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National Conference on Innovative Technologies in Agriculture (NCITA-2022)

Organized By

Internal Quality Assurance Cell,
Priyadarshini Bhagwati College of Engineering, Harpur Nagar,
Umred Road, Nagpur, Maharashtra, India

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About the College

Priyadarshini Bhagwati College of Engineering was established in the academic year 2007 and is one among the fast growing technical institute in the region with a view to impart high quality technical education to the aspirants of technical education in the field of Engineering. The college is situated in the heart of Nagpur city at Harpur Nagar on the main Umred Road, at a distance of only 5 - 6 Kms from Railway Station and 2.5 Kms from Bus Stand. It is well connected by rail, road and air routes. The college is in developing stage, well equipped with all kind of necessary infrastructure and qualified and dedicated faculties. It is set up on 06 acres land situated well within the city area at Nagpur - the orange city.

About The Conference

Priyadarshini Bhagwati College of Engineering, Nagpur Maharashtra invites all the young researchers, research scholars, policy makers, academicians, and youth farmers across the globe to the National Conference on "INNOVATIVE TECHNOLOGIES IN AGRICULTURE" (NCITA-2022) during 24th -25th March 2022. The Conference includes keynote presentations, oral talks and it will be organized in hybrid (Online/Offline) mode.

Objective

The main objective of conference is to provide common national platform to discuss the probable solution to various challenges faced by farmers. This objective will be achieved through interactive sessions amongst researcher, academicians and entrepreneurs. The various issues discussed will focus mainly on themes like Climate/ weather prediction

through Artificial Intelligence, Use of renewable energy in Agriculture, Automation of Mechanization in Agriculture Sector and Entrepreneurship in the Agricultural Sector. This conference will provide an opportunity for participants to share their ideas and strategies on innovation and recent development in technology in the field of agriculture and will also open new door for interdisciplinary research

Call For Paper

We are delighted to inform you that Internal Quality Assurance Cell of Priyadarshini Bhagwati College of Engineering, Nagpur, Maharashtra is organizing National Conference on "Innovative Technologies in Agriculture" (NCITA-2022) in hybrid mode during 24-25th March 2022. Audience and attendees will be the students, global agriculture experts, scientists, researchers, academicians, agriculturists, economists, environmentalists, industrialists, entrepreneur and innovative farm youth/farmers. The topic of interest may include the following or their emerging areas but not limited to:

- ✓ Climate/ weather prediction through Artificial Intelligence.
- ✓ Improving farm yields and supply chain management using Big Data.
- ✓ The Role of RFID in Agro-Food Sector.
- ✓ Monitoring and controlling crop irrigation systems via smartphone.
- ✓ Advancements in the use of IoT Technology for Precision Agriculture.
- ✓ Artificial Intelligence (Robotics, Automation, Drones and Sensor and Cloud Software System).
- ✓ Improved productivity from mechanization of agriculture.
- ✓ Use of renewable energy in Agriculture.
- ✓ Automation of Mechanization in Agriculture Sector.
- ✓ Role of Agri-Business Entrepreneurship, Innovation and Value Chains/Networks in Farmer Income Improvement.
- ✓ Entrepreneurship in the Agricultural Sector: Challenges and Opportunities.
- ✓ Economical Food & Grain Storage device for farmers.

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Approaches towards Human Pose Estimation (HPE) Based on Artificial Intelligence and Deep Learning

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ABSTRACT

Human pose estimation (HPE) systems use data from several types of sensors to attempt to automatically recognize and analyze human positions. Despite the fact that multiple comprehensive review papers on broad HPE themes have previously been published, the evolving technology in the area, as well as the multidisciplinary nature of HPE, necessitate regular updates in the field. Indeed, the majority of computer vision applications, including as human-computer interaction, virtual reality, security, video surveillance, and home monitoring, are strongly linked to HPE tasks. In the development cycle of HPE systems, this establishes a new trend and milestone.

Therefore, the current survey aims to provide the reader with an up to date analysis of vision-based HPE related literature and recent progress in the field. At the same time, it will highlight the main challenges and future directions. HPE continues to remain a challenging problem in uncontrolled smart environments despite the amount of work contributed by the researcher in this field.

Human pose estimation localizes body key points to accurately recognizing the postures of individuals given an image. This step is a crucial prerequisite to multiple tasks of computer vision which include human action recognition, human tracking, human-computer interaction, gaming, sign languages, and video surveillance.

This overview is presented as a baseline for novices and courses researchers to find out new models by means of watching the procedure and structure flaws of current researches. HPE is an important yet challenging research topic in the computer vision community. We design a structure to obtain the high-level representation of human activity combining both motion features and context features.

Keywords— Human Pose Estimation, Pose Landmark Detection, CNN, Media pipe, Deep Learning, Machine Learning, AI, Yoga.

I. INTRODUCTION

Human pose estimation (HPE), which has received a lot of attention in the computer vision literature, consists estimating the configuration of human body parts using camera input data, such as photographs and

videos. HPE gives geometry and motion information on the human body, which has been used in a variety of applications (for example, human-computer interaction, motion analysis, augmented reality (AR), virtual reality (VR), healthcare, and so on). Deep learning solutions have been proved to outperform traditional computer vision approaches in recent years, thanks to the rapid development of such solutions.

Video surveillance is being used nowadays in most public places such as schools, colleges, shops, libraries, parks, metro stations, hospitals and on roads to monitor traffic flow. With this increase in footage gathered by the cameras, there is a need to develop a process or method in order to make sense of the pose performed in the videos. Human Pose Estimation abbreviated as HPE is used to make sense of the poses that are being performed by the humans in such videos/camera feeds.

Given the number of cameras, it's not possible for a person or group to monitor them 24*7 with high accuracy while keeping down operating costs. This problem can be solved by using a computer program or software which only has to be developed once and can be implemented and run at large scale to do specific pose estimation .

It all begins with the process of designing the model for detection of pose. Firstly a set of poses to detect are determined. Further steps include the extraction of key points from the body to help build the model to detect human activities in real-time. The model is then deployed on the camera feed and hence the pose is being estimated.

II. LITERATURE SURVEY

Deep learning provides determination of various poses accurately and find its application in various fields. Human pose estimation known as the problem of localization of human joints has managed to gather an attention in computer vision . Here the pose estimation is evaluated as DNN- based regression problem towards body joints. The main stream of this work provides lot of articulated poses as holistic view of human pose estimation. The idea of representing articulated objects in general, and human pose in particular, as a graph of parts has been advocated from early days of computer vision. The DNN-based regression has the advantage of capturing context and reasoning about pose in a holistic manner. This survey has focused on enriching the representational power of the models while maintaining tractability. In all experiments of this paper same network architecture was used. The face based body detector used here resulted in a rough estimate, which however presented a good starting point for the approach. The formulation of the problem as DNN-based regression to join coordinates and the presented cascade of such regressors has the advantage of capturing context and reasoning about pose in holistic manner. As a result we are achieving better results on several challenging datasets.

Human pose Estimation aims in determining the position or spatial location of body keypoints of a person from a given image or video. This pose estimation obtains the pose of an articulated human body, which consist of joints and rigid parts using image-based observations. The main reasons for this trend is the ever increasing new range of applications, for an example human-robot interaction, gaming, sports performance analysis which are driven by current technological advances. The problems and challenges faced in human pose estimation has been advanced and progressed remarkably with the help of deep learning and publicly available datasets. This

survey provides a summary of these works comprehending up to date information and points the future research directions. It provides a preferred backbone architectures and also give an overview of recent models on 2D human pose estimation. Limitation of each model's work and open issues are also briefly discussed. Method used in this paper are deep pose, VGG Neural Network, Alexnet, Resnet. This paper reviewed the progress made in pose estimations for human beings with selected and most notable researches made to our knowledge. It also presents a review of most outstanding and influential models in human pose estimation progress.

Human pose estimation is studied in computer vision literature, involves estimating the configuration of human body parts from input data captured by sensors ,in particular images and videos. It provides geometric and motion information of the human body which has been applied to a wide range of applications . This survey shows that rapid development of deep learning solutions in recent years ,have been shown to outperform classical computer vision methods in various task including image classification, semantic segmentation, and object detection. This survey indicates significant progress and remarkable performance have already been made by employing deep learning techniques in HPE tasks. Given the rapid progress in HPE research ,this survey attempts to track recent advances and summarize their achievements in order to provide a clear picture of current research on deep learning -based 2D and 3D HPE. It represent a systematic overview of recent deep learning -based 2D and 3D HPE methods. There has been a coverage of comprehensive taxonomy and performance comparison of these methods.

III. METHODOLOGY

A. Existing System

Classical Appraches to 2D Human Pose Estimation

Classical approaches usually refer to techniques and methods involving swallow machine learning algorithms. For instance, the earlier work to estimate human pose included the implementation of random forest within a "pictorial structure framework". This was used to predict joints in the human body.

The pictorial structure framework (PSF) is commonly referred to as one of the traditional methods to estimate human pose.

These models work well when the input image has clear and visible limbs, however, they fail to capture and model limbs that are hidden or not visible from a certain angle.

B. Proposed System

Deep Learning-based approaches to 2D Human Pose Estimation

- Deep learning-based approaches are well defined by their ability to generalize any function (if a sufficient number of nodes are present in the given hidden layer). When it comes to computer vision tasks, deep convolutional neural networks
- (CNN) surpass all other algorithms, and this is true in HPE as well. CNN has the ability to extract patterns and representations from the given input image with more precision and accuracy than any other algorithm; this makes CNN very useful for tasks such as classification, detection, and segmentation.

- Unlike the classical approach, where the features were handcrafted; CNN can learn complex features when provided with enough training data.
- As stated before, the single-pose estimation algorithm is the simpler and faster of the two. Its ideal use case is for when there is **only one** person centered in an input image or video. The disadvantage is that if there are multiple persons in an image, keypoints from both persons will likely be estimated as being part of the same single pose — meaning, for example, that person 1's left arm and person 2's right knee might be conflated by the algorithm as belonging to the same pose. If there is any likelihood that the input images will contain multiple persons, the multi-pose estimation algorithm should be used instead.

