characterization of fabricated microchannel by using Rapid-I Vision Machine

VI. CONCLUSION

The study successfully demonstrates that CO2 laser machining is an effective method for fabricating micromixers on acrylic sheets, offering high precision and flexibility in design. After doing computational analysis it noted that Mixing Index for Y-shaped Inlet Micromixer gives higher mixing Index ie.0.97 at Velocity 0.1 m/s.

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A Survey on Abnormal Behavior Detection for Road Safety using CNN

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ABSTRACT
The increasing number of road accidents and fatalities worldwide has prompted the need for advanced safety measures and intelligent systems to monitor and mitigate risks on the road. Abnormal behavior detection plays a pivotal role in enhancing road safety by identifying and responding to potentially hazardous situations in real-time. This survey presents an innovative approach to ab- normal behavior detection for road safety, leveraging cutting-edge technologies such as computer vision, machine learning, and sensor fusion. Various system integrates data from multiple sources, including on board cameras, LiDAR sensors, GPS, and vehicle telemetry, to create a comprehensive situational awareness framework. Through the application of deep learning algorithms, we analyze this multimodal data to identify and classify abnormal behaviors exhibited by pedestrians, and cyclists on the road.
Index Terms : — World Health Organization, Abnormal Behavior Detection, Deep Learning Algorithms, Computer Vision, Machine Learning

I. INTRODUCTION

Road safety is a critical concern globally due to the high number of accidents, in- juries, and fatalities occurring on roadways. The World Health Organization (WHO) reports that road traffic accidents are a leading cause of death and injury, with mil- lions of lives lost and countless more individuals suffering from lifelong disabilities every year. In response to this ongoing crisis, there has been a growing emphasis on developing advanced technologies and intelligent systems to enhance road safety.

Abnormal behavior detection for road safety represents a pivotal area of research and development in the quest to reduce accidents and save lives. Traditionally, road safety measures have relied on static signage, traffic signals, and human enforcement. While these methods have been effective to some extent, they often fall short in addressing dynamic and unexpected situations that occur on the road. It capitalizes on technological advancements and data-driven approaches to address one of the most pressing public health challenges worldwide.

A combination of humanitarian, economic, technological, and regulatory factors. By harnessing the power of advanced technologies and data-driven approaches, these systems aim to make roads safer, save lives, and create more efficient and sustain- able transportation ecosystems.

To significantly reduce the number of road accidents by promptly identifying and responding to abnormal behaviors exhibited by vehicles, pedestrians, and cyclists.

To prevent injuries and fatalities resulting from road accidents.

To comply with traffic laws and regulations by providing real-time feedback and alerts for behaviors that pose a danger to themselves and others.

II. LITERATURE SURVEY

Cunsuo Pang, Shengheng Liu and Yan Han [1] invented Radar detection of high-speed targets suffers from range walks during the integration time. Methods in current use for mitigating range walks are beset by high computational complexity therein that hinders practical real-time processing. In this context, we exploit the sparsity of the target echo in the transform domain and propose an efficient range walk mitigation algorithm based on sparse Fourier transform (SFT). Concretely, the input long echo sequence is first divided into short overlapped segments with an SFT bucket structure. Then, speed compensation is performed to the short segments, which involves less complex multiplications. Subsequently, SFT is employed which efficiently obtains the Fourier transform of the long sequence such that the range alignment of the multi-pulse echo is accomplished.

Zhiyong Niu , Jibin Zheng, Tao Su, Wentong Li, and Lu Zhang [2] presents a blind speed side lobe (BSSL) induced by the ambiguous velocity is a main challenge in the long-time coherent integration based high-speed target detection. In this article, considering the support area difference between the BSSL and the real target, [2] propose an improved minimized windowed Radon– Fourier transform (RFT)-based radar high-speed target detection method to suppress the BSSL and realize target detection. First, two groups of window functions are designed to force the BSSL support areas to split, and then, minimum operations are adopted to sup- press the BSSL. The effect of minimum operation on target detection is theoretically analyzed for the first time. Finally, the validity of the proposed algorithm is verified by the measured data. Compared with RFT and CWFM, this algorithm can suppress BSSL more significantly.

Chunlei Wang, Hongwei Liu and Bo Jiu, [3] facing high-speed targets, the traditional radar target detection framework may suf fer from performance degradation due to the signal-to-noise ratio loss caused by Doppler mismatches, especially for phase coded waveforms. In this paper, an end-to- end sliding residual network detector (SRND), which is derived from the likelihood ratio test, is proposed to detect high-speed targets in additive white Gaussian noise environments with a single radar echo pulse. The SRND uses a residual network with an efficient depth to increasingly capture the representations of target echoes, and we partially show this process through visualization. The SRND is robust to target velocities because the employed residual network utilizes layers of convolutional filters to match with target echoes of both low-speed and high-speed targets. Besides, with a waveform adapter, the SRND is compatible with different wave- forms, that is to say, the SRND needs to be trained only once and then can cope with different phase modulations of waveforms. More importantly, the SRND, which is trained with computer-generated data only, can deal with not only simulated

data but also measured data. Numerical experiments are given to demonstrate the superior detection performance of the SRND over the traditional detector.

Abnormal Crowd Behavior Detection Using Motion Information Images and Convolutional Neural Networks [4] introduce a novel method for abnormal crowd event detection in surveillance videos. Particularly, this work focuses on panic and escape behavior detection that may appear because of violent events and natural disasters. First, optical flow vectors are computed to generate a motion information image (MII) for each frame, and then MIIs are used to train a convolutional neural network (CNN) for abnormal crowd event detection. The proposed MII is a new formulation that provides a visual appearance of crowd motion. The proposed MIIs make the discrimination between normal and abnormal behaviors easier. The MII is mainly based on the optical flow magnitude, and angle difference computed between the optical flow vectors in con secutive frames. A CNN is employed to learn normal and abnormal crowd behaviors using MIIs. The MII generation, and the combination with a CNN is a new approach in the context of abnormal crowd behavior detection. Experiments are performed on commonly used datasets such as UMN and PETS2009. Evaluation indicates that our method achieves the best results

Daxin Tian, Chuang Zhang, Xuting Duan, and Xixian Wang [5] car accidents cause a large number of deaths and disabilities every day, a certain pro- portion of which result from untimely treatment and secondary accidents. To some extent, automatic car accident detection can shorten response time of rescue agencies and vehicles around accidents to improve rescue efficiency and traffic safety level. In this paper, we proposed an automatic car accident detection method based on cooperative Vehicle Infrastructure Systems (CVIS) and machine vision. First of all, a novel image dataset CAD-CVIS is established to improve accuracy of accident detection based on intelligent roadside devices in CVIS. Especially, CAD-CVIS is consisted of various kinds of accident types, weather conditions and accident location, which can improve self-adaptability of accident detection methods among different traffic situations. Secondly, we develop a deep neural network model YOLO-CA based on CAD-CVIS and deep learning algorithms to detect accident.

A Comprehensive Study on IoT Based Accident Detection Systems for Smart Vehicles [6] with population growth, the demand for vehicles has increased tremendously, which has created an alarming situation in terms of traffic hazards and road accidents. The road accidents percentage is growing exponentially and so are the fatalities caused due to accidents. However, the primary cause of the increased rate of fatalities is due to the delay in emergency services. Many lives could be saved with efficient rescue services. The delay happens due to traffic congestion or unstable communication to the medical units. The implementation of automatic road accident detection systems to provide timely aid is crucial. Many solutions have been proposed in the literature for automatic accident detection. The techniques include crash prediction using smartphones, vehicular ad-hoc networks, GPS/GSM based systems, and various machine learning techniques. With such high rates of deaths associated with road accidents, road safety is the most critical sector that demands significant exploration.

Delay-Aware Accident Detection and Response System Using Fog Computing [7] globally, a significant number of deaths occur each year, caused by excessive de- lays in rescue activities. Vehicles embedded with sophisticated technologies, along with roads equipped with advanced infrastructure, can play a vital role in the timely identification and notification of roadside incidents. However, such infrastructure and technologically-

rich vehicles are rarely available in less developed countries. Hence, in such countries, low-cost solutions are required to address the issue. Systems based on the Internet of Things (IoT) have begun to be used to detect and report roadside incidents. The majority of the systems designed for this purpose involve the use of the cloud to compute, manage, and store information. However, the centralization and remoteness of cloud resources can result in an increased delay that raises serious concerns about its feasibility in emergency situations; in life-threatening situations, all delays should be minimized where feasible. To address the problem of latency, fog computing has emerged as a middleware paradigm that brings the cloud-like resources closer to end devices. In light of this, the research proposed here leverages the advantages of sophisticated features of smartphones and fog com putting to propose and develop a low-cost and delay-aware accident detection and response system, which we term Emergency Response and Disaster Management System (ERDMS).

In this paper, we present a critical analysis of various existing methodologies used for predicting and preventing road accidents, highlighting their strengths, limitations and challenges that need to be addressed to ensure road safety and save valuable lives.

III. PROBLEM STATEMENT

Road safety is a critical concern in today's society, and identifying abnormal behaviors on the road is essential to prevent accidents and ensure the well-being of all road users. This paper aims to study a computer vision system for abnormal behavior detection on the road using Convolutional Neural Networks (CNN).
It will also contribute to a more comprehensive approach to road safety that combines technology, data analysis, and driver awareness.

IV. SCOPE OF SYSTEMS

The scope of abnormal behavior detection for road safety encompasses a wide range of technologies and methodologies aimed at identifying and mitigating unusual or dangerous behaviors on the road. Accident Detection systems are used to monitor roads and intersections, identifying accidents, traffic congestion, and other incidents that could disrupt traffic flow or endanger lives.
Crowd Detection systems are used to monitor roads and intersections, identifying accidents, traffic congestion, and other incidents that could disrupt traffic flow or endanger lives.
The scope of these applications continues to expand as technology advances, making them valuable tools for ensuring safety, optimizing operations, and enhancing overall user experiences.

V. PROPOSED SYSTEM

The primary goal is to develop an automated and highly accurate system to reduce the manual workload of physicians and minimize the occurrence of incorrect diagnoses, particularly in cases of knee osteoarthritis. The system encompasses various components: user registration, login for registered users, a training phase utilizing 80% of the data with Convolutional Neural Network (CNN) and Support Vector Machine (SVM) algorithms, and a testing phase involving the remaining 20% of the data. During testing, users can input knee images, and the system will swiftly determine the presence of Knee Osteoarthritis. The CNN, specialized in recognizing

image patterns, and the SVM, effective in categorizing data based on specific features, collaborate to enhance the accuracy and efficiency of knee osteoarthritis detection, offering a valuable diagnostic tool.

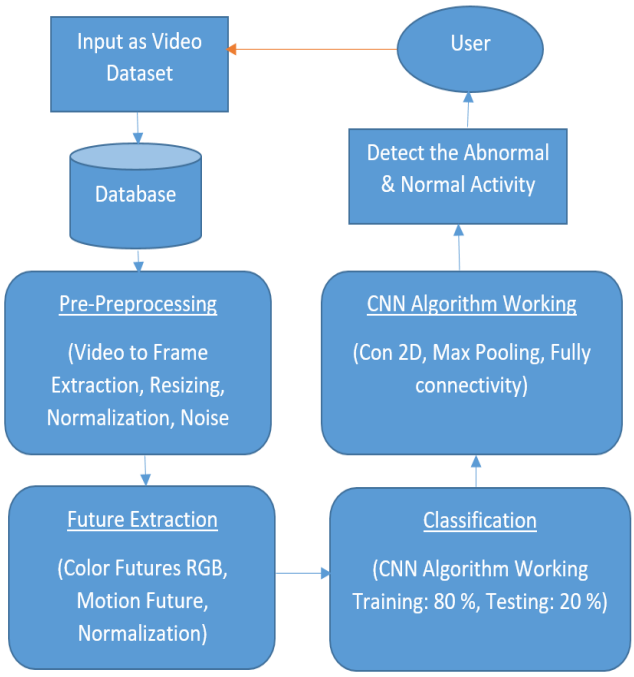

Fig.1 System Architecture

V. CONCLUSION

In conclusion, abnormal behavior detection for road safety represents a transformative approach to addressing the pressing issue of road accidents and fatalities. This innovative technology leverages advancements in sensor technology, machine learning, and computer vision to identify and respond to abnormal behaviors exhibited by vehicles, pedestrians, and cyclists on the road. By harnessing the power of technology and data, these systems contribute to safer and more reliable roadways, aligning with the overarching goal of creating a transportation ecosystem that prioritizes safety and sustainability. However, their successful deployment also requires a balanced approach that addresses ethical, legal, and privacy considerations while ensuring the seamless integration of these systems into existing transportation infrastructure.

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Design and Development of Belling Machine for Solid Waste Management

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ABSTRACT
This abstract introduces a novel belling machine concept for efficient solid waste management. The machine employs a specialized mechanism to enclose waste securely, enhancing containment during transportation. Hydraulic systems power the belling and compression processes, while integrated smart sensors adjust compression levels based on waste density. Safety features, including emergency stops and overload sensors, ensure operator security. A user-friendly interface facilitates real-time monitoring and control. The project aims to minimize waste volume, reduce transportation costs, and improve waste management efficiency. Through interdisciplinary collaboration, the machine's design, testing, and refinement ensure optimal functionality. Ultimately, the belling machine offers a promising solution to urban waste challenges, promoting sustainable waste management.

I. INTRODUCTION

The management of solid waste has emerged as a pressing concern as urbanization accelerates globally. With expanding populations and increasing consumption, effective waste containment, transportation, and disposal have become paramount. Conventional waste management methods often fall short of addressing the challenges posed by escalating waste volumes and the need for sustainable solutions. This project delves into an innovative approach: the design and development of a belling machine specifically tailored for solid waste management.

The belling machine offers a unique solution that seeks to transform waste containment during transportation. By encasing solid waste within a securely formed bell-shaped structure, the machine addresses concerns related to waste spillage, littering, and environmental degradation. This design concept capitalizes on the synergy of mechanical engineering, automation, and waste management practices to create a practical solution that can revolutionize the way we manage and transport waste in urban environments.

In this paper, we explore the intricacies and complexities of designing and developing such a belling machine. The machine's primary objective is to enhance waste containment efficiency, ensuring that waste materials are securely encapsulated throughout transportation. By doing so, the machine reduces the risk of scattered waste and associated environmental hazards, aligning with the broader goals of sustainable waste management and urban cleanliness.

The belling machine's design involves a convergence of engineering principles, technological innovation, and waste management expertise. At its core is a specialized belling mechanism that forms a protective enclosure around the waste. Hydraulic systems power the belling and compression processes, providing the force necessary to create a secure containment structure.

II. METHODOLOGY

Belling Machine:

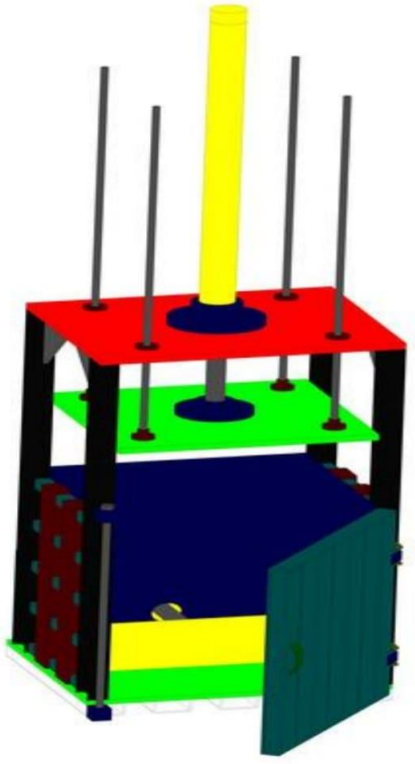

Fig. Final Design

The design and development of the solid waste belling machine involve a structured and iterative methodology that encompasses various stages to ensure efficient, reliable, and practical results.