C. ML Pipeline

Real-time, simultaneous perception of human pose, face landmarks and hand tracking on mobile devices can enable a variety of impactful applications, such as fitness and sport analysis, gesture control and sign language recognition, augmented reality effects and more. MediaPipe, an open-source framework designed specifically for complex perception pipelines leveraging accelerated inference (e.g., GPU or CPU), already offers fast and accurate, yet separate, solutions for these tasks. Combining them all in real-time into a semantically consistent end-to-end solution is a uniquely difficult problem requiring simultaneous inference of multiple, dependent neural networks.

Pipeline and Quality

The MediaPipe Holistic pipeline integrates separate models for pose, face and hand components, each of which are optimized for their particular domain. However, because of their different specializations, the input to one component is not well-suited for the others. The pose estimation model, for example, takes a lower, fixed resolution video frame (256x256) as input. But if one were to crop the hand and face regions from that image to pass to their respective models, the image resolution would be too low for accurate articulation. Therefore, we designed MediaPipe Holistic as a multi-stage pipeline, which treats the different regions using a region appropriate image resolution.

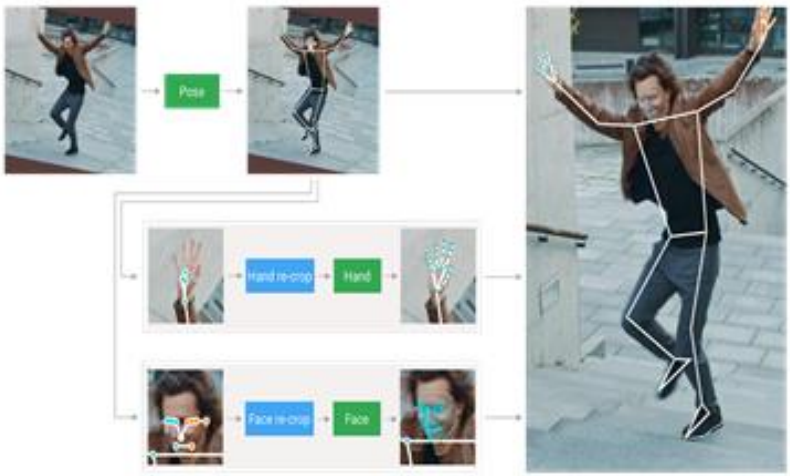

Fig 1 : MediaPipe Holistic Pipeline Overview

First, MediaPipe Holistic estimates the human pose with BlazePose's pose detector and subsequent keypoint model. Then, using the inferred pose key points, it derives three regions of interest (ROI) crops for each hand (2x) and the face, and employs a re-crop model to improve the ROI (details below). The pipeline then crops the full-resolution input frame to these ROIs and applies task-specific face and hand models to estimate their corresponding keypoints. Finally, all key points are merged with those of the pose model to yield the full 540+ keypoints.

To streamline the identification of ROIs, a tracking approach similar to the one used for the standalone face and hand pipelines is utilized. This approach assumes that the object doesn't move significantly between frames, using an estimation from the previous frame as a guide to the object region in the current one. However, during fast movements, the tracker can lose the target, which requires the detector to re-localize it in the image. MediaPipe Holistic uses pose prediction (on every frame) as an additional ROI prior to reduce the response time of the pipeline when reacting to fast movements. This also enables the model to retain semantic consistency across the body and its parts by preventing a mixup between left and right hands or body parts of one person in the frame with another.

In addition, the resolution of the input frame to the pose model is low enough that the resulting ROIs for face and hands are still too inaccurate to guide the re-cropping of those regions, which require a precise input crop to remain lightweight. To close this accuracy gap we use lightweight face and hand re-crop models that play the role of spatial transformers and cost only ~10% of the corresponding model's inference time.

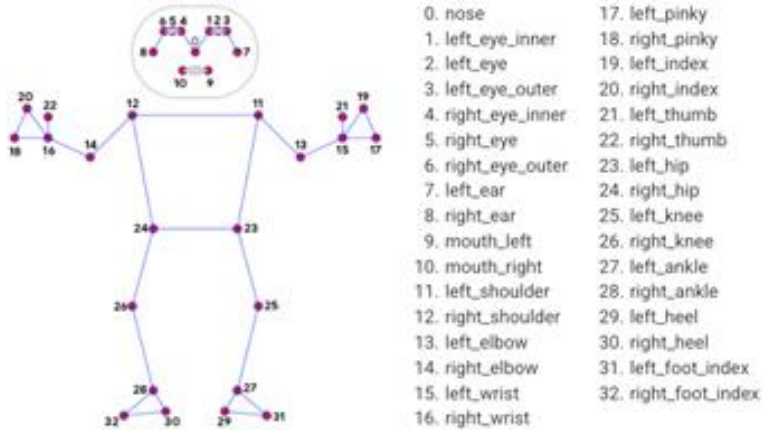

Fig 2 : Pose Landmarks

Performance

MediaPipe Holistic requires coordination between up to 8 models per frame — 1 pose detector, 1 pose landmark model, 3 re-crop models and 3 keypoint models for hands and face. While building this solution, we optimized not only machine learning models, but also pre- and post-processing algorithms (e.g., affine transformations), which take significant time on most devices due to pipeline complexity. In this case, moving all the pre-processing computations to GPU resulted in ~1.5 times overall pipeline speedup depending on the device. As a result, MediaPipe Holistic runs in near real-time performance even on mid-tier devices and in the browser.

Phone	FPS
Google Pixel 2 XL	18

Samsung S9+	20
15-inch MacBook Pro 2017	15

Performance on various mid-tier devices, measured in frames per second (FPS) using TFLite GPU.

The multi-stage nature of the pipeline provides two more performance benefits. As models are mostly independent, they can be replaced with lighter or heavier versions (or turned off completely) depending on the performance and accuracy requirements. Also, once pose is inferred, one knows precisely whether hands and face are within the frame bounds, allowing the pipeline to skip inference on those body parts.

Applications

MediaPipe Holistic, with its 540+ key points, aims to enable a holistic, simultaneous perception of body language, gesture and facial expressions. Its blended approach enables remote gesture interfaces, as well as full-body AR, sports analytics, and sign language recognition. To demonstrate the quality and performance of the MediaPipe Holistic, we built a simple remote control interface that runs locally in the browser and enables a compelling user interaction, no mouse or keyboard required. The user can manipulate objects on the screen, type on a virtual keyboard while sitting on the sofa, and point to or touch specific face regions (e.g., mute or turn off the camera). Underneath it relies on accurate hand detection with subsequent gesture recognition mapped to a "trackpad" space anchored to the user's shoulder, enabling remote control from up to 4 meters.

This technique for gesture control can unlock various novel use-cases when other human-computer interaction modalities are not convenient.

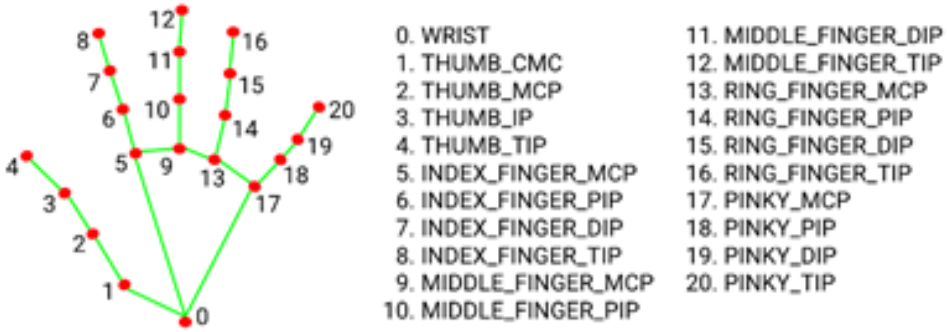

Fig3 : Hand Landmarks

D. Libraries Used

During the development of the project certain pre-trained libraries were employed that make it easier in developing the models. The prominent libraries are mentioned below:

- **Open CV**

Open Source Computer Vision Library commonly known as OpenCV is a collection of programming functions which is prominently used for Real time Computer Vision. As the name states, it is commonly used for capturing video's or images live.

OpenCV was built by Intel and was putforward by Willow Garage then Itseez. Finally after few moths , it was again undertaken by Intel Coorporation. This Library is inder the BSD licence and can be used across several

platforms with no cost. It is an open source software library used for capturing and processing video's. It uses the concepts of Computer Vision to process the captured video.

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. It was developed to deliver a sHPEed platform for Computer Vision applications and to promote the use of machine technology in consumer products. Being a BSD Licensed product, OpenCV is capable of updating the code hence making it easy to fullfill various business requirements.

It includes several interfaces like MatLab, Python, Java and C++. It can be implemented on various Operating systems like Linux, MACOS, Windows, and android. The library widely takes the advantages of SSE and MMX instruction for Real-Time computer vision applications. Many interfaces are built and developed using OpenCV such as OpenCL and CUDA. The latest version of OpenCV includes 10 times as many features and functions that compose or support those algorithms. There also also over 500 algorithms available in this library which related to Machine Learning and Computer Vision Applications. OpenCV works efficiently with STL containers and has a templated interface. It is natively written in C++.

Open Source Computer Vision Library contains over 2,500 tailored algorithms, including a detailed collection of both traditional and state-of-the-art computer vision and machine learning algorithms. OpenCV has more than 47 thousand people in the user community and an estimated number of downloads of more than 18 million. The library is widely used by companies, research groups and government agencies.

- **NumPy**

Numpy is a software library mainly used for Array Vectorization. It is implemented using Python programming language. It supports large multidimensional arrays and matrices. It also includes many Mathematical functions to operate on single and multidimensional arrays. Numpy was originally written as Numeric and was created by Jim Huguin with support from several other Developers. It is known to be as an ancestor of Numpy. In 2005, Travis Oliphant created NumPy by incorporating features of the competing Numarray into Numeric, with extensive modifications. NumPy is open-source software and has many contributors.

NumPy is implemented using Python programming language. In more specific, it is the python reference implementation of Python. The python reference is a non-optimizing bytecode interpreter. Mathematical algorithms written for this version of Python often run much slower than compiled equivalents. With the use of NumPy, this disadvantage was overcome by providing Mathematical functions applicable to both single and multi-dimensional arrays. Numpy provides operators and functions that operate effectively on Array Structures by modifying few segments of code which mainly included inner-outer loops. Python bindings of the widely used OpenCV computer vision library use NumPy arrays to store and operate data.

- **Scikit-Learn**

Sklearn or Scikit-Learn is a software library associated with Machine Learning Algorithms implemented using Python Programming Language. It was formerly called scikits.learn. Sklearn is designed in association with Python Scientific and Numeric Libraries Numpy and SciPy. Its features includes Random-Forest, SVM's (Support Vector Machines), Gradient Boosting and many more clustering algorithms. It prominently also includes classification, K-Means algorithms, dB scan, Regression algorithms in its latest versions.

Sklearn provides prominent results in Predictive Data Analysis. As it is a open-source free software library, it is flexible to use in any context and accessible by everyone. Also the code written can be modified and reused in

order to suite changing business needs. Sklearn can be implemented in association with many Python Libraries such as Pyplot and Matplotlib for plotting, Array Vectorization using Numpy, Extracting dataframes using Pandas,Scipy and many other libraries.

Sklearn is implemented using Python programming language. It makes use of Numpy library for Array Vectorization, Linear Algebra and High-Performance array manipulation operation. In order to further improve performance of the model, the Core Algorithms of Sklearn is written in Cython. Cython wrapper is used to build SVM's (Support Vector Machines). SVM's are build using LIBSVM, logistic regression and linear support vector machines by a similar wrapper around LIBLINEAR. In such cases, extending these methods with Python may not be possible.

- **Pandas**

In computer science, pandas is a Python programming language software library for data processing and analysis. In specific, it includes data structures and procedures for the analysis of numerical tables and time series. It is a free software released under a three-class BSD license. It is majorly utilised for Analysis and Manipulation of Data. The name comes from the word "panel data," an econometric word for data sets that contain findings over various time intervals with the same individuals.

Pandas is majorly used in applications where Data is extracted in the form of frames. Our applications takes input in the form of video feed and individual images needs to be extracted from the video. Hence Pandas was the best choice for this operation. It processes data in various formats that includes csv, excel and several other file formats. The Pandas library is implemented using Python programming language and it allows several data manipulation operations such as Group By, join, merge, melt, concatenation as well as data cleaning features such as filling, replacing or imputing null values.

IV. CONCLUSION

Human Pose Estimation systems are a large field of research and development, currently with a focus on advanced machine learning algorithms, innovations in the field of Hardware architecture, and on decreasing the costs of monitoring while increasing safety. We learnt a lot about this developing field of study while researching and developing this project.

During the development of this project to detect human activities from video feeds we came across multiple approaches to help detect a subset of activities. We had limited system Hardware resources like GPU for training models and we had only a conservative amount of data for the given set of activities. In future we can do this implementation with greater processing resources and with greater amount of data to increase the accuracy further than what has already obtained.

As we all know that the accuracy of the models can never be 100% so the results that are generated will always have a possibility of providing improper output as is the case with all machine learning classifications so if we can increase the data to improve the overall efficiency of detection of human activity we can do so in future models where a huge data setis used to train the developed models.

Other future enhancements can include the use of IOT based smart devices that can perform pre-programmed activities based on actions performed and provide automated solutions to simple problems.

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Bitcoin Price Prediction using LSTM Model

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ABSTRACT

Bitcoin has taken the universe of digital money and interest overall by a tempest. Bitcoin is a sort of Cryptocurrency and presently is one of kind of speculation on the securities exchange. Financial exchanges are impacted by many dangers of variable. What's more bitcoin is one sort of cryptographic money that continue to ascend in later hardly any years, and once in a while abrupt fall without knowing impact behind it on the financial exchange. With the advancement Machine learning and AI-helped exchanging has acquired interest in the beyond couple of years. The objective of this paper is to learn with what precision the bearing of Bitcoin cost in USD can be anticipated. The value information is obtained from Kaggle. The undertaking is accomplished with differing levels of progress through the execution of a Long Short-Term Memory (LSTM) organization. We store the everyday information for a specific period. With the methodologies helped by best-in-class calculations we get incredible results. With the assistance of basic calculations and engineering, the results made the development in the digital currency market. The digital money has become famous in 2017 due to the development in market capitalization. The digital currency can be produced and be utilized for online exchanges. The worth of Bitcoin continues to fluctuate each second. Hence, to anticipate the worth of bitcoin cost here, we utilize the LSTM Architecture. With the assistance of this engineering, we are attempting to demonstrate this LSTM design gives more exact outcomes than some other AI calculations and design. The objective of this undertaking is to determine with what precision the heading of Bitcoin cost in USD can be anticipated. The assignment is accomplished with shifting levels of accomplishment through the execution of a Long Short-Term Memory (LSTM) organization.

Keywords— Bitcoin, Cryptocurrency, LSTM, Machine Learning, AI.

I. INTRODUCTION

Time series prediction is certainly not another peculiarity. Forecast of most monetary business sectors like the stock market has been explored at large scale. Bitcoin presents an intriguing corresponding to this as it is a period series forecast issue in a market still in its early phase. Thus, there is high instability on the lookout what's more this gives an open door as far as forecast. Also, Bitcoin is the main cryptographic money in the

world with reception developing reliably over the long run. Because of the open idea of Bitcoin, it additionally presents one more trouble rather than conventional monetary business sectors. It works on a decentralized, shared and trust less framework in which all exchanges are presented on an open record called the Blockchain. This kind of straightforwardness isn't seen in other monetary business sectors. Customary time series forecast techniques like Holt Winters dramatic smoothing models depend on straight suspicions and require information that can be separated into pattern, occasional and commotion to be successful This kind of procedure is more reasonable for an errand, for example, anticipating deals where occasional impacts are available. Because of the absence of irregularity in the Bitcoin market and its high instability, these strategies are not exceptionally powerful for this assignment. Given the intricacy of the assignment, profound learning makes for an intriguing innovative arrangement in light of its presentation in comparable regions. Errands such as regular language handling which are additionally consecutive in nature and have shown promising outcomes. This kind of assignment utilizes information of a successive sort and subsequently is like a value forecast task. The intermittent neural organization (RNN) and the long momentary memory (LSTM) kind of counterfeit neural organizations are preferred over the customary multi-facet perceptron (MLP) because of the transient idea of the further developed calculations.

The prevalence of digital forms of money has soar in 2017 because of a few sequential long stretches of super remarkable development of their market capitalization, which topped at more than $800 billion in Jan. 2018. Today, there are more than1,500 effectively exchanged cryptographic forms of money. Between2.9and 5.8millions of private as well as institutional financial backers are in the different exchange organizations, as per a new study, andadmittance to the market has become simpler after some time.

Major cryptocurrencies may be offered the usage of fiat currency in some of on-line exchanges and then be used of their turn to shop for much less popular cryptocurrencies. The volume of day by day exchanges is currently superior to $15 billion. Since 2017, over a hundred and seventy hedge finances specialised in cryptocurrencies have emerged and Bitcoin futures had been released to address institutional demand for trading and hedging Bitcoin might be powerful additionally in predicting crypto forex fees. However, the utility The Bitcoin’s price varies similar to any other inventory. There are many algorithms used on stock marketplace facts for fee forecast. However, the parameters affecting Bitcoin are special. Therefore, it's miles vital to foretelling the price of Bitcoin in order that accurate investment decisions may be made. The price of Bitcoin does not depend on the business activities or intervening authorities authorities, unlike the inventory marketplace. Thus, to forecast the price we experience it's far important to leverage system learning era to expect the charge of Bitcoin. So, the assignment purpose is to predict the fee of bitcoin and help investor’s make better investments. This research is concerned with predicting the price of Bitcoin the use of device studying. The goal is to examine with what accuracy can the direction of Bitcoin fee in USD may be anticipated.

II. LITERATURE REVIEW

Research on predicting the price of Bitcoin the usage of gadget getting to know algorithms specially is lacking. [8] applied a latent supply model as developed by using [9] to are expecting the price of Bitcoin noting 89% go back in 50 days with a Sharpe ratio of four.1. There has additionally been work using textual content

information from social media platforms and different sources to expect Bitcoin prices.[10] investigated sentiment evaluation the usage of aid vector machines coupled with the frequency of Wikipedia perspectives, and the network hash price. [11] investigated the connection among Bitcoin charge, tweets and views for Bitcoin on Google Trends.[12] implemented a similar methodology except as opposed to predicting Bitcoin price they anticipated trading quantity using Google Trends perspectives. However, one limitation of such studies is the regularly small pattern length, and propensity for misinformation to unfold via diverse (social) media channels which includes Twitter or on message forums along with Reddit, which artificially inflate/deflate charges [13]. In the Bitcoin exchanges liquidity is drastically restrained. As a end result, the marketplace suffers from a greater danger of manipulation. For this motive, sentiment from social media is not considered similarly. [14] analyzed the Bitcoin Blockchain to predict the price of Bitcoin the usage of guide vector machines (SVM) and artificial neural networks (ANN) reporting price path accuracy of 55% with a regular ANN. They concluded that there has been confined predictability in Blockchain data by myself. [15] extensively utilized Blockchain records, enforcing SVM, Random Forests and Binomial GLM (generalized linear model) noting prediction accuracy of over 97% but without go-validating their models proscribing the generalizability in their effects. Wavelets have additionally been utilized to predict Bitcoin charges, with [16], [17] noting fantastic correlations among search engine views, network hash rate and mining issue with Bitcoin price. Building on those findings, information from the Blockchain, particularly hash rate and problem are included within the evaluation alongside data from the important exchanges supplied through CoinDesk. Predicting the charge of Bitcoin may be taken into consideration analogous to different monetary time series prediction tasks along with forex and stock prediction. Several bodies of research have implemented the Multilayer Perceptron (MLP) for stock charge prediction [4] [18]. However, the MLP handiest analyses one commentary at a time [19]. In comparison, the output from every layer in a recurrent neural community (RNN) is stored in a context layer to be looped returned in with the output from the next layer. In this experience, the community profits a memory of sorts in place of the MLP. The length of the network is called the temporal window duration. [20] notes that the temporal relationship of the series is explicitly modelled by the internal states contributing notably to model effectiveness. [21] effectively took this technique in predicting stock returns combining a RNN with a genetic algorithm for community optimization. Another shape of RNN is the Long Short-Term Memory.