Project Initiation:

- Define project objectives, scope, and key performance indicators.
- Form an interdisciplinary team of mechanical engineers, automation specialists, waste management experts, and other relevant stakeholders.
- Research and Analysis:
- Conduct a comprehensive literature review to understand existing waste management technologies, challenges, and best practices.
- Analyze waste composition, density variations, and transportation requirements specific to the target urban environment.

Conceptualization:

- Brainstorm and ideate potential design solutions for waste containment and efficient transportation.
- Evaluate the feasibility and viability of different design concepts through qualitative and quantitative assessments.

Design and Engineering:

- Develop detailed mechanical and hydraulic designs for the belling mechanism, compression system, and other key components.
- Utilize computer-aided design (CAD) software to model and simulate the machine's mechanical and hydraulic systems.

Sensor Integration and Automation:

- Select and integrate appropriate smart sensors for waste density monitoring and safety features.
- Develop algorithms for real-time sensor data processing and adaptive compression control. Battery
- Safety and User Interface Development:
- Incorporate safety features, emergency stop mechanisms, overload sensors, and safety barriers to ensure operator security.
- Design a user-friendly Human Machine Interface (HMI) for intuitive control and real time monitoring.

Prototype Construction:

- Fabricate a functional prototype of the belling machine based on the finalized design.
- Collaborate with manufacturers and fabricators to ensure precision and quality in component fabrication.
- Testing and Iterative Refinement: • Rigorously test the prototype's performance, including waste containment,
- compression efficiency, safety features, and user interface.
- Analyze test results and gather feedback from operators to identify areas for improvement and refinement.
- Data Analytics Integration:
- Develop data analytics algorithms to process sensor data and provide insights into waste composition trends and compression efficiency.

Performance Evaluation:

- Evaluate the prototype's performance under various waste types, densities, and operational conditions.
- Compare results against initial project objectives and performance indicators.

Documentation and Reporting:

- Document the design process, engineering details, testing procedures, and outcomes in a comprehensive report.
- Create user manuals and operational guidelines for the belling machine.
- Collaboration and Stakeholder Engagement:
- Collaborate with waste management companies, municipalities, and other stakeholders for feedback and potential partnerships.

Future Enhancements and Scaling:

- Identify potential future enhancements, such as advanced sensors, IoT connectivity, and automation capabilities.
- Consider scalability for different waste management scenarios and environments.

III. Conclusion

The project to repurpose forklifts as compressors for waste compaction offers a cost-effective, efficient, and environmentally sustainable solution for waste management facilities. By leveraging the versatility of forklifts and integrating compaction attachments, waste compaction can be performed immediately after collection, streamlining operations and reducing transportation costs.

The design ensures operator safety, with intuitive controls and clear visibility from the forklift cabin. Overall, this innovative approach optimizes space, improves efficiency, and contributes to a cleaner, greener urban environment. With further development and implementation, repurposing forklifts for waste compaction has the potential to revolutionize waste management practices and promote sustainable waste solutions.

IV. Future work

- Performance Optimization: Further refinement of the compaction attachment design and hydraulic system to improve compaction efficiency and reduce energy consumption.
- Integration of Smart Technologies: Explore the integration of sensors, IoT connectivity, and data analytics for real-time monitoring, predictive maintenance, and optimization of waste compaction processes.
- Scaling Up Implementation: Expand the project to larger waste management facilities or urban areas to assess scalability and address diverse waste management needs.
- Lifecycle Assessment: Conduct a comprehensive life cycle assessment (LCA) to evaluate the environmental impact of repurposing forklifts for waste compaction and compare it to traditional waste management methods.
- Regulatory Compliance: Stay updated on regulatory requirements and standards for waste management equipment and ensure continued compliance with safety and environmental regulations. By focusing on these areas of future work, the project can continue to evolve, innovate, and make significant contributions to improving waste management practices and promoting environmental sustainability.

V. ACKNOWLEGEMENT

We would like to express my deep sense of gratitude to our guide Mr K.S.Pukale for this constant guidance, supervision, motivation and encouragement all the way during the project work. I feel elated to extend our floral gratitude to our beloved Principal Dr. B.P.Ronge sir for providing us all the required faculties. We would like to thank our head of department Mechanical department Dr. S. B. Bhosale for co-operation and encouragement in completing this project. We take this opportunity to express our heartfelt thanks to all teaching and non-teaching staff members of department for guidance.

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[6]. Journals such as "Waste Management" and "Journal of Cleaner Production" often publish research articles and case studies related to waste management practices.
[7]. Government Guidelines and Reports:
[8]. Checked the waste management guidelines and reports provided by relevant government agencies in your region. These documents can offer insights into local regulations and best practices.
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Depression Level Analysis through Real Time Image

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ABSTRACT
Clinical depression is a type of soft biometric trait that can be used to characterize a person. Because of its importance in a variety of legal situations, this mood illness can be included in forensic psychological evaluations. In recent years, research into the automatic detection of depression based on real image has yielded a variety of algorithmic approaches and auditory indicators. Machine learning algorithms have recently been used successfully in a variety of image-based applications. Automatic depression recognition - the recognition of facial expressions linked with sad behavior is one of the most important applications. Modern algorithms for detecting depression usually look at both geographical and temporal data separately. This method restricts the capacity to capture a wide range of face expressions as well as the use of different facial parts. This research introduces a novel machine learning strategy for accurately representing face information associated to depressive behaviors from real-world images. Our suggested architecture outperforms state- of-the-art algorithms in automatic depression recognition, according to results from two benchmark datasets.
Keywords—Depression recognition, face recognition, convolutional neural network.

I. INTRODUCTION

Early recognition and accurate diagnosis of depression Studies focusing on individual-level neuroimaging data analyses are necessary if this approach is to be clinically useful [6] but the inherent complexity of the data and its analyses continues to be an obstacle [1].Depression, it is a general psychiatric disorder with a lifetime prevalence of ~ 20 % in the general population, is associated with high rates of disability, impaired psychosocial functioning and decreased life satisfaction are important criteria for optimizing treatment selection and improving outcomes, thus reducing the economic and psychosocial burdens resulting from hospitalization, lost work productivity and suicide [2–4]. Guided by established classification criteria (DSM-5) [5], the diagnosis of psychiatric disorders including depression relies solely on inferences based on self-reported information and observed general behavior. Identifying people with established depression does not usually present as a clinical challenge with standard clinical instruments but the potential for ambiguity, bias and low reliability of essential criteria for optimizing treatment selection and improving outcomes, thus reducing the economic and psychosocial burdens resulting from hospitalization, lost work productivity and suicide [2–4]. Guided by

established classification criteria (DSM-5) [5], the diagnosis of psychiatric disorders including depression relies solely on inferences based on self-reported information and observed behavior.

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II. Related work

Sr. No.	Paper title	Author Name	Year of Publication	Problem solved in this paper : Existing Problem Statement	Technique used to solve problem : Existing Problem Solution	What will be future work : Future Scope
1	Machine Learning based Depression Analysis and Suicidal Ideation Detection System using Questionnaires and twitter	Swati Jain, Suraj Prakash Narayan, Rupesh Kumar Dewang, Utkarsh Bhartiya, Nalini Meena and Varun Kumar	2019	Authors have proposed a depression analysis and suicidal ideation detection system, for predicting the suicidal acts based on the level of depression.	XGBoost, Logistic Regression classifier	Among future directions, we hope to understand how social media behavior analysis can help in leading to development of methods for analyzing depression at scale.
2	Reliable crowdsourcing and deep locality preserving learning for expression recognition in the wild	S. Li, W. Deng and J. Du	2018	we propose a new DLP-CNN (Deep Locality-Preserving CNN) method, which aims to enhance the discriminative power of deep features by preserving the locality closeness while maximizing the inter-class scatters.	DLP-CNN (Deep Locality-Preserving CNN) method	DCNN can learn more discriminative feature for expression recognition task.

3	Disentangled representation learning gan for pose-invariant face recognition	L. Tran, X. Yin, and X. Liu	2018	this paper proposes Disentangled Representation learning Generative Adversarial Network (DR-GAN) with three distinct novelties.	Disentangled Representation Learning-Generative Adversarial Network (DR-GAN)	Authors will extend GAN with a few distinct novelties, including the encoder-decoder structured generator, pose code, pose classification in the discriminator, and an integrated multi-image fusion scheme.
4	Deep residual learning for image recognition	K. He, X. Zhang, S. Ren, and J. Sun	2017	Authors present a residual learning framework to ease the training of networks that are substantially deeper than those used previously.	Deep Residual Learning	Further ideas can be investigated to improve the system performance.
5	Depaudionet: An efficient deep model for audio based depression classification	X. Ma, H, Yang, Q.Chen, D.Huang, and Y.Wang	2017	This paper presents a novel and effective audio based method on depression classification	CNN(Convolution neural network), LSTM(Long Short-Term Memory)	Furthermore, they work on image
6	Multimodal depression detection:fusion analysis of paralinguistic, head pose and eye gaze behaviors	S. Alghowinem, R. Goecke, M. Wagner, J. Epps, M. Hyett, G. Parker, and M. Breakspear	2017	This paper steps towards developing a classification system-oriented approach, where feature selection, classification and fusion-based experiments are conducted to infer which types of behaviour (verbal and nonverbal) and behaviour combinations can best discriminate between depression and non-depression.	Support Vector Machine	Future automated depression monitoring studies could consider this promising analysis.

III. BLOCK DIAGRAM/ARCHITECTURE

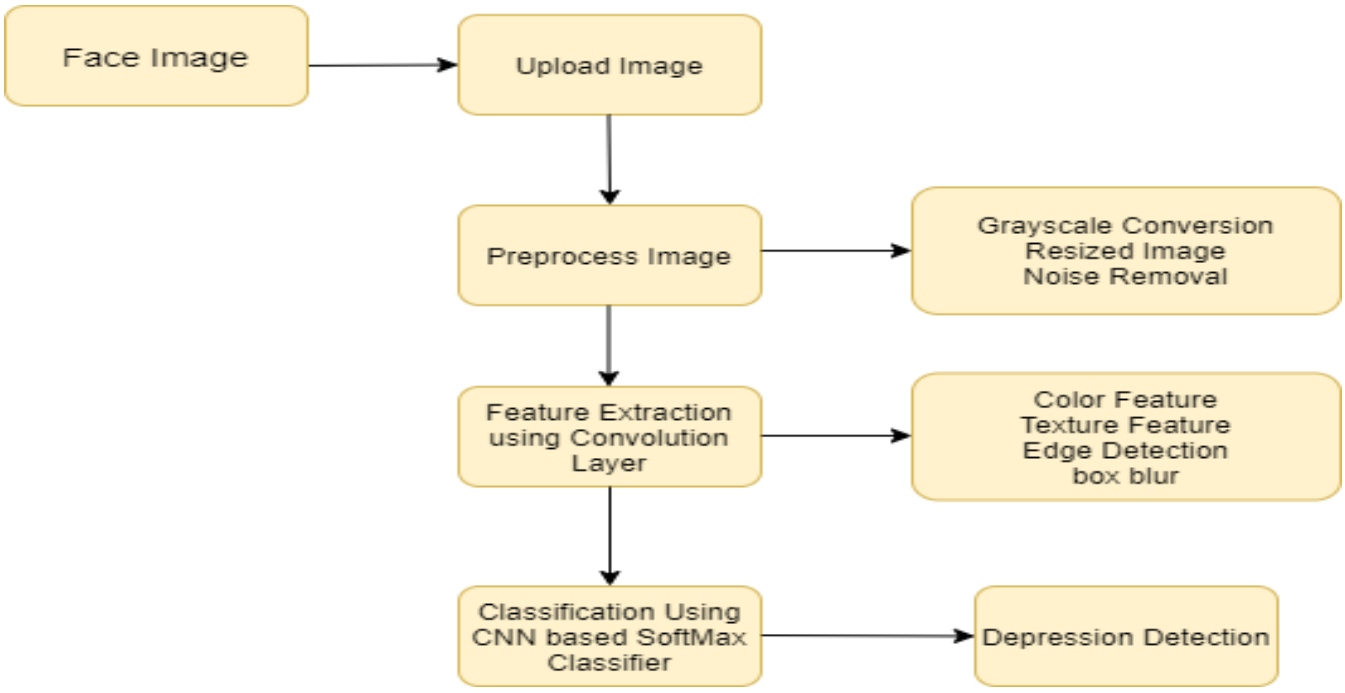


Figure 1. System Architecture

IV. PROPOSED SYSTEM

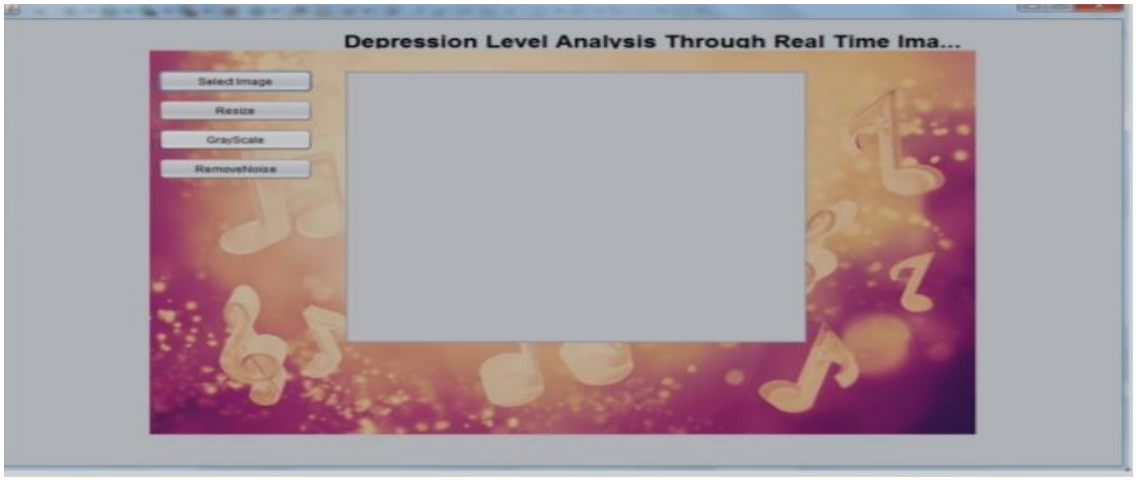
1. Input Image:
   Here we can upload the Input CT Image.

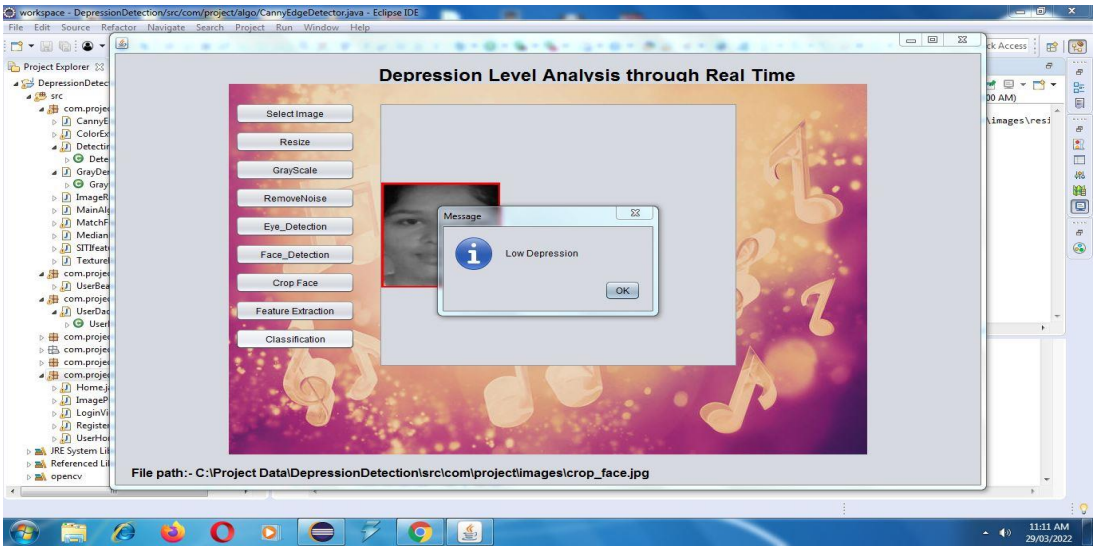
2. Image Pre-processing:
   In this step we will applying the image pre-processing methods like grey scale conversion, image noise removal.