(LSTM) network. They fluctuate from Elman RNN in that during addition to having a memory, they can pick which data to don't forget and which facts to neglect primarily based at the weight and significance of that function. [22] applied a LSTM for a time collection prediction undertaking finding that the LSTM done as well as the RNN for this mission. This type of version is carried out right here also. One hassle in schooling both the RNN and LSTM is the great computation required. For instance, a network of 50 days is comparable to training 50-character MLP models. Since the development of the CUDA framework with the aid of NVIDIA in 2006, the development of programs that take advantage of the extraordinarily parallel abilities of the GPU has grown greatly inclusive of the area of gadget studying. [23] reported over three times faster education and checking out of its ANN version whilst applied on a GPU rather than a CPU. Similarly, [24] suggested an accelerated pace in classification time to the magnitude of eighty instances when implementing a SVM on a GPU over an opportunity SVM algorithm run on a CPU. In addition, training time turned into nine times more for the CPU

implementation. [25] also acquired speeds that have been 40 times faster for training a whilst training deep neural networks for image recognition on a GPU as opposed to a CPU. Due to the plain benefits of making use of a GPU, our RNN and LSTM models are applied on each the CPU and GPU.

III. METHODOLOGY

3.1. Dataset used:

- For this model we'll be the usage of a Dataset named "Bitcoin Price Prediction (Light Weight CSV)" by means of TEAM AI.
- We Found this dataset on Kaggle.Com, Kaggle is an open-supply on line statistics technology community where we will find heaps of datasets appropriate for our version.
- This dataset includes bitcoin information from "January 2014" to "October 2017".
- This dataset consists of information like commencing rate, highest charge, lowest rate, last charge, volume, marketplace capitalization.
- This dataset gives a couple of features so it makes function engineering complicated however at the equal time increases the accuracy of the model.

3.2. Dataset:

Several Bitcoin data sets are available online to down load for free. Most of them provide the statistics related to rate of Bitcoin on a minute-to-minute basis However, the top aim of the venture is to create one-day in advance prediction of maximum and shutting worth of Bitcoin. So, we will want records inclusive of highest and remaining rate of Bitcoin for every day over length of several years The Qu and l API offers the Bitcoin really worth know-how set, ranging from September 2014-2017. This API offers get right of entry to Bitcoin exchanges and every day Bitcoin values. It lets in users to personalize the question whereas victimization the interface to switch the historic Bitcoin charges. The information is available in 3 different formats i.e., JSON, XML and CSV. Data is downloaded in the. Csv format. Size of information is round 200KB. It has a complete of 1380 statistics records (each file corresponds to a day) inclusive of Bitcoin open, high, low, remaining price and extent of Bitcoin (USD) starting from Sept 2014-2017. So, after the statistics is wiped clean, the final records set has a complete of 1380 statistics records. To are expecting the very best and last rate of Bitcoin one day ahead, in every of the sub records units, columns excessive and close are shifted up by way of one (1) unit. In the 3 sub data sets, it ought to be mentioned that the testing statistics is from 1st January to 18th March and it's far expected on nineteenth March (of years 2014, 2016, 2017) for 3 units respectively. The statistics set has constrained features and in the modern challenge nearly most of these capabilities are considered precious for the prediction project. To be clean, for predicting the very best and final price of Bitcoin one step ahead, functions inclusive of open, high, low, closing price and quantity of Bitcoin (USD) are used.

3.3. DATA PREPROCESSING:

The primary information accumulated from the web sources remains within the raw form of statements, digits and qualitative phrases. The raw data consists of blunders, omissions and inconsistencies. It calls for corrections

after careful scrutinizing the completed questionnaires. The following steps rectangular degree involved within the manner of primary information. A large volume of statistics gathered thru discipline survey must be taken care of for similar info of person responses. Data Pre-processing might be a technique this is accustomed convert the raw understanding facts information right into a clean information set. In alternative words, each time the info is amassed from absolutely exclusive assets it's amassed in raw format that isn't always possible for the evaluation. Therefore, sure steps rectangular measure lifeless to convert the data information into a bit clean fact set. This method is finished earlier than the execution of reiterative Analysis. The set of steps is thought as know-how pre-processing. The method comprises:

- Data Gathering
- Data Cleaning
- Data Normalization

3.4. LSTM:

LSTMs are explicitly designed to keep away from the long-term dependency trouble. Remembering records for lengthy intervals of time is practically their default behavior, not something they conflict to research. All recurrent neural networks have the form of a sequence of repeating modules of neural network. In general, RNNs, this repeating module could have a totally simple shape, together with a single tan h layer. The deep mastering LSTM neural networks overcome the issues with RNN associated with vanishing gradients, by changing nodes in the RNN with reminiscence cells and gating mechanism. In this regard, it's miles an attractive deep gaining knowledge of neural structure totally on the account of its efficacy in memorizing long- and short-term temporal facts concurrently, and it could be regarded the equal in LSTM architecture.

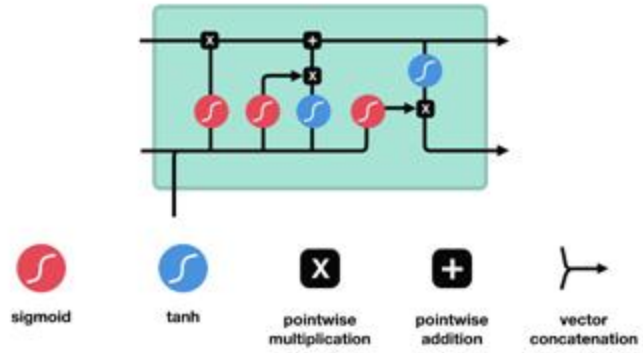

Fig 3.1: Working of LSTM cell

3.5. Testing:

The motive for testing is to discover blunders. Testing is the manner in the direction of end evoking to locate every possible blame or shortcoming in a piece item. It offers a method to test the usefulness of elements, sub gatherings, congregations as well as a finished object it is the way in the direction of working towards programming with the goal of ensuring that the Software framework lives up to its necessities and consumer desires and does now not flop in a flawed way. There are exceptional forms of take a look at. Each test kind tends to a particular testing prerequisite.

3.5.1. UNIT TESTING:

Unit checking out includes the structure of experiments that approve that the inward application rationale is working legitimately, and that software inputs produce massive yields. All desire branches and inside code circulate should be approved. It is the trying of man or woman programming devices of the utility. It's far completed after the finishing of a character unit before aggregate. This is a fundamental checking out, that depends on facts of its improvement and is evident. Unit exams perform essential tests at component degree and take a look at a particular commercial enterprise system, utility, and moreover framework design. Unit assessments guarantee that every super way of a enterprise procedure plays exactly to the recorded details and carries glaringly characterized information assets and anticipated consequences.

3.5.2. INTEGRATION TESTING:

Joining assessments are meant to check included programming segments to determine whether or not they genuinely keep walking as one application. Testing is event pushed and is progressively worried about the essential end result of displays or fields. Incorporation exams exhibit that in spite of the truth that the segments have been separately fulfilment, as appeared by means of efficiently unit testing, the mix of components is proper and reliable. Coordination trying out is explicitly long gone for uncovering the issues that emerge from the combo of segments.

3.5.3. VALIDATION TESTING:

A constructing approval test (EVT)is achieved on first building models, to assure that the critical unit plays to plan objectives and particulars. It is imperative in spotting plan issues, and fathoming them as proper off the bat inside the structure cycle as may want to fairly be expected, is the manner to maintaining ventures on time table and inner spending plan. Over and over again, item plan and execution issues aren't identified till overdue within the item improvement cycle—while the item is ready to be transported. The familiar pronouncing remains steady: It costs a penny to roll out an development in constructing, a dime underway and a greenback after an item is inside the field. Check is a Quality manage manner this is applied to evaluate whether an item, management, or framework conforms to suggestions, information, or situations pressured closer to the beginning of an improvement stage. Check can be being advanced, scale-up, or introduction. This is often an inner manner. Approval is a Quality affirmation procedure of putting in place evidence that offers a excessive degree of confirmation that an item, administration, or framework achieves its deliberate stipulations. This often includes acknowledgment of qualification for motive with stop customers and different item companions. The testing system overview is as follows:

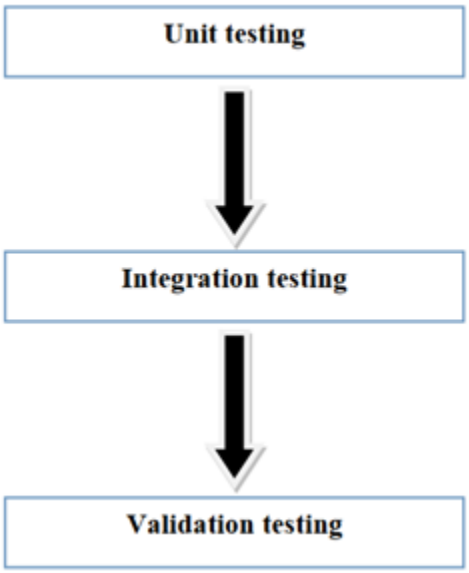

Fig 3.2: Testing overview

IV. RESULTS AND DISCUSSION

After the data analysis process, we find that the only four features were well suited for the testing of this project.
The data was trimmed and only the selected features were left.

	Open	High	Low	Close
0	11617.56	11693.94	11593.01	11678.72
1	11609.99	11644.65	11466.00	11617.56
2	11562.86	11620.00	11542.32	11609.99
3	11438.06	11584.60	11391.59	11562.86
4	11393.24	11450.00	11382.21	11438.06

Fig 4.1: Attribute/Features selected are Open, High, Low, and Close

We can see the output of two models, one which is the Machine Learning model i.e., Linear regression, and the other one is the Recurrent Neural Network model i.e., Long Short-Term Model which shows us the two different outcomes. Linear regression tends to work based on the Mean Squared Equation which tells us the accuracy of the linear graph with respect to the continuous-time frame data set. We see that the accuracy of the training data is approximately 99.97% and the accuracy of the testing data is tending to be approximately 99.97%. Meanwhile, the LSTM model tends to find the accuracy with respect to the Mean Absolute Error which shows the error rate approximately to be 0.08%.

```
In [38]: model.score(x_train, y_train)
Out[38]: 0.9997158887216999

In [39]: pred = model.predict(x_test)

In [40]: model.score(x_test, y_test)
Out[40]: 0.9997966090479169
```

Fig 4.2: Accuracy obtained from the training and testing data set using Linear regression model

S.No	Open	High	Low	Close	Expected Result
1	11617.56	11693.94	11593.01	11678.72	11669.05
2	11609.99	11644.65	11466.00	11617.56	11530.74
3	11562.86	11620.00	11542.32	11609.99	11603.13
4	11438.06	11584.60	11391.59	11562.86	11525.64
5	11393.24	11450.00	11382.21	11438.06	1140.47

Fig 4.3: Testing of Linear regression model

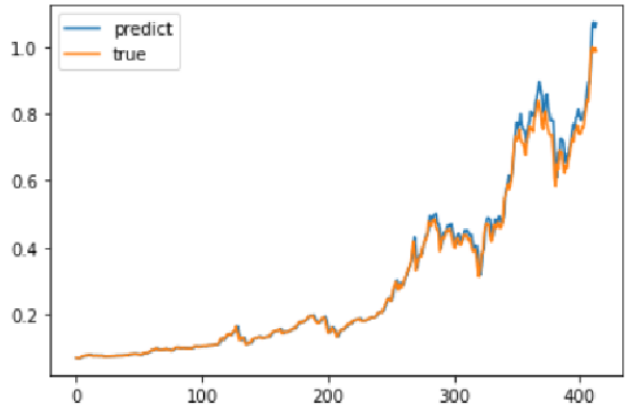

Fig 4.4: Graph Plotted On training subset

Fig 4.5: Graph Plotted on Testing subset

Discussion: The Data visualization shows the correlation between all the features and only the four selected features have a sharp correlation. Data is then fitted into the model using the predefined commands accessible to python. These data models were trained and tested out with a limited number of data sets and provided the result. With the growing technology and the raise in the data sets we can still work on the model with various other alternative crypto currencies. The model shows a better prediction rate for LSTM but with a very slight difference compared to the linear regression model.

V. LIMITATIONS

Although crypto trading has become the new trend, the increase in number of digital coins and the adaptation of the block chain technology, causes the biggest concern i.e., scalability. It is still dwarfed by the number of transactions that, VISA, processes each day. Additional to that is the speed of transaction which the crypto market cannot compete with the players like VISA and MasterCard until the infrastructure delivering these technologies is massively scaled. The analysis of any technical chart composes of mainly 3 major topics, the trend and momentum which indicate the direction and strength of direction, support and resistance which indicates the potential stopping points of those directions and the pattern in general, which indicates the information about the market psychology. Cryptocurrencies have not been around for long enough to provide sufficient information regarding the resistance and key support compared to stock market, currencies and commodities. This makes it difficult to predict and practice.

VI. CONCLUSION

The study reveals that the best accuracy rate is shown in Long Short-Term Memory than Linear Regression. This study is used to compare the features: open, close, high, and low only, hence the result may differ if we tend to take various other features into considerations. Because the crypto market is volatile and influenced by social media and other external factors, data sets cannot be the only reason for forecasting. As technology advances, new data can be collected, analyzed, and practiced, resulting in better results for this experiment.

A. Future Scope:

- To work on a better User Interface so that people can access these data easily and effortlessly.
- Implementing IOT model for smart automatic analysis.
- Implementing more algorithms to find out the best method for predicting the crypto currency

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Investigation and Analysis of Characteristics of 3D Printed Parts Produced by Fusion of Different Filament Materials

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ABSTRACT

3D printing can create physical objects from a geometrical representation by successive addition of material. This 3D process had many experienced a phenomenal expansion in recent years. First commercialized of the 3D printing processes in year 1980 by Charles Hull. Currently,3D printing primarily used for producing artificial heart pump, jewelry collections, 3D printed cornea, PGA rocket engine, steel bridge in Amsterdam and other products related to the aviation industry as well as the food industry.3D printing technology has originated from the layer-by-layer fabrication technology of three-dimensional (3D) structures directly from computer-aided design (CAD) drawing. 3D printing technology is a truly innovative and has emerged as a versatile technology stage, we adopt new technology with new invention and create new invention and create new things for enjoys life very easily. There are lots of new technologies we adopted in our daily life. In this technology one of them is 3D-printer. This is one of innovation on this we can make many objects.
Nowadays, 3D printing is widely used in the world. 3D printing technology increasingly used for the mass customization, production of any types of open-source designs in the field of agriculture, in healthcare, automotive industry, and aerospace industries.

Keywords: 3D printing, innovative, versatile, healthcare, automotive, aerospace industries etc.

I. INTRODUCTION

The birth of 3D-printer was 1974; David E. H. Jones laid out the concept of 3D-printing. In 1984, chuck hall of 3D system corporation filled his own patent. The 3D-printing it is the process in which making 3D objects from digital file. In this process objects made by printing layers on one another of specific material until entire object complete. This is one of the best process to create any complex objects in minimum time without complex process and large machines. 3D printing technology is getting more popular day by day for producing objects which were difficult to produce by using traditional methods. 3D printing has obtained extensive success over traditional methods in prototyping as well as in manufacturing of working products because of several advantages including fabrication of complex geometry with high precision, flexibility in design, material saving,

short time to market, waste reducing and personal customization. 3D printing adoption has rapidly increased in the recent years. It has become more useful as the technology continues to advance in versatility and capabilities. Commercial 3D printers have been utilized in many fields due to the cheap manufacturing, quick production and user-friendly interface.Consumers have greater input in the final product and can request to have it produced to fit their specifications. At the meantime, the facilities of 3D printing technology will be located closer to the consumer, allowing for a more flexible and responsive manufacturing process, as well as greater quality control. Furthermore, when using 3D printing technology, the need for global transportation is significantly decreased. 3-dimensional (3D) printing is a technology to manufacture 3D structures by accumulating the printable materials layer-by-layer. There is a wide range of 3D printing technologies and processes such as fused deposition modeling (FDM), electron beam melting (EBM), stereo lithography (SLA), selective laser melting (SLM), selective laser sintering (SLS).

3D printing allows students to create prototypes of items without the use of expensive tooling required in subtractive methods. Students design and produce actual models they can hold. Engineering and design principles are explored as well as architectural planning. Students recreate duplicates of museum items such as fossils and historical artifacts for study in the classroom without possibly damaging sensitive collections. Other students interested in graphic designing can construct models with complex working parts easily.

System under Study

There are many filaments available in the market. They have different qualities and properties. Some are tough, flexible, and heat-resistant. Meanwhile, others are weak, brittle or with adhesion issues. They are also available in various diameters and layers. Here are the types of 3D printing filaments that you can choose from. The following problems are come while 3d printing.

- 3D printing isn't standardized.
- Additive manufacturing impacts the environment.
- Equipment and product costs are high.
- There's a 3D printing knowledge gap.
- Additive manufacturing complicates intellectual property.

II. OBJECTIVES

The process of 3D printing makes it easier for designers to create complex designs, and unlike with traditional processes, 3D printed parts and prototypes can typically be produced in hours to make data more securable. to encrypt or decrypt color image data. 3D printing is known for its speed, accuracy, and cost-effectiveness, especially when compared to more traditional processes such as hand-built prototyping and CNC machining. The process of 3D printing makes it easier for designers to create complex designs, and unlike with traditional processes, 3D printed parts and prototypes can typically be produced in hours (rather than days or weeks), allowing companies to move through design cycles faster and more efficiently.

- **3D printer filaments** come in different types and your filament choice might depend on the object that you are trying to build. 3D
- 3D printers currently on the market can vary widely by size, price, and capability. The best 3D printer for you will depend primarily on your industry and desired applications.
- The adoption of 3D printing in major industries printer can accommodate one or more types of filaments.has created an increased demand for 3D printing materials that suit a variety of applications

III. VARIOUS TYPES OF FILAMENT MATERIALS

3D printing filament is the thermoplastic feedstock for fused deposition modelling 3D printers. There are many types of filament available with different properties, requiring different temperatures to print. Filament is commonly available in the two standard diameters of 1.75 mm and 2.85 mm. Filaments used in 3D printing are *thermoplastics* which are plastics (aka polymers) that melt rather than burn when heated, can be shaped and molded, and solidify when cooled. The filament is fed into a heating chamber in the printer's extruder assembly, where it is heated to its melting point and then extruded (squirted) through a metal nozzle as the extruder assembly moves, tracing a path programmed into a 3D object file to create, layer by layer, the printed object. Although most 3D printers have a single extruder, there are some dual-extruder models that can print an object in different colors or with different filament types.

Materials There are two main materials, PLA and ABS. These are both Thermoplastics, which means that they can be heated and moulded, continually, i.e. over and over again. Both these materials are available in a wide variety of colours. However for a material to be useful for 3D Printing, it has to pass three different tests;

- Initial Extrusion into Plastic Filament.
- Extrusion and Trace-Binding during the 3D Printing Process.
- End Use Application.