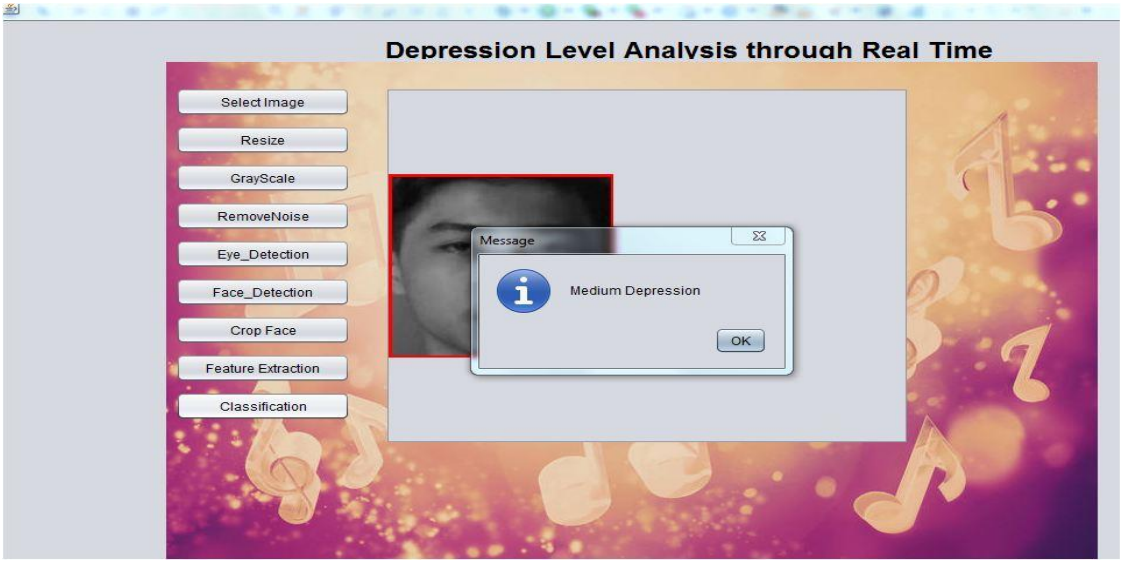
3. Image Feature Extraction:
   In this step we will applying the image pixel extraction methods to remove the image features from image.

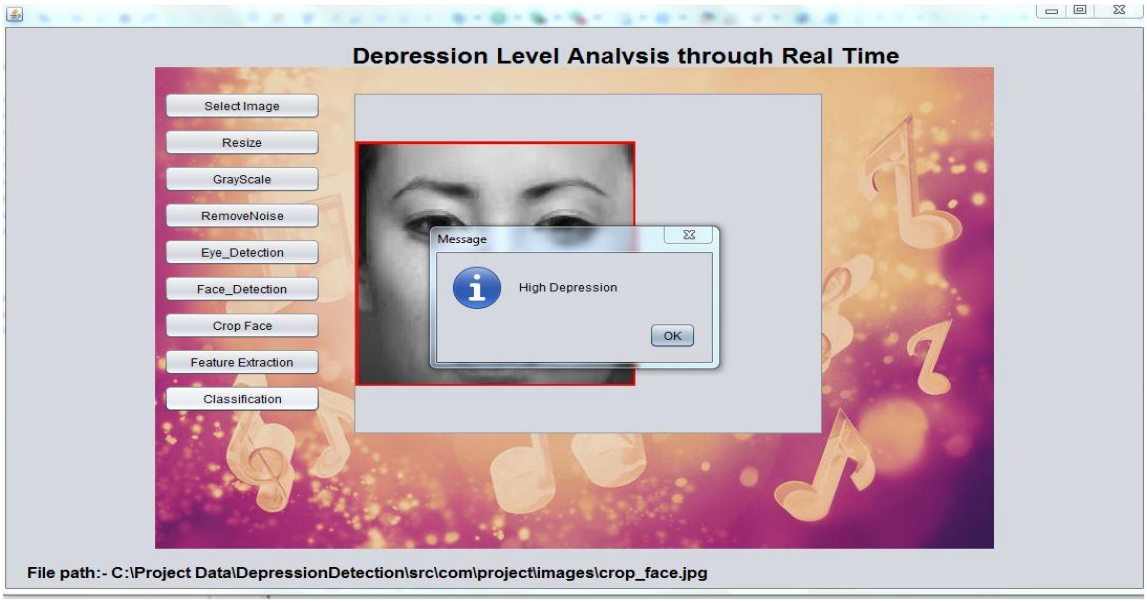
4. Image Classification:
   In this stage we will applying the picture classification methods to distinguish the contaminated region and safe area from features.

V. Result & Discussion









VI. CONCLUSION

From the consideration of all the above points we conclude that face image may be a useful tool in discriminating between depressed and healthy individuals. Given the questionable reliability of diagnoses based on clinical symptoms, this quantitative methodology may be a useful adjunctive clinical decision support for identifying depression and it supports independent studies confirming the potential clinical utility of computer-aided diagnosis of depression using face image.

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A Comprehensive Multimodal Analysis of Research Papers through Natural Language Processing (NLP) and Deep Learning

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ABSTRACT

The project introduces an innovative automated system poised to transform research paper analysis across diverse academic fields, offering dynamic summaries and flow charts through cutting-edge technologies like deep learning and natural language processing (NLP). Its core aim is to enhance the accessibility and understanding of scholarly literature by swiftly extracting key insights from dense academic texts. Leveraging deep learning-based NLP, the system generates concise summaries, expediting the review process for academics and researchers. Additionally, employing computer vision and deep learning algorithms, it creates comprehensive flow charts that aid in visualizing complex concepts within research papers, promoting better comprehension. Users can interact with these flow charts to intuitively explore relationships and significant elements within the papers. Notably, the system meets usability standards, allowing users to input research articles and access the generated summaries and flow charts. By amalgamating mind mapping with dynamic summarization, this groundbreaking project addresses the challenges posed by the exponential growth of scholarly research, underscoring its commitment to facilitating efficient and thorough research consumption for academics, researchers, and institutions alike.

Keywords— BERT Bidirectional Encoder Representations from Transformers, BART Bidirectional and Auto-Regressive Transformers, ROUGE Recall-Oriented Understudy for Gisting Evaluation, BLEU Bilingual Evaluation Understudy

I. INTRODUCTION

Our project tackles the challenge of navigating the vast expanse of scholarly literature by introducing an advanced automated system for research paper analysis. Utilizing state-of- the-art deep learning techniques, our system aims to enhance accessibility and comprehension of research papers through several key features. Employing advanced natural language processing methods, it dynamically generates summaries tailored to researchers' needs, significantly expediting the review process. Additionally, leveraging computer vision and deep learning algorithms, the system creates hierarchical mind maps that visually represent the paper's content, facilitating better comprehension of complex ideas. It also provides keyword extraction and relevant reference identification, further aiding in understanding the paper's essence. By seamlessly integrating flow chart generation with dynamic summarization, our project represents a paradigm shift in research paper analysis, offering researchers greater efficiency and customization in navigating academic literature, thus advancing the utilization of deep learning for intelligent and accessible research consumption.

II. LITERATURE REVIEW

Recent advancements in natural language processing (NLP) have spurred significant developments in text summarization techniques. Several studies have contributed diverse methodologies to address the challenges inherent in summarizing large volumes of text. Tham Vo's work introduces a pioneering text graph-based summarization model known as TGA4ExSum. By integrating bidirectional attention auto- encoding and multi-headed attention mechanisms, Vo's model demonstrates notable efficacy in summarizing textual data, outperforming conventional baselines. The utilization of graph- based architectures underscores the importance of contextual and structural representations in enhancing summarization tasks across various NLP benchmarks. Tong Chen et al. present an innovative approach to abstractive summarization by incorporating knowledge graphs into the summarization process. Through the integration of large language models (LLMs) and transformer modules, Chen et al.'s method generates summaries of high informativeness and relevance. The incorporation of both textual and graphical inputs enriches the summarization process, promising improved quality in summarization outputs. Semantic representation forms the crux of Georgios Alexandridis et al.'s work, which introduces a deep learning-based approach to summarization. Their model, leveraging a deep encoder-decoder architecture, excels in capturing the nuanced semantic meanings of words, resulting in the production of comprehensive summaries. The emphasis on semantic understanding signifies a shift towards more contextually relevant summarization outputs. Citation graph- based summarization is explored by Chenxin An et al., who introduce the CGSUM model. Through the integration of information from source papers and references, CGSUM surpasses existing methods in summarization quality, underscoring the critical role of citation graph structures in summarization tasks. Mohamed Elhoseiny and Ahmed Elgammal propose an automated approach to generate MindMaps from textual data, utilizing Detailed Meaning Representation (DMR). While effective, their method faces challenges in parsing complex statements and assuming central ideas, necessitating further research in hierarchical abstract information generation and word vector utilization. Mengting Hu et al. present a graph-based summarization approach that combines the LexRank algorithm and DistilBERT. Their methodology, characterized by superior summarization quality and efficiency, showcases the potential of lightweight BERT alternatives in streamlining summarization tasks. By integrating diverse methodologies such as graph-based architectures, semantic understanding, and knowledge graph integration, these studies collectively contribute to advancing the state-of-the-art in text summarization, paving the way for more sophisticated and contextually relevant summarization techniques.

III. METHODOLOGY

A. Summarization:

BART: An inventive sequence-to-sequence paradigm called BART (Bidirectional and Auto-Regressive Transformers) was created for challenges involving natural language processing. BART generates text that is coherent and rich in context by combining bidirectional and auto-regressive training objectives, which sets it apart from typical autoregressive models. BART gains a flexible knowledge of language through pre-training on large-scale corpora utilising denoising autoencoder objectives, where input sentences are distorted and the model is trained to rebuild them. BART's flexible comprehension enables it to perform a wide range of downstream tasks, including language translation and text summarization. BART is a strong and adaptable model for a variety of natural language processing applications because of its bidirectional and auto-regressive fusion, which helps it capture complex connections withinsequences.

BERT: Contextualised word embeddings are transformed by the ground-breaking natural language processing algorithm BERT (Bidirectional Encoder Representations from Transformers). Because BERT uses a bidirectional transformer design, it may take into account a word's whole context within a sentence, in contrast to standard models that analyse text in a unidirectional fashion. BERT acquires deeply contextualised representations that capture complex syntactic and semantic links through pre- training on huge corpora and concealed language modelling aims. With the help of this contextual knowledge, BERT surpasses earlier state-of-the-art techniques in a variety of downstream tasks, including sentiment analysis, question answering, and named entity recognition. The success of BERT emphasises how important bidirectional context modelling is to improve language comprehension and performance in various natural language processing applications.

B. Flow chart generation:

The Python function {flowchartMaking} creates flowcharts automatically from text summaries using cutting-edge NLP techniques. It utilises a state-of-the-art architecture developed by Facebook AI called the BART (Bidirectional and Auto- Regressive Transformers) model. This model is particularly good at condensing lengthy paragraphs into concise summaries without sacrificing crucial details; it may be obtained via the Hugging Face {transformers` library. By using BART, the function ensures that the output summaries contain the most crucial information from the input text.

After obtaining the summary, the function uses NLTK's `sent_tokenize` function to divide it into individual sentences. Because it enables the creation of a flowchart later on that illustrates how the information in the summarised text makes sense, this stage is crucial for granular analysis. The function's primary skill is its use of graph theory to create visual representations from textual summaries. The directed graphs are created from the summary sentences, where each sentence is a node. Depending on the semantic content of the phrase, phrases containing conditional assertions, or "if" conditions, are represented as decision nodes (diamond-shaped), whilst other sentences are represented as action nodes (rectangle-shaped). This differentiation facilitates readers' comprehension of the flowchart by enabling them to discern between decision points and actionable processes.[7]

Furthermore, directed edges are used by the function to establish relationships between nodes, representing the thoughts in the summary in chronological order. This visual tool expedites the process of comprehending the condensed information while also organising the data logically. Once the process is complete, the created flowchart is displayed using matplotlib, and it is saved as a PNG image with the file name "flowchart1.png." This graphic output enables users to comprehend the summary text's organisation and flow intuitively, facilitating efficient analysis and decision-making. In conclusion, by automating the transformation of textual summaries into visual flowcharts using a combination of complex NLP algorithms and graph theory concepts, the `flowchartMaking` function enhances the accessibility and usefulness of summarised material.

C. Keyword Extraction:

The provided code makes excellent use of the RAKE (Rapid Automatic Keyword Extraction) technique to extract keywords from a given text by utilising the `rake_nltk' library. Depending on how frequently and pertinently they occur in the text, this algorithm utilises an advanced way to identify possible keywords and assigns them a score. The `generate_keywords` function encapsulates this process and offers a useful method for extracting essential concepts and themes from textual input. Readers can obtain a brief synopsis of the main points of the text.

Through its interaction with the `rake_nltk} library, the code streamlines the keyword extraction process, enabling users to acquire insightful information about the text content more quickly. When everything is said and done, this code provides a powerful tool for automating the extraction of pertinent keywords, improving the analysis and interpretation of textual material.

D. Reference Similarity Matching:

The `find_references` function can be used to retrieve the "References" section from a text. It starts by looking for the term "references" somewhere in the text, regardless of case sensitivity. The text that follows this sentence is recorded if it can be found, with the assumption that this material is the references section. This section is then divided into separate reference points by newline characters. Every point undergoes a process to remove leading and trailing whitespaces. Additionally, any empty strings that remain after splitting are eliminated.

The `find_most_similar_points` function then discovers, from a set of reference points, the reference points that are most similar to a target text. The degree of similarity is calculated by counting the number of common words (independent of case) between each reference point and the target text. These similarity scores, which are stored in a dictionary, map each reference point to its matching score. The vocabulary is then arranged in descending order using these scores. Points with zero similarity are filtered out to ensure that only relevant matches are considered. If there are fewer similar points than the specified count, the function adds dissimilar points to the list. Finally, the function offers a meticulously curated list of the most similar reference points, along with an analysis of their significance to the text.

The code extracts reference points from a text that has a "References" section and a target text using `find_references`. The five reference points that are most similar to the target text are then identified using {find_most_similar_points}. This is used for content comparison or information retrieval, where users can find relevant references within a corpus.