- **(ABS) Acrylonitrile Butadiene Styrene** - filament is the most popular or commonly used 3D printer filament. In fact, it is used in a wide variety of applications because it is tough and high impact-resistant. This filament is also strong and slightly flexible, which makes it a good material for 3D printing. In addition, it can be easily extruded, which makes it very easy to print. It is available in 3.0mm and 1.75mm diameter at 2 lbs., 5 lbs., and 10 lbs spools. There are also ABS engineering-grade filaments on the market if you want one. **Print Temperature Range: 210°C – 250°C.**

Applications-ABS is the best 3D printer filament for moving parts, automotive parts, electronic housing, and toys. ABS filament is also used in pipes, automotive components, electronic assemblies, and protective headgear like bicycle helmets, music instruments, kitchen appliances, LEGO bricks and more.

- **(PLA) polylactic acid**– Filament is one of the most commonly used 3D printing materials that is often compared against ABS. PLA is a biodegradable thermoplastic that is derived from renewable resources like cornstarch, sugar cane, tapioca roots, and potato starch.This 3D print filament is more environment-friendly compared to other plastic materials. Due to this and its low-toxicity features, more and more prefer PLA over ABS. Furthermore, it is even one of the most popular 3D printing plastics in the 3D

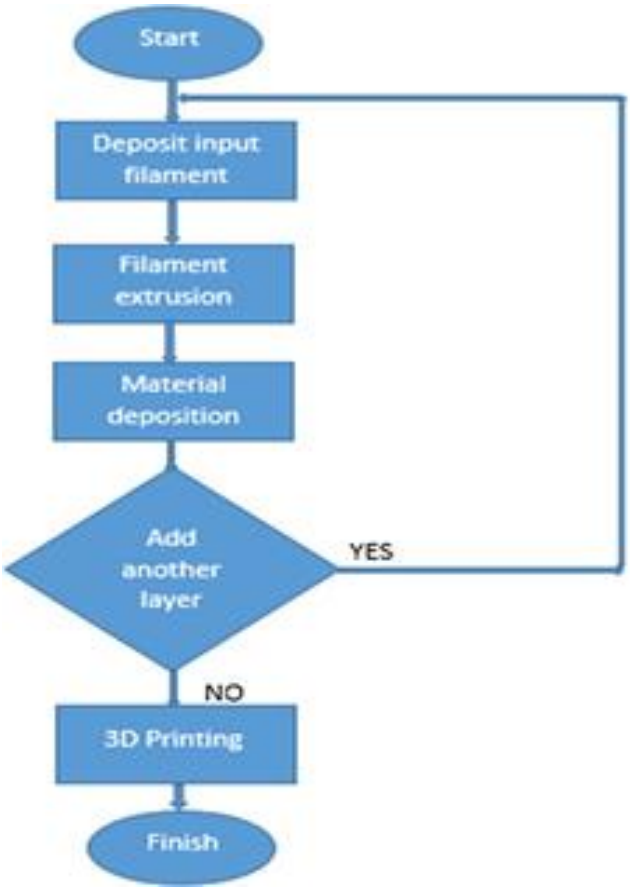
printing community. In contrast to ABS, PLA filament doesn't produce toxic stinks during printing. Due to its safe and non-toxic nature, this filament is the best 3D printer filament. **Print Temperature Range: 180°C – 230°C.**

Application-This filament has the ability to degrade into inoffensive lactic acid in the body and due to this property, it is used in medical suturing and surgical implants. Surgically implanted screws, pins, rods or mesh naturally breaks down in the body within 6 months to 2 years. Aside from the aforementioned, it is considered safe. Thus, it is also used in food packaging, candy wrappers, disposable tableware, disposable garments, hygiene product, and diapers to name a few.

- **(PVA) Polyvinyl Alcohol-** filament is another great 3D filament. PVA is a special plastic that is water-soluble. This type of filament is based on polyvinyl alcohol, so it has pretty good properties like being non-toxic and biodegradable. It is the most popular support material in the market.PVA is easy to print that's why they make good support during a printing process for models with overhangs that is impossible to print without support material. **Print Temperature Range: 180°C – 230°C.**

Applications-PVA 3D printing filament is commonly used as a paper adhesive, thickener, packaging film, in feminine hygiene, adult incontinence products, in children's play putty or slime. This material is also the best filament for freshwater sports fishing.

IV. METHODOLOGY



V. CONCLUSION

There are many other materials available on the market for 3-D printing filament. A recent study has already investigated the mechanical properties of 3-D printed parts using a commercial open-source for a wide range of materials. Future work could probe the use of these other materials for bicycle components. In addition, with the continued development of novel and affordable 3-D printing filament technologies, the types of materials that may become common for FFF is expected to grow and involve the use of additives such as strengthening agents to common 3-D filament printable materials Other techniques involve treating 3-D printable materials to increase strength. In addition, other components of the bicycle such as handlebars, brake levers, brake pads, handlebar grips, etc. could be designed and tested for use. Although, tensile strength of many 3-D printing materials are available, these results cannot directly be used for structural analysis. The orientation, infill density, direction of force applied, type of forces, etc. change the strength of the component being analyses.so we can investigate various filament available in market and analysis with recent used filaments. By this we will know the various characteristics of various 3-D printer filaments by calculations and various software.

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Sign Language Detection by using Python

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ABSTRACT

Communication is key to any relationship whether it is corporate or personal. Whenever we meet anyone we verbalise with them and apportion our celebrations and feelings via communication. But it becomes an inelegant situation when a person can't express the feeling due to the language barrier or lack of communication faculties. Society has many people with some disabilities like the one who cannot speak, one who cannot auricularly discern or cannot visually perceive. Examining these different parameters, the conception of denotement language apperception is proposed. For precision and apperception, machine learning libraries and algorithms are utilised. This methodology will avail auditorily impaired and imbecilic people to understand the language of others, as well as others, who can understand their language and feelings via dactylology exhibited on the screen.

Keywords: Sign language, deaf and dumb, conversation, machine learning, CNN.

I. INTRODUCTION

Dactylology is utilised by auditorily impaired and incoherent people to express their feelings in front of others. Dactylology includes hand gestures, displaying letters or words utilised in gestures. A vision-predicated dactylology apperception is a trending topic to work on nowadays. Being a component of the interaction is paramount to build wearable or a portable system for auditorily impaired and imbecilic people that sanctions them to communicate facilely with their near and dear ones. This work's main focus is on engendering a vision-predicated system capable of doing genuine-time dactylology apperception. The reason for culling a system predicated on vision relates to the fact that it provides a simpler and more intuitive way of communication between a human and a computer. Being hand-pose one of the most consequential communication implements in humans' daily life, and with the perpetual advances of image and video processing techniques, research on human-machine interaction through gesture apperception led to the utilisation of such technology in a very broad range of applications, like touch screens, video game consoles, virtual authenticity, medical applications, and dactylology apperception.

II. LITERATURE SURVEY

Auditorily impaired Mute Communication Interpreter- A Review [1]: This paper aims to cover the sundry prevailing methods of auditorily impaired-mute communication interpreter system. The two broad relegations of the communication methodologies utilised by the auditorily impaired mute people are – Wearable Communication Contrivance and Online Learning System. Under the Wearable communication method, there are Glove predicated systems, the Keypad method, and Handy Cam Touch-screen. All the above-mentioned three sub-divided methods make utilisation of sundry sensors, accelerometer, an opportune micro-controller, a text to verbalization conversion module, a keypad, and a physical contact screen. The desideratum for an external contrivance to interpret the message between an auditorily impaired mute and non-auditorily impaired-mute people can be overcome by the second method i.e., the online learning system. The Online Learning System has different methods. The five subdivided methods are- the SVELTE module, TESSA, Wi-Visually perceives Technology, SWI_PELE System, and Web- Sign Technology.

An Efficient Framework for Indian Dactylology Apperception Utilising Wavelet Transform [2]: The proposed ISLR system is considered as a pattern apperception technique that has two consequential modules: feature extraction and relegation. The joint utilisation of Discrete Wavelet Transform (DWT) predicated feature extraction and most proximate neighbour classifier is utilised to perceive the denotement language. The experimental results show that the proposed hand gesture apperception system achieves maximum 99.23% relegation precision while utilising cosine distance classifier.

Hand Gesture Apperception Utilising PCA in [3]: In this paper authors presented a scheme utilising a database driven hand gesture apperception predicated upon skin colour model approach and thresholding approach along with an efficacious template matching with can be efficaciously utilised for human robotics applications and homogeneous other application. Initially, the hand region is segmented by applying the skin colour model in the YCbCr colour space. In the next stage, thresholding is applied to the dissever foreground and background. Determinately, a template predicated matching technique is developed utilising Principal Component Analysis (PCA) for apperception.

Hand Gesture Apperception System for the Incoherent People [4]: Authors presented the static hand gesture apperception system utilising digital image processing. For hand gesture feature vector SIFT algorithm is utilised. The SIFT features have been computed at the edges which are invariant to scaling, rotation, and addition of noise.

An Automated System for Indian Dactylology Apperception in [5]: In this paper, a method for automatic apperception of designations on the substratum of shape-predicated features is presented. For segmentation of hand region from the images, the Otsu's thresholding algorithm is utilised, which culls an optimal threshold to minimise the within-class variance of threshold ebony and white pixels. Features of segmented hand regions are calculated utilising Hu's invariant moments that are limited to Artificial Neural Network for relegation. Performance of the system is evaluated on the substructure of Precision, Sensitivity, and Specificity.

Hand Gesture Apperception for Dactylology Apperception: A Review in [6]: Authors presented sundry methods of hand gesture and dactylology apperception proposed in the past by sundry researchers. For

auditorily impaired and incoherent people, Dactylology is the only way of communication. With the avail of denotement language, these physically impaired people express their emotions and celebrations to others.

Design Issue and Proposed Implementation of Communication Avail for Auditorily impaired & Incoherent People in [7]: In this paper, the author proposed a system to avail communication of auditorily impaired and imbecilic people communication utilising Indian dactylology (ISL) with mundane people where hand gestures will be converted into a congruous text message. The main objective is to design an algorithm to convert dynamic gestures to text at genuine-time determinately after testing is done the system will be implemented on android platform and will be available as an application for keenly intellective phone and tablet pc.

Genuine Time Detection and Apperception of Indian and American Dactylology Utilising Sift In [8]:

The author proposed a genuine time vision-predicated system for hand gesture apperception for human-computer interaction in many applications. The system can perceive 35 different hand gestures given by Indian and American Dactylology or ISL and ASL at a more expeditious rate with virtuous precision. RGB-to-GRAY segmentation technique was acclimated to minimise the chances of erroneous detection. The authors proposed a method of improvised Scale Invariant Feature Transform (SIFT) and the same was habituated to extract features. The system is a model utilising MATLAB. To design an efficient utilizer-convivial hand gesture apperception system, a GUI model has been implemented.

A Review on Feature Extraction for Indian and American Dactylology in [9]: Paper presented the recent research and development of denotement language predicated on manual communication and body language. Dactylology apperception systems typically elaborate three steps: pre-processing, feature extraction, and relegation. Relegation methods utilised for apperception are Neural Network (NN), Support Vector Machine (SVM), Obnubilated Markov Models (HMM), Scale Invariant Feature Transform (SIFT), etc.

Sign Pro-an Application Suite for Auditorily impaired and Incoherent. in [10]: The author presented an application that avails the auditorily impaired and incoherent person to communicate with the rest of the world utilising dactylology. The key feature in this system is the authentic time gesture to text conversion. The processing steps include gesture extraction, gesture matching, and conversion to verbalization.

III. PROPOSED METHODOLOGY

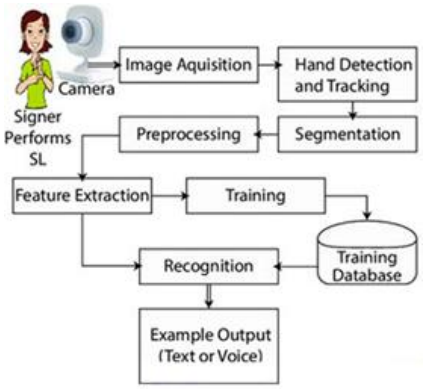

Fig. 2 System Architecture

The system is a vision-predicated approach. All the departments are represented with bare hands and so it eliminates the quandary of utilising any artificial contrivances for interaction.

Dataset Creation:

It is required to make an opportune database of the gestures of the designation language so that the images captured while communicating utilising this system can be compared. The steps followed to engender data sets are as follows. Used the Open (OpenCV) library in order to engender the dataset. Firstly, captured around 8500 images of each of the symbols in ASL for training purposes and around 100 images per symbol for testing purposes. Then capture each frame shown by the webcam of another machine. In each frame, a (ROI) is denoted by a blue bounded square.

The gaussian blur filter to apply on image which avails of extracting sundry features of the image.

Gesture Recognition:

In this method two layers of the algorithm presage the final symbol of the utilizer.

Layer 1 Algorithm:

OpenCV to get the processed image after feature extraction to apply gaussian blur filter and threshold to the frame taken.

Then the processed image is passed to the CNN algorithm module where it is compared to the number of sign language albha to recognise the word correctly.

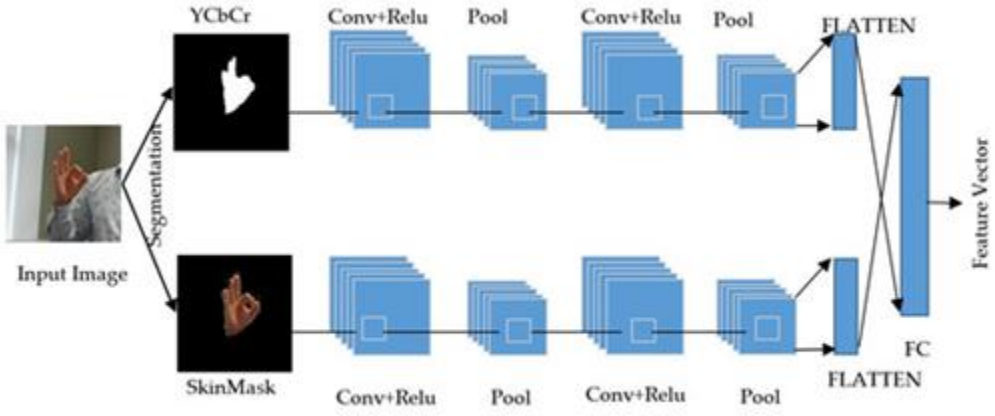

Fig. 2 CNN classification

Layer 2 Algorithm:

After the processing of CNN algorithm it is then sent to the next layer that is of SVM classification layer to recognise the symbol made with the hand gesture, to further elaborate the results on the screen.

Training and testing of the hand gestures:

The input images are now converted from (RGB) into grayscale and apply gaussian blur to extract noise present in the image. An adaptive threshold to extract the hand from the background and resize the images to 200 x 200. An input image after pre-processing for training and testing after applying all the layers above.

IV. RESULT

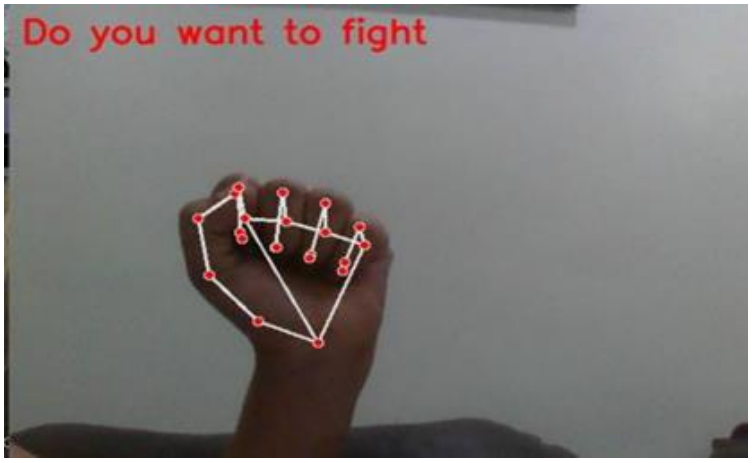

Fig. 4 Do you want to fight Sign Recognised

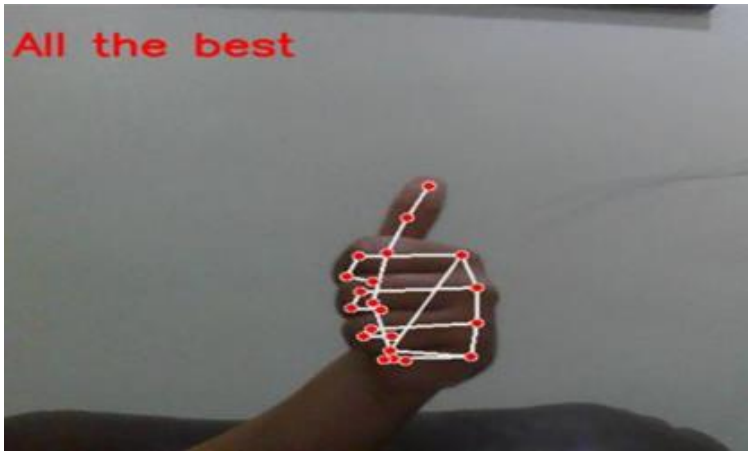

Fig. 5 All the best Sign Recognised

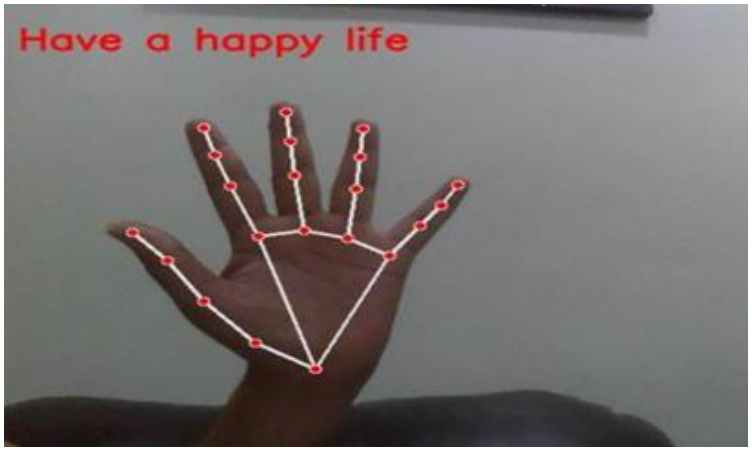

Fig. 6 Have a happy life Sign Recognised

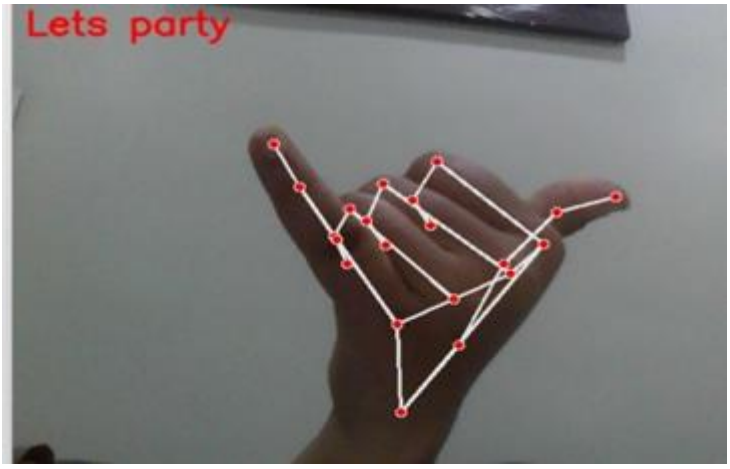

Fig. 7 Lets party Sign Recognised

V. CONCLUSION

In this report, a functional authentic-time vision-predicated American dactylology apperception for Auditorily impaired and Incoherent people has been developed for asl alphabets. Finally achieved final precision of 92.0% on the dataset. System is able to ameliorate the prognostication after implementing two layers of algorithms in which the verification and prognosticate symbols are more homogeneous to each other. This way the symbols or sign made with hand gestures is recognised and the results are seen on the screen.