IV TESTING & TEST CASES

A. Test Cases:

Input 1:

```
Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics , pages 5082–5092
Florence, Italy, July 28 - August 2, 2019. Initially, a theoretical model for
semantic-based text generalization is intro-
duced and used in conjunction with a deep
encoder-decoder architecture in order to pro-
duce a summary in generalized form. Sub-
sequently, a methodology is proposed which
transforms the aforementioned generalized
summary into human-readable form, retaining
at the same time important informational as-
pects of the original text and addressing the
problem of out-of-vocabulary or rare words. The overall approach is evaluated on two pop-
ular datasets with encouraging results. In the latter case, new sen-tences are generated which concatenate the ove
all meaning of the initial text, rephrasing its con-
tent.
```

Fig. 1 Output Summary 1

Output Flowchart 1:

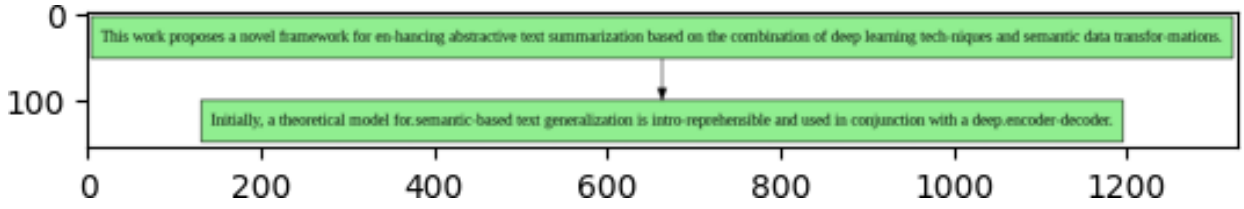

Fig. 2 Output Flow Chart 1

Input 2:

Automatic Summarization for Academic Articles using Deep Learning and
Reinforcement Learning with Viewpoints
Li Jinghong, Tanabe Hatsuhiko, Ota Koichi, Gu Wen, Hasegawa Shinobu
Japan Advanced Institute of Science and Technology, Japan
{s2220006,s2030410,ota,wgu,hasegawa}@jaist.ac.jp
Abstract
The purpose of this research is to develop a Viewpoint Re-
finement in Automatic Summarization (VPRAS) system for
research articles. The system will reflect viewpoints of sur-
vey to support surveys stage for researchers and students. Fi-
nally, we implemented an agent to automatically extract sum-
mary sentences based on a reward function. With the rapid progress of in-
formation science in recent years, comprehending where
particular fields are headed has grown increasingly impor-
tant (Wu et al. Additionally, ChatPDF (Mathis Lichtenberger
und Moritz Lage GbR, n.d.) is a recently developed summa-
rization tool that is based on the ChatGPT model, capable of
generating highly readable and concise abstract summaries. However, since the model has not undergone advanced aca-
demic training, it may occasionally provide incorrect infor-
mation. All rights reserved.potheses, techniques employed etc. Our Approach
Firstly, As a database construction for running machine
learning models, we perform web-scraping to gather
Japanese articles from Japan link center and then prepro-
cess the collected articles in PDF format automatically. To
reflect the structure of the article, we combine article con-
tent, meta information and hierarchize data down to sentence
level. Secondly, deep
learning is applied to classify the text of the article accord-
ing to the main-viewpoints. Viewpoints Classification By Deep Learning
Based on the dataset we built, we use deep learning to
classify sentences into main-viewpoint classes. 2014) for word embedding and PV-DM (Le et al.

Fig. 3 Output Summary 2

Output Flowchart 1:

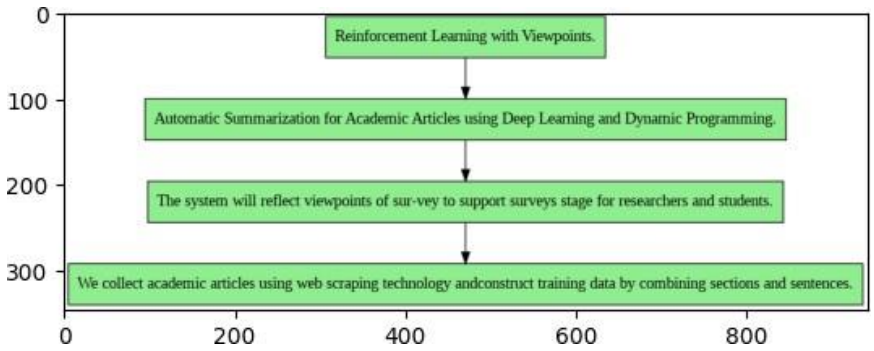

Fig. 4 Output Flow Chart 2

B. Testing

ROUGE, which stands for "Recall-Oriented Understudy for Gisting Evaluation," is a crucial instrument for assessing the effectiveness of machines learning and natural language processing (NLP) automatic summarization algorithms. Its main goal is to determine the degree of similarity between summaries that are automatically produced by systems and those that are created by humans, or reference summaries. ROUGE gives recall top priority and highlights how the system can condense all relevant information from the source documents into the summary. ROUGE guarantees that important details are not missed by

summarization techniques by emphasizing recall. Each of the metrics that make up ROUGE, such as ROUGE-N, ROUGE-L, and ROUGE-W, is intended to measure a different component of summary quality. ROUGE-L determines the longest common subsequence (LCS), ROUGE-N quantifies n- gram overlap, and ROUGE-W gives n-grams weighted counts. ROUGE scores are determined by comparing the generated summary with one or more reference summaries, calculating the overlap of n-grams or LCS, and then calculating metrics for precision, recall, and F1-score.

ROUGE scores: {'rouge-1': {'r': 0.2684268426842684, 'p': 1.0, 'f': 0.4232437087187465}, 'rouge-2': {'r':

0.17338534893801474, 'p': 0.9615384615384616, 'f':

0.29379360740031907}, 'rouge-l': {'r': 0.2684268426842684,

'p': 1.0, 'f': 0.4232437087187465}}

V. RESULTS & DISCUSSIONS

TABLE I. EVALUATION OF HYBRID SUMMARY

	Recall	Precision	F-1 score
Rouge-1	0.268	1.000	0.423
Rouge-2	0.173	0.961	0.294
Rouge-L	0.268	1.000	0.423

TABLE II. EVALUATION OF CHATGPT SUMMARY

	Recall	Precision	F-1 score
Rouge-1	0.056	0.756	0.104
Rouge-2	0.017	0.365	0.032
Rouge-L	0.052	0.704	0.097

The comparison between the summarization results of our algorithm and ChatGPT highlights the algorithm's superior performance in capturing relevant information. In Table 1, the algorithm consistently achieves higher recall and precision scores across all Rouge measures compared to ChatGPT in Table 2. Particularly noteworthy is the algorithm's perfect precision (1.000) in Rouge-1 and Rouge-L, indicating its exceptional ability to accurately extract key details from the source material.

In contrast, ChatGPT presents lower recall and precision scores, suggesting it struggles to precisely capture the essence of the text. While ChatGPT's F-1 scores are relatively higher for Rouge-1 and Rouge-L, indicating a balanced performance in terms of precision and recall, its inability to match the algorithm's precision levels implies a potential loss of critical information.

Overall, the algorithm's superior precision implies a higher level of accuracy and reliability in its summaries, ensuring that important details are not overlooked. While ChatGPT may demonstrate a more balanced performance across Rouge measures, its lower precision raises concerns about the comprehensiveness and accuracy of its summaries compared to the algorithm. Therefore, the results suggest that the algorithm outperforms ChatGPT in producing more accurate and informative summaries.

VI. CONCLUSIONS & FUTURE SCOPE

In conclusion, our study delved into the efficacy of research paper analysis, including nlp, and Deep Learning models, like T5, nltk, spacy, network, bert-extractive-summarizer, rouge for analyzing text data, particularly focusing on summarizing the research paper in easier ways by creating a flow chart to speed up the analysis.

Our findings underscored the importance of tailored techniques and extraction methods in enhancing research paper analysis accuracy. While the bert-extractive-summarizer model exhibited promising performance, Bart method (Abstractive summarization) also showcased notable accuracy. However, the Deep Learning model, being powerful, demonstrated higher accuracies compared to traditional machine learning approaches.

The functional requirements document offers a thorough blueprint for developing an advanced automated system that would revolutionise the analysis of research papers. By merging state-of-the-art deep learning and natural language processing (NLP) methods, the system aims to provide dynamic characteristics.

Looking ahead, expanding the scope to include more ways to increase the analysis accuracy by using intricate and newer frameworks that can foster inclusivity and applicability of multiple documents i.e, multiple related research papers to make the summary domain focused. Customizing the analysis and incorporating multiple domain documents can significantly enhance the accuracy effectively.

Future research endeavors could focus on optimizing preprocessing techniques and incorporating more specific features to further boost accuracy and robustness in multi modal analysis. Additionally, exploring hybrid models integrating machine learning and deep learning techniques could offer novel insights into analysis tasks, paving the way for more nuanced analysis.

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Design and Fabrication of Remote-Controlled Trash Collector Boat by using Bluetooth Module

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ABSTRACT
The Remote-controlled Trash Collector Boat is an innovative solution designed to tackle water pollution by efficiently removing floating debris from water bodies. The designed eco-friendly boat is equipped with a lightweight, durable hull, electric propulsion system, and an advanced remote-control unit. The primary feature of fabricated boat is a front-mounted conveyor belt that collects trash and deposits it into a large storage compartment. It has been powered by an Li-ion battery of 9v battery pack, the boat operates sustainably with minimal environmental impact. This technology offers precise navigation and efficient debris collection, making it ideal for use in various aquatic environments, from small ponds to large lakes. By automating the trash collection process, the boat significantly reduces labour and time, contributing to cleaner and healthier water ecosystems.
Keywords: Remote control, Water bodies, Floating debris, Conveyor belt, Environment.

INTRODUCTION

Rivers are crucial for our lives, but many people don't realize their importance. The evidence is clear: our rivers and creeks are full of trash, making them look and smell like dumpsites. This garbage isn't just ugly—it can contaminate our drinking water and harm nature, ourselves, and our loved ones. Even one piece of litter on the street can end up in our rivers. Rivers are very important and need to be cleaned. There are species unique to the Philippines that could be saved if we clean our rivers. Clean rivers mean better health for people and a better quality of life. Less trash also means more fun activities like walking and running along safe, clean river trails [1].

The trash collector boat is a small, automated boat designed to collect floating trash from the water's surface and store it temporarily. At the end of its operation, the collected trash will be removed manually. The design process used engineering methods to create a practical and portable trash collector boat based on existing designs. Using Autodesk Inventor 2009, a 3D model of the boat was created to show all the details. The boat will be built with suitable materials to ensure it works efficiently [2].

The "Trash Boat" is a machine designed to clean up waste and debris from water bodies like rivers, ponds, and lakes. It works with a waterwheel-powered conveyor belt that collects and removes garbage, including plastic waste, from the water. This helps reduce water pollution and saves aquatic animals from harm. The conveyor

belt lifts the debris out of the water, making it easier to collect and dispose of the waste. This machine helps keep water bodies cleaner and healthier [3].

Water running through a water drainage system mostly carries along waste materials most which are non-biodegradable which not only cause flooding but also climate change. Our project help to reduce water pollution and clean the water, which can be very useful for the living things. In India there is need of automated machine which can clean trash and collect this solid waste. The “River cleanup machine” used in that places where there is waste debris in the water body which are to be removed. This machine is consists of waterwheel driven conveyer mechanism which collect & remove the wastage, garbage & plastic wastages from water bodies [4,5,6].

The impurities present in water can cause hazardous and disease. As long as the draining system is considered the function of the main drainage system is to collect, transport and dispose of the water through an outfall or outlet. Impurities in drainage water can be only like empty bottles, polythene bags, papers, etc. It’s an Industrial Working Prototype of Entirely Solar Powered Water Cleaning Mechanism which can auto collect floating garbage and solid waste from the water surface and collect it into its floating bin. It can be programmed, scaled up to any size and can operate remotely. The system is indigenous and efficient to tack river cleaning cause [20].

Author explained the present condition of the National sacred rivers which are infected by large amount of waste and loaded with pollutants, toxic chemicals, debris, etc. due to such situation and also because of the multiplying water pollution in the form of waste debris the aquatic life is in danger. The machine has been designed that will be collecting all the waste debris from the water. This will be resulting into reduction of water pollution and also reduce the rate of aquatic animals’ death. The use of this project will be made in rivers, ponds, lakes and other water bodies for to clean the surface water debris from bodies.[9]

The model features a cage that is partially submerged in water to collect floating garbage. The debris is trapped by moving the cage around it. Researchers added level sensors to manage the amount of garbage in the cage, as well as pH and turbidity sensors to measure water pollution. An odor sensor detects harmful smells in the water.

This project addresses the severe problem of rising water pollution, which endangers aquatic life and can cause skin diseases in humans. Aquatic animals sometimes eat the debris, mistaking it for food, which can lead to their death. To tackle these issues, the "River Cleanup Machine" has been proposed. This machine efficiently removes waste debris, plastic, and garbage from the water surface.

Powered by hydropower, the machine uses waterwheels to convert kinetic energy into mechanical energy to drive a conveyor system that collects and disposes of the waste. This design aims to clean the Godavari River effectively [21].

The Over two thirds of Earth's surface is covered by water; less than a third is taken up by land. As Earth's population continues to grow, people are putting ever-increasing pressure on the planet's water resources. In a sense, our oceans, rivers, and other inland waters are being "squeezed" by human activities so their quality is reduced. Poorer water quality means water pollution. It relates to skimmer boats, i.e., work boats for collecting and disposing of floating solid waste materials in harbors and waterways [20].

Today, pollution, especially water pollution, is a major problem for humans and living organisms. Water pollution harms living creatures in various ways, putting many aquatic species in danger. Fish and other aquatic animals, as well as plants, are facing hazardous conditions. Polluted water often leads to excessive algae growth, which reduces oxygen levels and causes the death of fish and other organisms. Over the past twenty years, aquatic life has decreased by about 40%. Algae also give water an unpleasant taste and smell and can cause illnesses like gastroenteritis. There are many recorded cases of marine life being destroyed by polluted water [5].

Among the various sources of pollution, floating debris such as plastic bottles, bags, and other waste materials pose a particularly visible and pervasive problem in water bodies worldwide. To address this challenge, innovative solutions are needed to efficiently collect and remove debris from the water surface. One such solution is the development of remote- controlled trash collector boats.

Remote-controlled trash collector boats represent a promising technological advancement in the field of waterway cleanup. These specialized vessels are designed to navigate water bodies autonomously or under remote control, equipped with mechanisms to detect, collect, and store floating debris. By harnessing remote control technology, these boats can access hard-to-reach areas and effectively remove trash from rivers, lakes, harbors, and coastal regions.

METHODOLOGY

1. Motor

A torque motor is a specialized type of electric motor designed to provide high torque at low speeds, or even at standstill, without requiring gear reduction. They are commonly used in applications where precise control of rotational force is needed.

Key Characteristics:

High Torque at Low Speeds: Designed to deliver significant torque even when the motor's speed is low or zero.

Direct Drive: Typically used in direct drive applications, eliminating the need for mechanical gearboxes.

Precision Control: Offers precise control over torque and positioning, making them suitable for applications requiring fine adjustments.

Types of Torque Motors:

Permanent Magnet Torque Motors: Utilize permanent magnets to generate torque, known for their high efficiency and reliability.

Induction Torque Motors: Rely on electromagnetic induction, typically used in applications requiring robust and maintenance-free operation.

2. Battery

A 12-volt lithium battery is a compact, high-energy-density power source commonly used to power small electronic devices and motors, including torque motors. These batteries offer several advantages over traditional battery types, making them suitable for applications requiring consistent and reliable power.

Voltage: Provides a stable 12-volt output, which is suitable for various low-power applications.

Energy Density: High energy density allows for longer operational times compared to other battery chemistries.
Lightweight: Lithium batteries are lighter than their alkaline counterparts, making them ideal for portable applications.
Capacity: -volt lithium batteries typically have capacities ranging from 500 to 1200 mAh, which determines how long they can power a device.
Rechargeability: Rechargeable variants offer long-term cost benefits but require an appropriate charger.
Compatibility: Ensure the battery meets the voltage and current requirements of the torque motor to prevent underperformance or damage.
using a 12-volt lithium battery to drive a torque motor.
Power Requirements: Verify the torque motor's voltage and current requirements align with the battery's output.
Current Draw: Ensure the battery can supply sufficient current for the motor's operation, especially under load.
Battery Life: Assess the expected runtime based on the motor's power consumption and the battery's capacity.

3. Conveyor belt

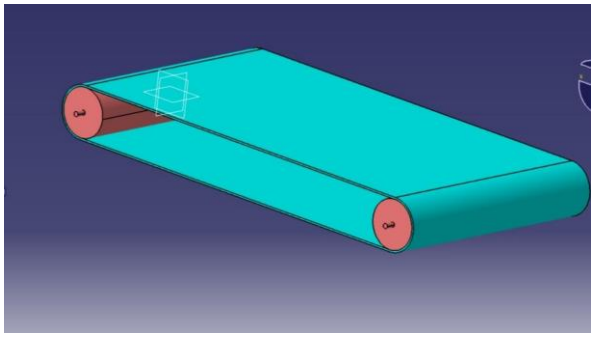


Fig. 1. Conveyor belt

A conveyor belt on a trash collector boat is a crucial component designed to collect and transport floating debris from the water's surface into a storage compartment on the boat. This system enables efficient and automated cleaning of water bodies, contributing to environmental conservation.

Key Characteristics:
Material: Typically made from durable, corrosion-resistant materials like rubber, to withstand water exposure and harsh environmental conditions.
Design: Features a series of belts or chains with attached scoops or paddles that move debris from the water onto the boat.
Power Source: Operated by an electric motor, often powered by the boat's battery or solar panels, ensuring continuous and reliable operation.
Components:
Belt: The main component that moves continuously to transport collected debris.
Rollers: Cylindrical components that support and guide the belt, ensuring smooth operation.

Frame: The structure that holds the conveyor system in place, typically mounted at the front or side of the boat.

Motor: Provides the necessary power to drive the belt, often a low-voltage motor suitable for battery operation.

Scoops/Paddles: Attached to the belt to help lift debris out of the water and onto the belt.

The conveyor belt on a trash collector boat is an essential system for efficient and automated debris collection from water bodies. Made from durable materials and powered by reliable motors, these conveyor belts ensure continuous operation and effective cleaning. Their use in various aquatic environments helps maintain cleaner water, contributing to environmental conservation and sustainability.

4. Arduino uno and Bluetooth model.

Integrating an Arduino microcontroller and a Bluetooth module into a trash collector boat enhances its functionality by enabling remote control and automation. This setup allows for wireless
communication between the boat and a remote controller ,
facilitating precise maneuvering and efficient debris collection.

Components

Arduino Board: The central microcontroller that processes input signals and controls the boat's motors and other components.

Bluetooth Module (e.g., HC-05): Enables wireless communication between the Arduino and a smartphone or remote controller.

Motor Driver (e.g., L298N): Controls the motors based on commands received from the Arduino.

Motors: Propel the boat and operate the conveyor belt.

Battery: Provides power to the Arduino, Bluetooth module, and motors.

Conveyor Belt System: Mechanically collects and transports debris from the water surface to the storage compartment.

Arduino pin connection with Motor Drive and Bluetooth Module

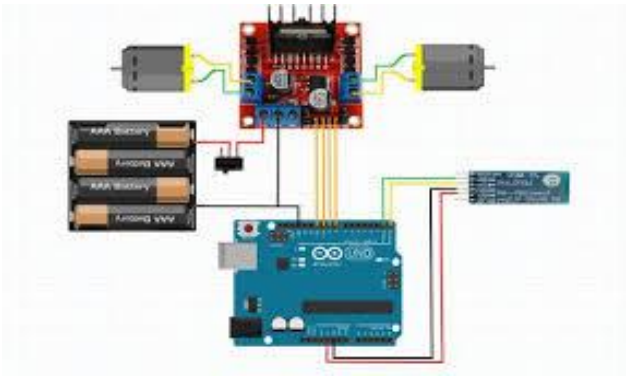


Table: 1 Arduino connection

Arduino Uno	Motor Driver	Bluetooth Module
TX	RX (pin 0)	RX
RX	TX (pin 1)	TX
5V	VCC	VCC
GND	GND	GND
3	Motor 1 Positive	-

6	Motor 1 Negative	-
9	Motor 2 Positive	-
10	Motor 2 Negative	-

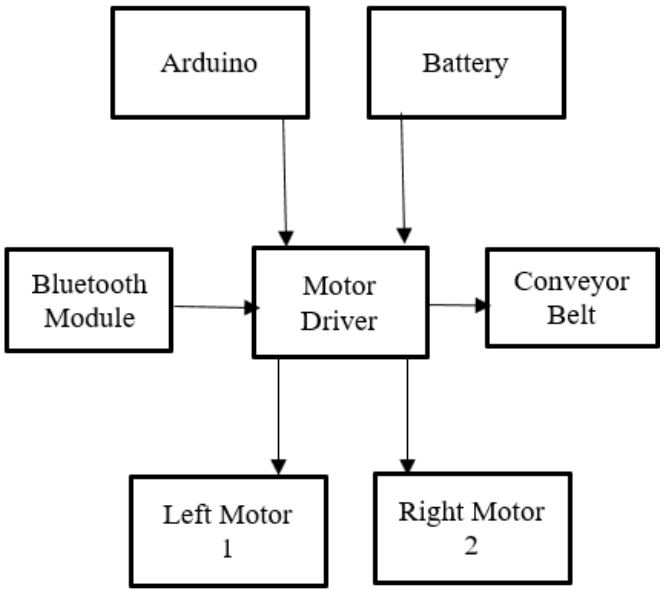


Fig. 2 Block Diagram of Arduino and Bluetooth module connection

Using Arduino code for controlling a trash collector boat using Bluetooth communication. It utilizes two motor driver pins for controlling the movement of two motors responsible for propulsion. The Bluetooth module, connected to pins 0 and 1, receives commands from an external device. Commands 'F' and 'B' initiate forward and backward movement, respectively, while 'L' and 'R' command the boat to turn left and right. The 'S' command halts all motor activity. Each command triggers a corresponding function that sets the appropriate motor pins to achieve the desired movement. This setup allows remote control of the boat's navigation, making it suitable for collecting trash from water bodies.

Using an Arduino and Bluetooth module to control a trash collector boat allows for efficient and precise remote operation. This setup enables real-time maneuvering and debris collection, enhancing the boat's functionality and ease of use. By integrating these technologies, the trash collector boat becomes a more effective tool in maintaining clean and healthy water bodies.

5. Floating Platform

The floating platform of the trash collector boat consists of five hollow PVC pipes, each measuring 60 cm in length and 3 inches in diameter, attached to a sturdy wooden board. This design choice offers several advantages for the functionality and efficiency of the boat. Firstly, the hollow PVC pipes provide buoyancy, enabling the boat to float effectively on water while carrying out trash collection tasks. Additionally, their lightweight nature ensures that the overall weight of the boat remains manageable, facilitating easy maneuverability and transportation. The use of PVC pipes also contributes to the platform's durability, as PVC is resistant to corrosion and degradation when exposed to water and environmental elements. By securely

affixing these pipes to a wooden board, the platform gains stability and rigidity, allowing it to support the weight of the boat and any collected debris efficiently. This design configuration optimizes the performance and functionality of the trash collector boat, making it well-suited for addressing water pollution challenges in various aquatic environments.

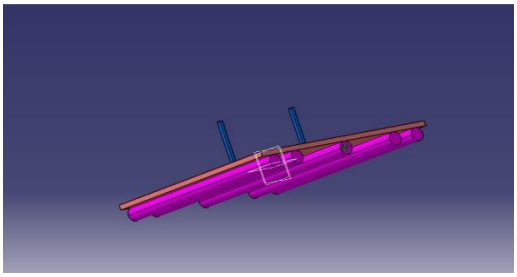


Fig. 3 Floating Platform

Calculations for floating Platform:-

Total volume of hollow pipe = max. water displaced
Length = 60cm,
Radius = 3.8cm
Volume of 1 pipe = length × π× radius^2
Total Volume of pipes = 60 ×π ×3.8^2×5
Total Volume of Pipes = 13609cm^3
Total Water Displaced =Volume of pipes×Water Density
Density of Water = 1g/cm^3
Total Water Displaced= 13609×1
Total Water Displaced = 13609 gram
In Kg 13.60Kg
Self weight of Hull is 3.5 Kg

II. RESULT

The Remote-Controlled Trash Collector Boat represents a significant advancement in addressing water pollution. By leveraging automated technology this boat efficiently removes floating debris from water bodies, ensuring cleaner and healthier aquatic environments. Its design, featuring a durable hull, precise navigation via remote control, and an effective conveyor belt system, makes it a practical solution for various applications, including lakes, rivers, and coastal areas.

Enhanced Automation

Sensor Networks: Utilizing advanced sensors to monitor water quality and debris levels, optimizing the boat's routes and collection efficiency.

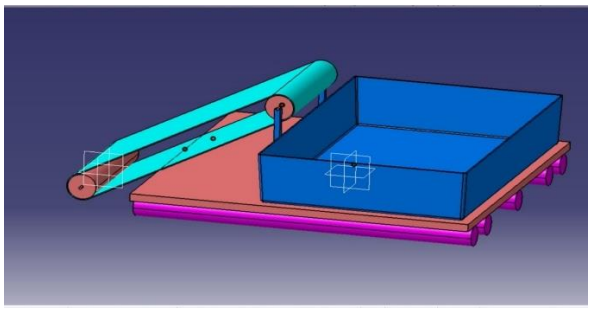
Increased Efficiency Advanced Materials: Using lightweight, durable materials to enhance the boat's performance and longevity.

Expanded Applications

Larger Scale Operations: Designing bigger models for larger bodies of water, capable of handling greater volumes of debris.

Specialized Designs: Creating specialized versions for different types of debris, such as oil spills or microplastics.

Design



CONCLUSION

To achieve this goal, the proposed system utilizes a conveyor belt for collecting Debris in the water bodies. Conveyor belt rotates and lift the floating debries from water surface into the basket. The proposed system will also include a Bluetooth module with Arduino that can navigate boat for collecting debris and hazardous environments to assist with rescue and recovery efforts. The boat's ability to reduce manual labour and enhance the efficiency of trash collection highlights its potential as a vital tool in environmental conservation efforts.

REFRENCE

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Meal Recommendation System Using Machine Learning Algorithm

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ABSTRACT

By customizing meal ideas to hotel guests' daily calorie needs and nutritional preferences, this research presents a hybrid meal recommendation system that aims to improve their dining experience. The technology effortlessly integrates content- based filtering, which uses nutritional aspects like protein, fat, and carbohydrates, with collaborative filtering, which considers user behavior and feedback. The findings of this hybrid system demonstrate its ability to generate exact meal recommendations while balancing the hotel's offerings with user input and behavior. This concept provides a practical and scalable solution for personalized dining experiences, promoting healthier and more fulfilling meal options for hotel guests. The technology responds to a wide range of visitor tastes by combining content-based and collaborative filtering processes. This ensures an upgraded gastronomic journey during their stay.

Index Terms—KNN, Content Based Filtering, Cosine Similar- ity, Pearson correlation.

INTRODUCTION

In an era characterized by information overload and busy lifestyles, maintaining a balanced and nutritious diet often becomes a challenging endeavor. The proliferation of fast- food options and the abundance of conflicting nutritional advice further complicate the task of making informed dietary choices. Recognizing this challenge, our research endeavors to address the vital need for personalized meal recommendations, catering to individual nutritional requirements and preferences. The "Enhancing Dietary Wellness: A Meal Recommendation System" project aims to provide a solution that empowers users to make healthier food choices aligned with their unique dietary goals. Leveraging the principles of machine learning and data analytics, our system not only considers daily caloric requirements but also incorporates user-specified macronutri- ent preferences, offering a tailored and user-centric approach to meal recommendation.

The motivation behind this research stems from the growing importance of nutrition in overall well-being and the potential impact of technology on fostering healthier dietary habits. As dietary-related health issues continue to rise, the need for accessible and personalized tools that guide individuals toward nutritious food choices becomes increasingly crucial.

This paper presents a comprehensive exploration of our meal recommendation system's architecture, methodology, and evaluation metrics. By delving into the intricate details of the system's design, we aim to contribute to the existing body of knowledge in the domain of personalized nutrition recommendations. The utilization of advanced machine learn- ing techniques, coupled with a user-friendly interface, sets our approach

apart, providing users with a practical tool for enhancing their dietary wellness. Through the course of this paper, we will delve into the intricacies of the recommenda- tion algorithm, the significance of macronutrient percentages, and the evaluation metrics employed to gauge the system's effectiveness. Moreover, we will discuss the potential impact of such systems on promoting healthier dietary choices and contributing to the broader discourse on the intersection of technology and wellness. In summary, our research endeavors to bridge the gap between dietary information and individ- ual needs, offering a practical and personalized solution to the modern-day challenge of making health-conscious food choices. The meal recommendation system presented in this paper offers a personalized approach to enhancing the dining experience for hotel guests. Leveraging unsupervised learning techniques, specifically collaborative filtering, our system an- alyzes historical user interactions and meal characteristics to generate tailored recommendations. By incorporating features such as calorie requirements and macronutrient preferences, our system provides users with meal suggestions that align with their dietary goals and tastes. Through the utilization of techniques such as K-Nearest Neighbors (KNN), our system identifies similar users or meals based on past interactions, facilitating the delivery of personalized recommendations. This paper outlines the development and implementation of our meal recommendation system, highlighting its potential to promote healthier and more satisfying meal choices for hotel patrons.

LITERATURE REVIEW / PREVIOUS WORK

In [1], Philip M. Sedgwick discusses Pearson's correlation coefficient, which is a measure of the linear correlation between two variables. The paper, available on ResearchGate, was published on 4 July 2012.

In [2], Badr Hssina presents a study on recommendation systems using the k-nearest neighbors and singular value decomposition algorithms. This work was published in the International Journal of Electrical and Computer Engineering (IJECE), Vol. 11, No. 6, in December 2021.

In [3], Hua-Ming Wang and Ge Yu explore personalized recommendation systems and the optimization of the k- neighbor algorithm. This research was presented at the ICITEL conference in 2015 and published in March 2016.

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In [9], Johan Eko Purnomo and Sukmawati Nur Endah compare the Collaborative Filtering Algorithm (CFA) with the Dissymetrical Percentage Collaborative Filtering Algorithm (DSPCFA) for rating prediction in movie recommendation systems. This study was published by IEEE on 6 February 2020.

METHODOLOGIES

A. Data Collection

For the data collection phase of this project, several avenues can be explored to gather a comprehensive dataset containing food products and their nutritional details. One approach involves sourcing publicly accessible datasets from reputable sources such as government agencies, research institutions, or health organizations. Alternatively, if a pre-existing dataset meeting the project's requirements is not available, creating a custom dataset through manual data entry or collaboration with domain experts could be considered. Regardless of the approach chosen, ensuring the accuracy, completeness, and relevance of the collected data is paramount to the success of the project. Additionally, attention should be paid to data licensing agreements, terms of use, and ethical considerations surrounding data usage and privacy.

B. Data Pre-processing

In the data pre-processing phase, several steps will be un- dertaken to ensure the cleanliness, consistency, and reliability of the dataset. Firstly, missing values will be addressed by employing techniques such as imputation or deletion, depend- ing on the extent and nature of the missing data. Imputation methods like mean, median, or mode replacement can be used for numerical features such as calories, protein, carbs, fats, vitamins, and minerals. For categorical features, missing values can be filled with the mode or a separate category indicating missingness. Additionally, to ensure consistency in the data, standardization of portion sizes for each food item will be performed. This may involve converting portion sizes to a common unit (e.g., grams) or adjusting portion sizes based on standard serving sizes for food groups. Outlier detection and treatment will also be conducted to identify and address any anomalies in the data that could adversely impact statistical analysis and machine learning model train- ing. Techniques such as Z-score normalization, trimming, or Winsorization can be applied to handle outliers appropriately, ensuring that they do not unduly influence the analysis or model performance. By diligently addressing missing values, standardizing portion sizes, and detecting/treating outliers, the dataset will be prepared effectively for subsequent analysis and modelling stages, ultimately leading to more robust and accurate results.

C. User Input

The user interface is designed to provide a seamless expe- rience for individuals to input their daily calorie requirement, weight, and height, facilitating personalized calculations based on these inputs. Upon accessing the interface, users are greeted with a user-friendly layout that guides them through the input process. They are prompted to enter their daily calorie require- ment, which serves as a crucial factor in determining their nutritional needs and goals. Users can input this value based on factors such as their activity level, weight management objectives, and overall health considerations

D. Feature Engineering

In addition to extracting basic nutrient content, food cate- gories, and dietary labels, the feature engineering step of this is the dot product of the vectors, and project encompasses a more nuanced analysis of nutritional composition. Beyond simply considering calorie counts and macronutrient percentages, we delve deeper into understanding the relative proportions of proteins, fats, and carbohydrates in each meal. By calculating the percentage contribution of each macronutrient to the total calorie count, we gain insights into the meal's nutritional profile and its alignment with user pref- erences. This approach enables us to create a comprehensive feature matrix that encapsulates the multifaceted aspects of each meal's nutritional content. Moreover, we can incorporate additional features such as meal diversity, portion sizes, and ingredient lists to further enrich our understanding of each menu item. By analysing ingredient compositions, we can identify common allergens, dietary restrictions, and ingredient preferences, allowing for more tailored recommendations.

E. Machine Learning models

1) Model 1 - Content Based Filtering: Content-based filtering, is a recommendation technique that relies on the characteristics or features of items to make recommendations to users. In the context of the meal recommendation system, content-based filtering analyzes the nutritional attributes and other features of each meal to suggest items that are like those a user has enjoyed in the past or are likely to enjoy based on their stated preferences. Content-based filtering is implemented by first creating a feature matrix that encapsulates the relevant attributes of each meal, such as calorie content, protein, fat, and carbohydrate percentages. This feature matrix represents the "content" of the meals. The system then calculates the cosine similarity between the user's preference vector and each meal's feature vector. Cosine similarity measures the similarity between two vectors based on the cosine of the angle between them, indicating how closely aligned the items are in feature space. The higher the cosine similarity score between a user's preference vector and a meal's feature vector, the more similar the meal is to the user's preferences, making it more likely to be recommended. By sorting meals based on their similarity scores in descending order, the system identifies the most similar meals and presents them as recommendations to the user. Content-based filtering is advantageous in scenarios where there is limited or no data on user interactions, as it does not rely on user behavior or feedback.

The formula for cosine similarity between two vectors

$$\text{cosine similarity} = \cos(\vartheta) = \frac{\mathbf{A} \cdot \mathbf{B}}{\|\mathbf{A}\|\|\mathbf{B}\|}$$

where:

$$\mathbf{A} \cdot \mathbf{B} = \sum_{i=1}^{n} A_i B_i$$

A and B is given by:

Cosine similarity measures the cosine of the angle between two vectors, providing a measure of similarity irrespective of their magnitude. It ranges from -1 to 1, where:

Cosine Similarity = 1 indicates that the vectors are identical.

Cosine Similarity = 1 indicates that the vectors are

diametrically opposed.

Cosine Similarity = 0 indicates that the vectors are orthogonal.

The Pearson correlation coefficient r between two variables

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}}$$

X and Y is calculated as:

where:

The Pearson correlation coefficient, often denoted as r, is a statistical measure that calculates the strength and direction of the linear relationship between two variables. It ranges from

-1 to 1, where:

- r = 1 indicates a perfect positive linear relationship.
- r = –1 indicates a perfect negative linear relationship.
- r = 0 indicates no linear relationship.

Xi and Yi are individual data points, and X and Y are the mean values of X and Y , respectively. Using Pearson Correlation in kNN:

In the context of kNN, the Pearson correlation coefficient can be used as a similarity metric to determine the ”closeness” between two data points. When predicting the target value for a new data point, kNN identifies the k nearest neighbors based on this similarity metric and averages their target values (for regression tasks) or votes (for classification tasks) to make the prediction.

1) Model 2 - Collaborative Based Filtering: In the context of the meal recommendation system, collaborative filtering plays a pivotal role in providing personalized meal suggestions to users based on their interactions and preferences. Unlike content-based filtering, which primarily relies on the attributes of meals, collaborative filtering taps into the collective behaviour and preferences of users to make recommendations. Specifically, it utilizes a technique akin to user-based collaborative filtering, where users with similar preferences to the target user are identified, and items liked by those similar users are recommended. This method allows the system to recommend meals that align with the tastes and preferences of the target user, based on the preferences of other users with similar profiles. Moreover, collaborative filtering can also incorporate item-based approaches, where meals like those the user has interacted with in the past are recommended. By identifying meals that share common characteristics or are frequently consumed together by users, the system can offer recommendations that are likely to resonate with the user’s preferences. Collaborative filtering is a cornerstone of recommendation systems across various industries, including e-commerce, streaming services, and social media platforms. Its ability to offer tailored suggestions enhances user satisfaction and engagement, ultimately contributing to a more immersive user experience. However, it is important to note that collaborative filtering requires a substantial amount of user interaction data to be effective.

K- Nearest Neighbors In the context of our meal recommendation system, incorporating K-Nearest Neighbors (KNN) into the methodology offers a valuable approach to collaborative filtering. By leveraging KNN, we can effectively identify similar users or meals based on historical interactions, enhancing the personalization of meal recommendations. For instance, in user-based collaborative filtering, KNN can identify users with similar dining preferences to the target user, allowing us to recommend meals that have been enjoyed by those similar users. Similarly, in item-based collaborative filtering, KNN can identify meals that share common characteristics or are frequently consumed together by users, enabling us to recommend complementary or similar meals to those a user has previously enjoyed. However, it is essential to acknowledge the limitations of KNN within the context of our recommendation system. Scalability issues may arise when dealing with many meals or users, potentially impacting the efficiency of the recommendation process. Additionally, the sparsity of the user-meal interaction matrix and the cold start problem may pose challenges, particularly when recommending meals to new users or items with limited interaction data. To mitigate these challenges, we may explore hybrid approaches that combine KNN with more advanced recommendation algorithms, such as matrix factorization or deep learning-based methods. By incorporating these techniques, we can enhance the performance and robustness of our meal recommendation system, providing users with more accurate and relevant suggestions tailored to their preferences and dietary needs. The distance that will be required during KNN is implemented using Euclidean Distance.

Euclidean distance (p=2): This is the most used distance measure, and it is limited to real-valued vectors. Using the below formula, it measures a straight line between the query point and the other point being measured.

The Euclidean distance between two points (x_1, y_1) and (x_2, y_2) in a two-dimensional space is given by:

$$d((x_1, y_1), (x_2, y_2)) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Training the Model To train our collaborative filtering model on the pre-processed dataset, we begin by utilizing historical data of users' food choices and calorie intakes. This dataset serves as the foundation for understanding user preferences and interactions with various meals offered by the hotel. By analysing this historical data, we can identify patterns and similarities among users' dining habits, enabling us to build a robust collaborative filtering model. During the training phase, we feed the pre-processed dataset into our collaborative filtering model, allowing it to learn from past user interactions and preferences. The model iteratively adjusts its parameters to optimize its ability to predict meal choices or preferences for each user. This iterative learning process continues until the model achieves a satisfactory level of performance, accurately predicting user preferences and providing relevant meal recommendations.Moreover, it is crucial to evaluate the performance of the trained model using appropriate metrics like precision.

TABLE I: Types of Recommendations

Type of Recom-mendation	Number of Meals Recommended	Description
Healthy Meals	5	This feature of the recommenda-tion system recommends 5 meals based on the calories given by the user. Its main purpose is to recom- mend healthy meals to the user.
Delicious Meals	10	This feature of the recommenda-tion system recommends the top 10 meals based on the ratings from users. It ranges from 1 to 10.

Recommendation Engine To implement the recommendation engine, we utilize the trained collaborative filtering model to provide personalized meal recommendations based on user inputs. When a user interacts with the recommendation engine, they provide information such as their daily calorie requirement and macronutrient preferences. This information serves as input to the model, allowing it to generate predictions on which meals or food items are most suitable for the user. Upon receiving user inputs, the recommendation engine employs the collaborative filtering model to analyze historical data of users' food choices and calorie intakes. By leveraging techniques like K-Nearest Neighbors (KNN), the model identifies similar users or meals that align with the user's preferences and dietary requirements. The engine then returns a list of recommended meals or food items based on the model's predictions, prioritizing options that are likely to be well-received by the user.

User Interface We develop a user-friendly interface using Streamlit, a popular Python library for building interactive web applications. Streamlit allows us to create intuitive and responsive user interfaces with minimal code, making it an ideal choice for our meal recommendation system.

With Streamlit, we can seamlessly integrate user input fields where users can specify their calorie requirements and preferences, providing a straightforward and accessible means of interaction. Additionally, to enhance the visual appeal and interactivity of our interface, we leverage the streamlit_lottie library.

Lottie is a library that enables the integration of high- quality animations and graphics into Streamlit applications, adding a visually engaging element to the user experience. By incorporating Lottie animations, we can create dynamic and eye-catching elements within our interface, making the process of receiving meal recommendations more engaging and enjoyable for users.

Overall, the combination of Streamlit and streamlit_lottie libraries empowers us to build a user-friendly interface that simplifies the process of inputting preferences and receiving personalized meal recommendations. The intuitive design and interactive features of our interface contribute to a seamless and enjoyable user experience, ultimately enhancing the overall usability and effectiveness of our meal recommendation system.

D. System Architecture

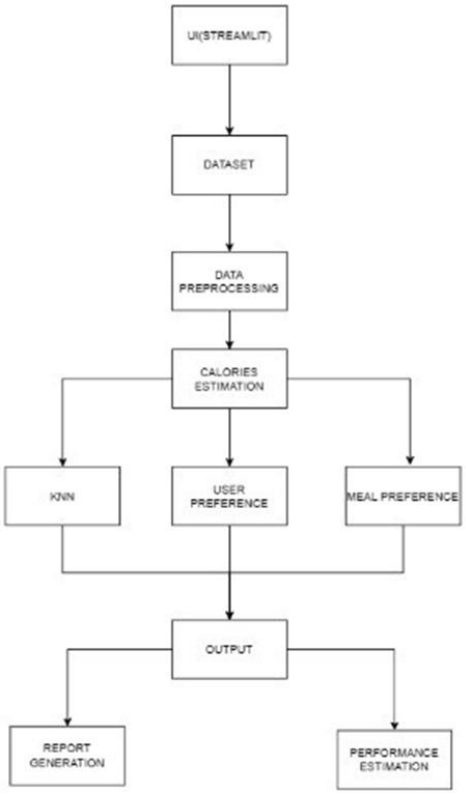

Fig. 1: System Architecture

RESULT AND DISCUSSIONS

The food recommendation system successfully deliv- ers tailored meal suggestions by integrating content-based and collaborative filtering methodologies. The content-based filtering component leverages user-specific nutritional re- quirements—such as calorie intake and macronutrient ra- tios—providing meal options that closely align with the user's health goals. On the other hand, the collaborative filtering aspect focuses on user ratings, recommending highly rated and popular dishes that enhance the dining experience. The dual approach ensures a comprehensive recommendation system that balances health consciousness with taste preferences. Users reported that the recommendations were both relevant and helpful, demonstrating the system's ability to cater to diverse dietary needs and preferences.

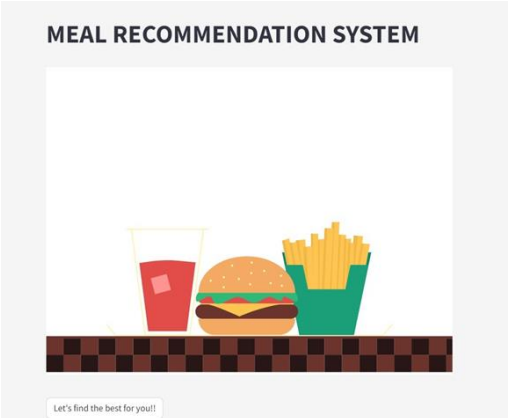

Fig. 2: Homepage UI

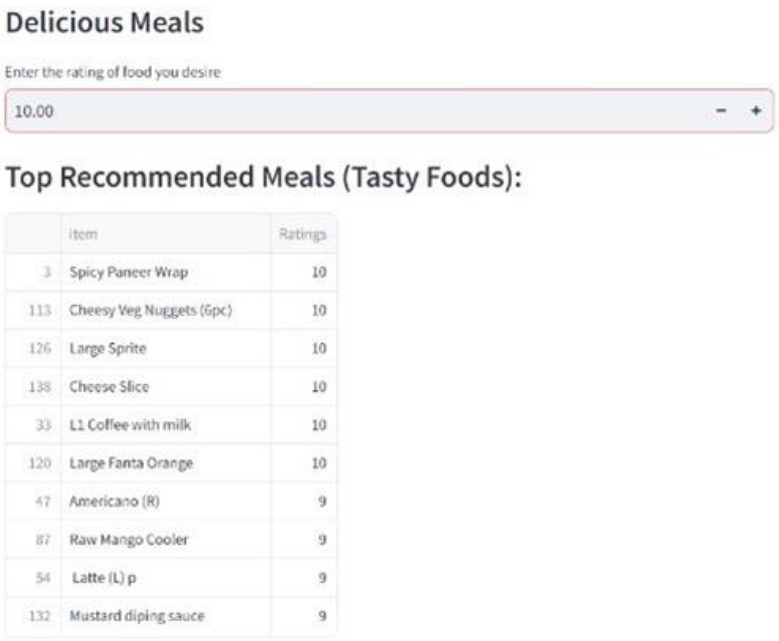

Fig. 3: Delicious Meals

Fig. 4: Healthy Meals

CONCLUSION

In conclusion, the development of a food recommendation system represents a significant step forward in leveraging technology to enhance dietary choices and promote healthier eating habits. By combining content-based and collaborative filtering techniques, the system provides personalized meal suggestions that cater to individual nutritional needs and taste preferences. This dual approach not only ensures that users receive recommendations that align with their health goals but also introduces them to highly rated, enjoyable dishes. The project demonstrates the potential of data-driven solutions in addressing

contemporary health challenges and underscores the importance of personalized nutrition guidance in fostering overall well-being. As we move towards a more health- conscious society, such innovative systems will play a crucial role in empowering individuals to make informed dietary decisions, ultimately contributing to better health outcomes and improved quality of life.

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IOT Based Polyhouse Farming with Controlled Environment and Monitoring

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ABSTRACT

Polyhouse farming, integrating IoT and cloud computing, addresses agricultural challenges in India through optimized irrigation schedules based on real-time environmental data. Employing sensors and bots for automated actions like precise watering and fertilization, alongside smartphone connectivity for remote monitoring, promises to revolutionize agricultural practices. This approach enhances water conservation, soil management, and early disease detection, offering a pathway to sustainable growth in India's agricultural sector. This research holds potential for impactful paper publication. The purpose of this research is to revolutionize agricultural practices in India through the implementation of smart polyhouse farming techniques. By integrating IoT, cloud computing, and automated systems, the aim is to optimize irrigation schedules, enhance water conservation, improve soil management, and enable early disease detection. Ultimately, the goal is to contribute to sustainable growth and advancement in India's agricultural sector. The methodology for this study involves a comprehensive exploration of existing literature on smart polyhouse farming, IoT applications, and agricultural methodologies. Subsequently, a smart polyhouse farming system will be conceptualized, integrating IoT sensors, cloud computing, and automated irrigation techniques. This system will then be deployed in real polyhouse farming environments, gathering data on critical parameters such as temperature, humidity, soil moisture, and crop growth. Through rigorous data analysis, the efficacy of the system in optimizing irrigation schedules and improving crop yields will be assessed and compared against conventional farming practices. The results obtained will demonstrate the system's capability in enhancing water management, soil health, and disease detection, potentially revolutionizing agricultural practices in India. The study's conclusion will underscore the transformative potential of smart polyhouse farming technology in addressing the challenges faced by Indian agriculture, emphasizing the need for further research and widespread adoption to realize its full benefits.

Keywords— IOT, Polyhouse farming, Controlled Environment and Monitoring.

I. INTRODUCTION

Agriculture is the primary source of income in India for the vast majority of its citizens. Agriculture is the most diverse economic sector in India, and it has made a significant contribution to the country's development. Our country is also giving importance for technological advancements. By combining technology with Agriculture more positive results can be achieved. The traditional method of growing

necessitates a significant amount of time, human work, and constant monitoring. In the traditional way of production, there are various issues such as uncertain weather conditions and the plants' vulnerability to pests and diseases. A polyhouse is a climate-controlled habitat in which plants are cultivated on a regulated platform, regardless of temperature or location. With the help of bamboo wrapped with the sheets called as ultra violet sheet, Polyhouse building is made. These sheets are of a specific thickness. The crop decided the thickness of the ultra violet sheet. A very good solution is provided by Polyhouse which is dependable and vital means of increasing earnings. Essentially, it is an automated system that modifies physical parameters in favors of the crop's plantation and growing process. Polyhouse is a method of increasing the speed with which crops and plants are produced while still adhering to the crop's growing requirements. The polyhouse approach allows plants to develop without interference from the outside world. Harvesting a single crop requires the least amount of further applications and inputs, allowing for optimum productivity and profits. Plants of higher quality can be cultivated in a polyhouse. Plant development is primarily influenced by a few factors such as temperature, CO2 levels, soil moisture content, light intensity, humidity. By controlling all of the above-mentioned elements, we will get the proper output in terms of an appropriate plant growth, which results in proper crop yield by boosting the plant's development potential and creating optimum conditions for plant growth. However, it is very difficult to control and monitor this in an open atmosphere. Important and the basic concept is to cultivate in a contained atmosphere, such as a polyhouse, while monitoring and controlling all of the needed factors. Any change in one climatic parameter can have an impact on the others, necessitating ongoing monitoring and control action to ensure that the requirements are met. The plant's 8 normal growth may be hampered by insufficient and unknown environmental conditions. In order to achieve a high yield, eco-friendly conditions should be carefully monitored and controlled. Controlling these characteristics through some type of control action may lead to proper plant growth and crop. Several articles are already published giving the need for polyhouse cultivation and the benefits of various methods. With the help of appropriate sensors, the important parameters data is gathered within the polyhouse and delivered to the controlling unit. This data is communicated to the controlling unit. Microcontroller process this data and determines the appropriate controlling action to do with the purpose of maintaining proper plant growth. A polyhouse is an enclosed structure designed to protect crops from external weather conditions and pests. It is a controlled environment where farmers can grow crops year-round, regardless of the external climate. A smart polyhouse agriculture system integrates IoT technology with the polyhouse environment to improve crop yields and reduce Labor costs. In this research paper, we present a working model of an IoT embedded smart polyhouse agriculture system. The system comprises sensors to collect data on environmental parameters, microcontrollers to process the data, actuators to control the environment, a cloud platform to store and analyse the data, a mobile app for remote monitoring and control, an alerting system for critical environmental changes, and data analytics for generating insights. The proposed system can help farmers to optimize crop management by providing real-time data on environmental conditions and enabling remote monitoring and control. The system can also reduce Labor costs by automating tasks like watering and ventilation. We believe that our proposed system can be a significant step towards sustainable and efficient food production. Other than conventional agricultural practices, technique, and methods like usual agricultural operation (pre-harvest and post harvest), one component which separates a Polyhouse from a traditional farm is the control and monitoring of the process parameters. In this study, a remote irrigation

monitoring and control system was evaluated for precise control irrigation in water-scarce locations. In India, there are currently very few businesses as well as service providers engaged in the control, supervision, and automation of polyhouses; in the states of Maharashtra, Gujarat, and Tamil Nadu has the major example. The acceptance of Polyhouses will automatically lead to a big leap in demand for better control and automation. To offer more automated supervision, multiple greenhouse climate and crop models have been designed. In prior 9 research, a summary of present-day greenhouse climate models is provided. An outline of greenhouse crop models and modelling methodologies are offered in previous research. Dynamic crop and greenhouse climate models have been utilized to establish set points automatically and replace grower decision-making. Automated algorithms can regulate greenhouse climate as well as crop growth if climate and crop simulation models are coupled and connected to a greenhouse's sensors and actuators. In Netherlands, similar studies with tomatoes and sweet peppers have been carried out successfully. In this experiment, climate simulations were done using actual weather conditions and projections. In order to forecast future crop growth and improvement for various sets of setpoints, crop growth simulation was conducted concurrently with the cropping cycle. The best set was then automatically used in the greenhouse. The computations were performed daily basis, though this, crops were cultivated using an optimum management approach. Various tomato experiments also have been carried out in the recent past for this research point of view.

II. Literature Review

Author concluded that the system proposed uses a microcontroller (Node MCU) which has a Wi-Fi module (ESP32) over it. Smartphones with blynk are used as a user interface. Soil moisture sensor, humidity and temperature sensor (DHT11) and rain detection sensors along with DC motor and deck robot are used. This DC motor is connected to a water pump which pumps water to the crops when the DC motor is ON. The soil moisture sensor senses the moisture level in the soil. Depending on the level of moisture, Node MCU decides whether to water the crop or not. By using appropriate function sand conditional statements in the code written for the Node MCU functioning, the watering of the crop starts by Node MCU making DC motor ON when the moisture content is below a threshold value and is made OFF when there is enough moisture content in the soil. The humidity and temperature sensor gives the humidity and temperature values of the atmosphere which determine whether the crop is suitable for growth. Some crops grow only in particular weather conditions and some give better yield only for a particular temperature range. The raindrop sensor measures the intensity of rain. If there is enough rainfall to provide soil with required water, the crops are not watered. Even after raining, if the crops are not having sufficient water then water is pumped again by turning the DC motor ON. Data reaches the blynk cloud from Node MCU through Wi-Fi from the Wi-Fi module present on Node MCU. Polyhouse farming is a relatively new approach to agriculture, and there is limited literature available on the topic. However, here is a brief literature review of the available research: "Polyhouse Farming: A Review" by S. S. Kulkarni and S. S. Patil: This paper provides an overview of smart polyhouse farming and its potential benefits. The authors discuss the various systems involved in smart polyhouse farming, such as the irrigation system, lighting system, and temperature control system, and how they can be automated to optimize plant growth. They also discuss the potential benefits of smart polyhouse 22 farming, such as increased crop yields, reduced water usage, and minimized use of pesticides and fertilizers. IOT based polyhouse Farming: A Review of Technologies and Applications by G. S. Mahajan, et al.: This paper provides a detailed review of the various technologies and applications involved in smart polyhouse farming.

The authors discuss the use of sensors to monitor various parameters such as temperature, humidity, light levels, and soil moisture levels, and how this data can be used to automate systems such as the irrigation system, lighting system, and temperature control system. They also discuss the potential benefits of smart polyhouse farming, such as increased crop yields, reduced water usage, and minimized use of pesticides and fertilizers. IOT based Polyhouse Farming: A Sustainable Approach to Agriculture by K. R. Patil and V. S. Patil: This paper provides an overview of smart polyhouse farming and its potential as a sustainable approach to agriculture. The authors discuss the potential benefits of smart polyhouse farming, such as increased crop yields, reduced water usage, and minimized use of pesticides and fertilizers. They also discuss the potential challenges of smart polyhouse farming, such as the high initial investment costs and the need for skilled labor. Overall, the available literature suggests that smart polyhouse farming has the potential to revolutionize the way we produce food by creating a more sustainable and efficient approach to agriculture. However, more research is needed to fully understand the potential benefits and challenges of this approach. Polyhouse with automation is latest trend which is taking long strides towards its inclusion in farming. More return on investment has become need of an hour in today's technological era not only in farming society but in all fields of the world. as described below explores the findings by different authors during their research work. The research findings by Kuthada (2018) emphasize the critical influence of relative humidity on photosynthesis and leaf growth in crops, highlighting the need for precise control of environmental conditions through sensor-based monitoring and fogging systems. Similarly, Kulkarni et al. (2020) underscore the efficacy of fully automatic greenhouse setups equipped with IoT systems in quickly and efficiently responding to climatic changes, thereby reducing errors and ensuring rapid adaptation. Raja et al. (2018) focus on the benefits of sensor-based irrigation and IoT technologies in enabling remote monitoring and control of greenhouse conditions, relieving farmers of physical presence and enhancing efficiency in managing temperature, humidity, and moisture levels. Kumari et al. (2021) advocate for the adoption of automatic irrigation systems utilizing soil moisture sensors and microcontrollers to mitigate issues like over-irrigation and leaching, offering improved water regulation through mobile-controlled devices. Finally, Ahonen et al. (2008) propose comprehensive parameters for greenhouse management, emphasizing the controlled environment's enhanced outcomes through precise monitoring and signal-based interventions.

III.PROBLEM STATEMENT

The problem addressed by the IoT-based Polyhouse Farming Monitoring System lies in the inefficiencies and challenges faced by traditional agricultural practices. Conventional farming methods often lack real-time monitoring and control of crucial environmental parameters such as temperature, humidity, and soil moisture, leading to suboptimal crop growth, increased water wastage, and reduced yields. Additionally, manual intervention in irrigation and fertilization processes can be labor-intensive and prone to errors, resulting in resource inefficiencies and environmental degradation. Furthermore, the escalating demand for food production amidst changing climatic conditions necessitates innovative solutions to optimize crop cultivation while minimizing environmental impact. Therefore, the problem statement revolves around the need for an integrated monitoring and control system that leverages IoT technology to provide farmers with actionable insights, automate farming processes, and enhance overall agricultural productivity and sustainability. Objective of the IoT-based Polyhouse Farming Monitoring System is to significantly enhance crop production efficiency and minimize waste by providing real-time data on crop conditions

to farmers. This system aims to optimize farming operations by continuously monitoring crucial parameters such as water quality, temperature, and humidity, empowering farmers to make informed decisions regarding irrigation and fertilization practices. Additionally, the system endeavours to improve yield production, reduce water wastage, and alleviate the workload of farmers by automating critical tasks. By offering live data on essential parameters including temperature, humidity, and soil moisture, controlling climate conditions, and dynamically adjusting water supply, the system promotes sustainable and efficient agricultural practices. Smart polyhouse farming, through the utilization of cutting-edge technology, aims to optimize plant growing conditions, amplify crop yields, minimize resource consumption, and elevate produce quality, thereby contributing to the establishment of a more efficient and environmentally sustainable food production system.

IV. METHODOLOGY

The methodology of IOT based polyhouse farming involves the use of technology to optimize the growing conditions of plants. The following are the steps involved in the methodology of smart polyhouse farming:

1. Design and construction of a polyhouse structure: The polyhouse structure is designed to provide an enclosed environment that can be used to control the growing conditions of plants.

2. Installation of sensors: Sensors are installed in the polyhouse to monitor various parameters such as temperature, humidity, light levels, and soil moisture levels.

3. Automation of systems: Based on the data collected by sensors, various systems such as the irrigation system, lighting system, and temperature control system are automated to provide the ideal growing conditions for plants.

4. Data analysis: Data collected from sensors is analysed to optimize the use of resources such as water and fertilizers.

5. Dashboard Creation: A custom dashboard is created using custom app, which allows the user to monitor and control the growing conditions of plants remotely.

6. Crop management: The crops are monitored regularly, and any issues such as pests and diseases are addressed promptly. 7. Harvesting: The crops are harvested when they are ready, and the quality of the produce is evaluated. Overall, the methodology of IOT based polyhouse farming involves the use of technology to create an efficient and sustainable approach to agriculture. By providing the ideal growing conditions for plants, smart polyhouse farming can help to increase crop yields, reduce water usage, and minimize the use of pesticides and fertilizers.

V. EXPERIMENTATION/ RESULT:

1. Design and Construction of a Polyhouse Structure: The polyhouse structure is designed to provide an enclosed environment that can be used to control the growing conditions of plants.

Fig 1. Design and construction of a Polyhouse Structure.

2. Installation of Sensors: Sensors are installed in the polyhouse to monitor various parameters such as temperature, humidity, light levels, and soil moisture levels.

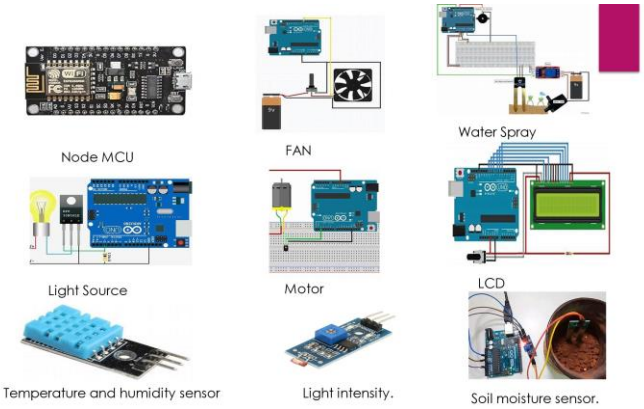
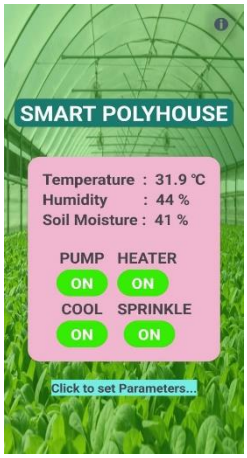


Fig 2. Installation of Sensors.

3. Automation of Systems: Based on the data collected by sensors, various systems such as the irrigation system, lighting system, and temperature control system are automated to provide the ideal growing conditions for plants.



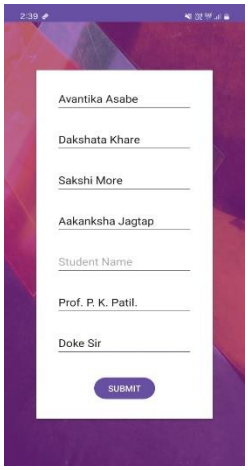


Fig 3. Automation of Systems

4. Data Analysis: Data collected from sensors is analysed to optimize the use of resources such as water and fertilizers.

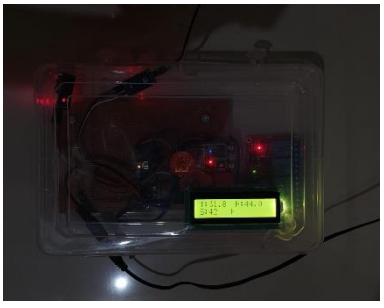


Fig 4. Data analysis

5. Dashboard Creation: A custom dashboard is created using custom app, which allows the user to monitor and control the growing conditions of plants remotely.

Fig 5. Dashboard Creation

6. Crop Management and Harvesting: The crops are monitored regularly, and any issues such as pests and diseases are addressed promptly and the crops are harvested when they are ready, and the quality of the produce is evaluated. Overall, the methodology of smart polyhouse farming involves the use of technology to create an efficient and sustainable approach to agriculture. By providing the ideal growing conditions for plants, smart polyhouse farming can help to increase crop yields, reduce water usage, and minimize the use of pesticides and fertilizers.

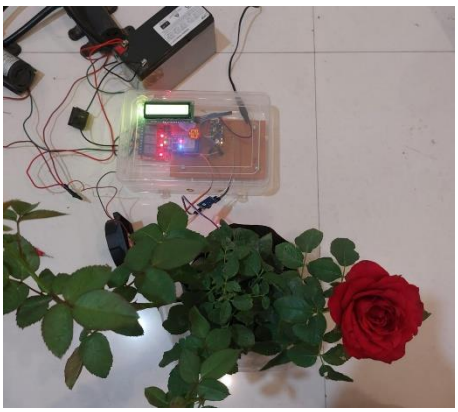


Fig 6. Crop Management and Harvesting

VI. CONCLUSIONS

It is an innovative technique that uses sensors, automation, and artificial intelligence to provide a controlled environment for plants to grow. The objectives of smart polyhouse farming are to reduce water usage and pesticide/fertilizer use, increase crop yield, and improve crop quality. By addressing the problem of growing crops in unpredictable and changing environments, smart polyhouse farming has the potential to revolutionize agriculture and help feed an ever-growing population.

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Cooperative Diversity for Free-Space Optical Communications: Transceiver Design and Performance Analysis

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ABSTRACT

In this work, a static relaying protocol, called Decode or Quantize and Forward (DoQF), is introduced for half duplex single-relay networks, and its performance is studied in the context of communications over slow fading wireless channels. The proposed protocol is inspired by the so-called Compress-and-Forward (CF) but only needs statistical Channel State Information at the Transmitter (CSIT). First, we analyse the behaviour of the outage probability Poof the proposed protocol as the SNR ρ tends to infinity. In this case, we prove that ρ2 Po converges to a constant ξ. We refer to this constant as the outage probability gain and we derive its closed-form expression for a general class of wireless channels that includes Rayleigh and Rice. We furthermore prove that the DoQF protocol has the best achievable outage gain in the wide class of half-duplex static relaying protocols and we minimize ξ w.r.t the power allocation to the source and the relay and the durations of the slots. Next, we focus on Rayleigh channels to derive the Diversity-Multiplexing Trade off (DMT) of the DoQF. Our results show that the DoQF achieves the 2 by 1 MISO DMT upper-bound for multiplexing gain <0.25.

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A Survey on Image Retrieval and Re-Ranking Techniques

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ABSTRACT

Content Based Image retrieval method considered as they put together use of query by sketch and relevance opinions as the technique to ease user interaction and improve retrieval effectiveness in CBIR. The main aim of CBIR is to remove visual content of the image automatically like shape, color, texture, shape or any type of blend them. The goal of CBIR to retrieve all the whose content is similar to those of question image. In this paper, different technique SBIR, SIFT Feature, RVFV, CBIR method have been used for searching relevant images are studied. it must be used re ranking and benefits feedback techniques are find out relevant images.

Index Terms- SBIR, RVFV, SIFT, CBIR.

I. INTRODUCTION

More recently The speediest growth of multimedia applications proceeds with the emergence of considerable image collections has brought about the advantages of efficient methods for storage, browsing, indexing and retrieval of images. Content Based Image Access (CBIR) is a programmed process to search relevant images based user suggestions. The input could be specified, sketches or example images. A typical CBIR process first extracts the image features and store them efficiently. Then it compares with images from the database and returns the results. Feature extraction and similarity measure are incredibly dependent on the features used. With each feature, there would be more than on representation. Among these Representations, the histogram is the most commonly used technique to describe features. Content-based image retrieval (CBIR) is the use of computer sight to the image retrieval trouble, in order to hard of searching for digital image in big sources. "Content-based" means with the purpose of explore will examine the literal contents of the. Here the term content in this context might submit to shade, physique, surface, or some other information that can be derived from the image itself. (CBIR) is a technique that used to see image features like (color, shape, texture) to find a query image in a huge scale the database. (Torres at 2006) The access images process, including, low level (content based features) and advanced (semantic structured features). The down sides of CBIR lie in reducing the distinctions of contents centered feature and the semantic based features. This problem in giving efficient access images guide the experts to use (CBIR) system, to take global color and texture features to reach, the better retrieval, where others used local color and texture features. The idea of Region Structured Image Retrieval (RBIR) from image segmentation on the foundation region to give better performance. Several low level feature extraction algorithms were also developed, almost all of them works are with common features. This overview will introduce some of them. The interaction between the user and content centered image retrieval system can help in obtaining better retrieval results and

conversation ranges from simply allowing the user to submit a new query structured on an existing one to giving the user the likelihood to choose part of the result image as relevant and non-relevant to allow the user aesthetically arrange a little set of the database images into clusters of similar images and rearrange the whole data source according the actions.

II. LITERATURE SURVEY

Testimonials the suitable background books and describes the concept of an image retrieval system. Scientific publications included in the literature survey have recently been chosen in order to build a sufficient background that would help out in solving the research sub-difficulties.

Miguelena Bada, A. M.; de Jesus Hoyos Rivera, G.; Marin Hernandez, A. [1] offered A proposal for a queried-by-sketch image retrieval system is introduced as an alternative to text-based image search on the Web. The user will create a sketch as a query which will be matched with the edges extracted from natural images. The main task regarding edge detection for Content-based Image Retrieval is made up in finding edges for larger regions and keeping away from the one corresponding to textures. For this goal, a blend of selective smoothing and color segmentation is applied prior edge extraction. An evolutionary algorithm is deployed to optimize the image-processing parameters. Similarity between the user? s sketch and the image's ends will be measure regarding two local aspects: spatial proximity and edge orientation. A full architecture for image search on the Web is proposed and preliminary answers are reported using a trial database.

Eitz, M.; Hildebrand, K.; Boubekeur, T.; Alexa, M. [2] introduce a benchmark for evaluating the performance of large-scale sketch-based image retrieval systems. The necessary data are acquired in a managed user examine where subjects rate how well given sketch/image pairs match. This system suggests how to use the data for evaluating performance of sketch based image retrieval systems The standard data as well as the large image repository are made publicly available for further studies of this type. Furthermore, it is developing new descriptors based on the bag-of features approach and use the benchmark to demonstrate that they significantly outperform other descriptors in the literature.

Desai Asmita A., Shinde Aparna S., Malathi P. [3] Nowadays, technology is boosting every day, the most improved research area in digital image processing is an image retrieval system. The techniques used for finding image on the basis of content, the content as text, draw, color and condition that can describe them. In this article it present various image retrieval methods which are widely- used as sketch content. Therefore, the system is referred toas Sketch Structured Image Retrieval System (SBIR).

In this paper put into action EHD, HOG and Built-in EHD and HOG codes and give the evaluation of three algorithms structured on their accuracy scored. SBIR is advantageous than purely text base image search. The retrieval system using sketches can be essential and effective in our daily life, such as Fendarkar J. D Gulve K. A. [5] System (CBIR) and draw based picture recovery framework (SBIR). In this paper, we exhibit the issues and difficulties worried with the plan and the making of CBIR frameworks, which depends on a free hand draw (i.e. SBIR). The utilization of the current strategies, portray a conceivable outcome, how to plan and execute an undertaking particular descriptor, which can deal with the educational hole between a draw a shaded picture to make an open door for the productive pursuit. The CBIR framework initially registers the likeness between the question and the pictures put away in the database. The improvement of content based picture recovery.

Khobragade S., Nikose S., Shaikh M. [6] Content-based picture recovery (CBIR) is an advanced picture handling framework. Accessible picture seek instruments depend on an exacting translation of the pictures. In these gadgets, the pictures physically clarified with watchwords and afterward utilizing content based inquiry device has been . This strategy won't promise outcomes. The objective of the visual components of CBIR is to concentrate and show the required picture. Utilizing SBIR this paper, issues and difficulties worried with the plan and development of CBIR frameworks is to apply. Comes about draw – based framework for clients to utilize a shrewd gadget permits seek questions. The method of computerized libraries, wrongdoing avoidance, and photograph sharing locales can be utilized as a part of numerous applications. One conceivable application for a display of mug shot pictures coordinating a criminological outline. In the field of picture handling on a wide range of usefulness requested the arrivalof the inquiry picture in view of the photo to see the substance of this paper center.

Dalal,N.; Triggs,B.[7] In this paper this framework concentrate the topic of capabilities for powerful visual protest acknowledgment, receiving direct SVM based human recognition as an experiment. In the wake of investigating existing edge and angle based descriptors, it demonstrates tentatively that matrices of Histograms of Oriented Gradient (HOG) descriptors essentially beat existing capabilities for human location. This framework concentrates the impact of each phase of the calculation on execution, reasoning that fine-scale inclinations, fine introduction binning, generally coarse spatial binning, and amazing nearby differentiation standardization in covering descriptor squares are exceedingly essential for good outcomes. The new approach gives close ideal division on the first MIT walker database, so it presents an all the more difficult dataset containing more than 1800 explained human pictures with an extensive scope of posture varieties and foundations.

Konishi, S., Yuille, A.L., Coughlan, J.M., Song Chun Zhu [8] This framework figure edge identification as factual surmising. This factual edge location is information driven, not at all like standard techniques for edge identification which are display based. For any arrangement of edge location channels (executing nearby edge signals), it utilize pre segmented pictures to take in the likelihood conveyances of channel reactions molded on whether they are assessed on or off an edge. Edge recognition is defined as a separation undertaking determined by a probability proportion test on the channel reactions. This approach accentuates the need of demonstrating the picture foundation (the off edges). It speaks to the restrictive likelihood circulations non parametrically. Various edges prompts, including chrominance and numerous scale, are consolidated by utilizing their joint appropriations. Subsequently, this prompt blend is ideal in the measurable sense. Framework assesses the viability of various visual signs utilizing the Churn off data and Receiver Operator Characteristic (ROC) bends. This demonstrates the approach gives quantitatively preferable outcomes over the Canny edge locator when the picture foundation contains huge mess. Also, it empowers us to decide the viability of various edge prompts and gives quantitative measures for the benefits of multilevel preparing, for the utilization of chrominance, and for the relative adequacy of various locators. Moreover, they demonstrate that it can take in these restrictive dispersions on one informational collection and adjust them to the next with just slight debasement of execution without knowing the ground truth on the second informational index. This demonstrates our outcomes are not simply area specific. They apply a similar way to deal with the spatial gathering of edge cases and get analogies to non-maximal concealment and hysteresis. They apply a similar way to deal with the spatial gathering of edge cases and get analogies to non-maximal concealment and hysteresis.

In 2008 E. Di Sciascio, G. Mingolla, M. Mongiello [9] built up the method to enhance the distinctive client interfaces. This procedure must be the joined utilization of question by portray and significance

straightforwardness client cooperation and enhance recovery viability in substance based picture recovery over the World Wide Web. This thought we executed Draw Search, a model picture recovery by substance framework that utilizations shading, shape and surface to file and recover images. User can enhance recovery comes about by choosing, among the top most positioned recovered pictures, the ones she considers pertinent. This is known as "positive input". Increment the productivity and precision of unstructured information recovery. In 2010 David Engel, Christian Herdtweck, Bjrn Browatzki and Cristbal Curio built up the method for actualizing the semantics portrays approach. This framework works on pictures connected names for a couple of abnormal state question classes, enabling us to seek quick with an insignificant memory impression. They utilize a structure like irregular choice woodlands which profits information driven dividing of the picture space giving a pursuit in logarithmic time as for the quantity of pictures. This makes our framework appropriate for substantial scale picture look issues. It is played out a client study that shows the legitimacy and ease of use of our approach.

III. PROPOSED METHODOLOGY

Content-based image retrieval (CBIR) is a technique for retrieving images on the basis of automatically-derived features such as color, texture and shape. In a particular CBIR, features related to visual content such as shapes, colors, and textures are extracted from a query image, the similarity between the set of features of the query image and that of each target image in a database can then be computed, and target images are next retrieved that are most similar to the query image. CBIR is also known as query by content (QBIC) and content centered information retrieval. Extraction of good features which compactly represent a query image is one of the top tasks in CBIR. Shape is a visual feature that describes the curves of objects in an image, which can be usually extracted from segmenting the image into meaningful regions or objects. The problems of image retrieval are becoming extensively recognized, and the look for solutions an increasingly active area for research and development. Problems with conventional methods of image indexing have led to the rise of interest in techniques for retrieving images on the basis of automatically derived features such as color, texture and condition images at each time. Feature extraction and likeness measure are incredibly determined by the used features. There is more than one representation in every feature, among these representations, to describe features histogram is the most widely used technique.

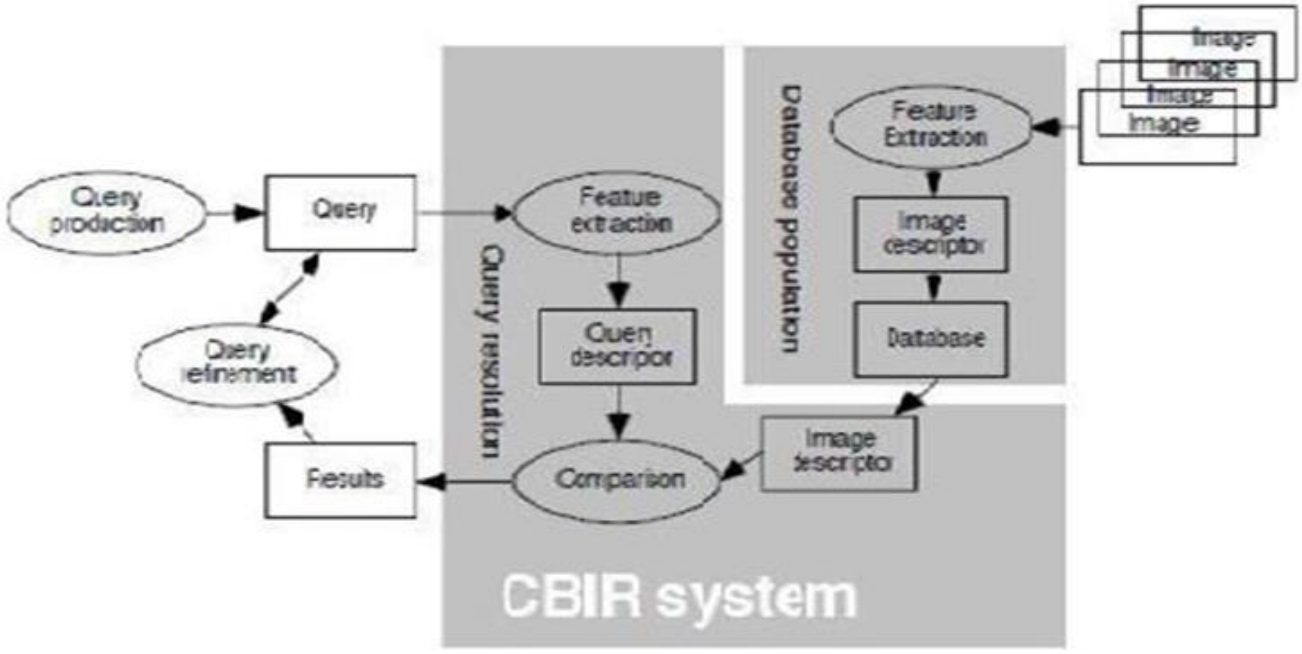

Fig-1: Content Based Image Retrieval System

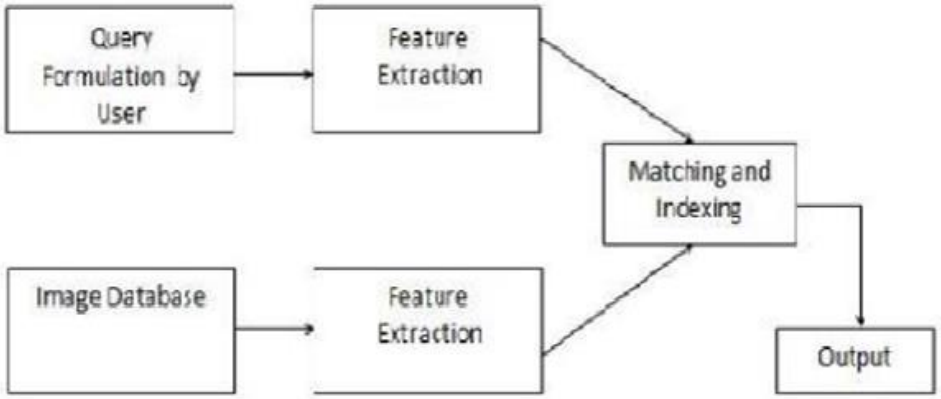

Fig-2: Flowchart of Content Based Image Retrieval System

IV. CONCLUSIONS

In the proposed framework combined Content based and Sketch based systems. The outcomes appeared in the outcome area demonstrates the examination of the current framework with the proposed frameworks. CBIR when all is said in done achieving particularly to the particular routes relying upon low level (shape, shading, surface) and abnormal state (counting semantic), in extra to revealing the insight into the fundamental issues which is speaking to how to assemble the extension between the low level and abnormal state, called the semantic crevice as show up from the most recent research which displays a few techniques present this hole. The SBIR is plates in base of ordering, highlight extraction, coordinating and geometrical component, (for example, turn, scaling, change) incorporated with coordinating. The most recent looks into in SBIR clarified numerous descriptors connected on highlight extraction to get a concise detail of elements, likewise many examines incorporate the utilization of descriptors in coordinating in view of components, while a few descriptors used to orchestrate full of feeling ordering of picture recovery in light of draw festally and precise.

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