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Review and Analysis on Android-Based System to Detect the Drowsiness of Driver Using Vision API

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ABSTRACT

In India, according to the National Crime Records Bureau (NCRB) data deaths per 100 accidents in 2016 were 32, and as the time increased the record of deaths also hiked, in 2020 it peaked up to 37 deaths per 100 accidents. The accident-related deaths in India in 2019 were 1,51,113 in number which is a very serious issue of concern. The major reasons for these accidents are driver drowsiness, absence of forbearance among drivers, fatigue, and irresponsible behavior of the vehicle driver. This paper describes a simple review of the driver drowsiness detection approach on Android application with the help of Android Studio and Vision API. With the help of this android application we can detect the real-time drowsiness of the driver before and while driving the application. We can also send our current location and driving statistics to anyone we want. For Facial analysis, head position, blinking duration we have used Google Vision API. This drowsiness detection system provides an accuracy of around 94 %, this application can be used in all types of commercial and personal vehicles.

Keywords: Android, drowsiness detection, driver fatigue, facial analysis, vision API

I. INTRODUCTION

Our country India is the world's largest democracy, also the world's fastest-growing economy. We also know India is a developing country. India has a population of near about 140+ crore, As having a higher population the need for vehicles also increases, currently we have around 0.57 million commercial vehicles and around 2.7 million passenger vehicles. Having an increased number of vehicles invites more accidents. According to the National Crime Records Bureau (NCRB) [1] data deaths per 100 accidents in 2016 were 32, and as the time increased the record of deaths also hiked, in 2020 it peaked up to 37 deaths per 100 accidents. The accident-related deaths in India in 2019 were 1,51,113 in number which is a very serious issue of concern. This all leads to the concern of road safety, which is one of the most highly focused areas in the field of transport. Sleep is a very

basic but very important need of a human being. if there is a lack of sleep a person reacts inefficiently, loses concentration, reduces reaction time and wakefulness, also leads to produces a decrease in alertness level, which makes the driving vehicle riskier and leads to accidents. According to many studies drowsiness is related to thousands of traffic Accidents annually, accidents produce about 50% of deaths or serious injuries injury [2], as it often results in high speed due to the driver falling asleep cannot brake or turn to avoid or minimize impact. To reduce risks real-time drowsiness detection system should be developed, to detect visual features of a driver who will measure fatigue or drowsiness during driving [3]. Icon finds that if the driver is traveling at 100 Km / h and then falls asleep for just four seconds without driver control the car will travel a distance of 111 meters on the Highway [4]. At that speed and distance, the effects are moving to an area that is likely to crash. These drivers who fall under this category are new drivers, Shift workers in the inclusive industry heavy vehicle drivers, and drivers with sleep disorders. Research conducted by The Adelaide Center for Sleep Research presents interesting facts about drowsiness [4]. The people who stay awake for 17 hours face the same risk of a crash, as a Person With 0.05 / 100 ml Blood Alcohol Content. The present technology in the detection of drowsiness has been classified into four types: [4].

- Measuring Visual Features like eyes, head movement, yawning.
- Measuring Non-Visual or clinical Features like EEG and ECG.
- Vehicle position in Lane Monitoring
- Steering Pattern Monitoring.

Developing an Android-based app that can be installed in the Android mobile placed in the car without disturbing the user can help the driver to get out of exhaustion or drowsiness while driving. The current activity is focused on the open and closed-eye state of the human using the Google Vision library that will help with compliance finding facial features. Our approach is able to detect blindness and predict accuracy even when the face and eye are marked with slight variations in brightness available in the car.

II. REVIEW

To increase the accuracy and speed of the onset of drowsiness, a number of methods have been suggested. This section attempts to summarize the previous methods and methods of getting drowsiness. The first method ever used is based on driving patterns and relies heavily on vehicle characteristics, road conditions, and driving ability. To calculate the driving pattern, the deviation from the horizontal or vertical position of the steering wheel movement must be calculated [5],[6] While driving, it is necessary to make small adjustments to the steering wheel to keep the car on the track. Krajweski [6] found detected drowsiness with 86% accuracy on the basis of the correlation between minor adjustment and drowsiness. Also, it is possible to use a detour in the route of the route to identify the driving pattern. In this case, the vehicle's location according to a given route is monitored, and the deviation is analyzed [7]. However, driving pattern-based strategies are highly dependent on vehicle characteristics, road conditions, and driving skills.

The second class of techniques uses data obtained from sensory organs, such as Electrooculography (EOG), Electrocardiogram (ECG) and Electroencephalogram (EEG) data. EEG signals provide information about brain function. The three main indicators for measuring driver drowsiness are theta, delta, and alpha symbols. Theta

and delta signals increase when the driver is drowsy, while the alpha signals increase slightly. According to Mardi et [8], this method is a very accurate method, with an accuracy rate of more than 90%. However, the main disadvantage of this method is its interference. Many sensors need to be connected to the driver's body, which may be uncomfortable. On the other hand, non-invasive methods of bio symptoms are less accurate.

The next one is Computer vision, based on the removal of facial features. It uses treatments such as the look or facial expressions, the length of the yawn, the movement of the head, and the closing of the eyes. Danisman [9] measured three-dimensional drowsiness between the eyelids. This figure is based on the number of blinks per minute, thought to increase as the driver begins to fall asleep. In Hariri [10], sleep patterns are oral behavior and yawning. The modified Viola-Jones [11] object detection algorithm was used to detect face and mouth. Recently, in-depth learning methods, especially Convolutional Neural Networks (CNNs) methods, have gained prominence in solving challenging class problems. Most of them represent various achievements.

Computer Vision functions, which include scene separation, emotional recognition, object detection, image separation [11],[12], etc. With less frequent CNNs, Dwivedi [13] obtained 78% accuracy of finding drowsy drivers. Park [14] developed a new structure using three networks. First [15] uses AlexNet which combines three fully integrated layers (FC) and five CNNs to produce the image feature. In addition, 16-layered VGG-FaceNet [16] is used to remove facial features from the secondary network. FlowImageNet [17] is used to extract behavioral features from a third-party network. This method has achieved 73% accuracy. Dwivedi [13] and Park [14] attempted to improve the accuracy of sleep deprivation using two classifications.

Convolutional Neural Networks (CNNs) methods have produced a remarkable performance in the drowsiness detecting area and are a great help in various classification tasks. Installing these algorithms in operating systems on embedded systems is still a burden as the model size is usually large and requires a high level of computational complexity.

III. METHODOLOGY

3.1. System model and equipment

This section describes the implementation details and configuration methods that have been used to make the system work successfully. In this system, an application has been proposed for the same purpose of acquiring drowsiness using a dedicated smartphone to process a stream of pictures frames to analyze facial analysis. The below Figure shows the system model.

The app will monitor driver fatigue in a timely and consistent manner while the person is driving by looking at the number blinking and drowsiness of the eyes. The app alerts the driver in the event that drowsiness is detected before while driving. The Global Positioning System (GPS) detects latitude and longitude and we can send that GPS location to anyone we want. According to the distance traveled by mathematical analysis, we can also measure the distance traveled. The continuous sequence of driver drowsiness monitoring remains until the destination is reached. Dynamic results are analyzed and monitored. A timer is set to count or monitor the blinking of the eye. The project aims not to use a number of external hardware or any gadgets because the driver may not feel comfortable except a cell phone.

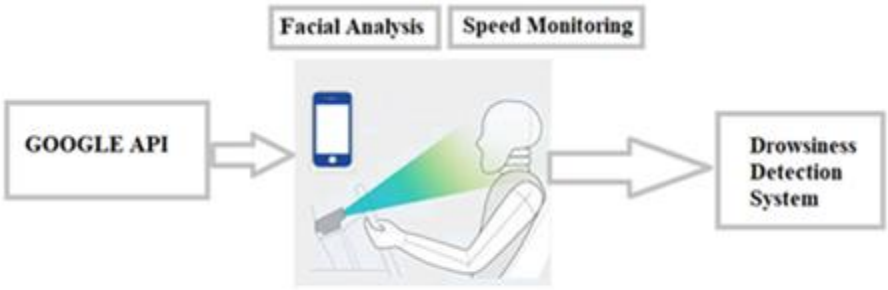

Fig 1: System Model

It is best to use the android app as well android platform program as it allows customization, either way, the user wants to give it an amazing user interface, is an independent tool where there is no major external Hardware support is required as required by EEG, Electro Oculogram (EOG) unless a smartphone holder holds smartphone at the time of finding the driver's drowsiness. Android Studio with a Software Development Kit (SDK) 23 and Target SDK 29 used.

Android Studio is an Integrated Development Environment (IDE) for Android app namely is built with JetBrain's IntelliJ IDEA software and is a slow-moving construction system. Allows engineers to build and test applications on various devices with rich simulation feature [18] and allows Java editing even Kotlin on Android Studio 3.0 or later. In addition, it allows C and C ++ with its support for the Native Development Kit (NDK), includes built-in Google Cloud Platform support as well provides updates for better performance and version compatibility with new features. Most importantly, of course, able to sign the app with google. The request was upgraded using Android Studio 3.6.1.

Additionally, Google APIs allow the application to access services anywhere from a mobile device therefore, do a less expensive system.

3.2. Algorithm

Face detection is the process of detecting a person's face in visual media (digital photos or video). If a face is found, local signs such as eyes and nose can be searched.

Face recognition automatically determines whether two faces are likely to be associated with the same person. Note at this time, Google Face API provides face detection functionality not recognition of face.

Face tracking extends face detection to face tracking. Any faces from the video at any length of time can be followed. That is, the faces found in consecutive video frames can be identified as one person. Note that this not a form of facial expression, this machine automatically generates position based on the position and facial expressions in the video sequence.

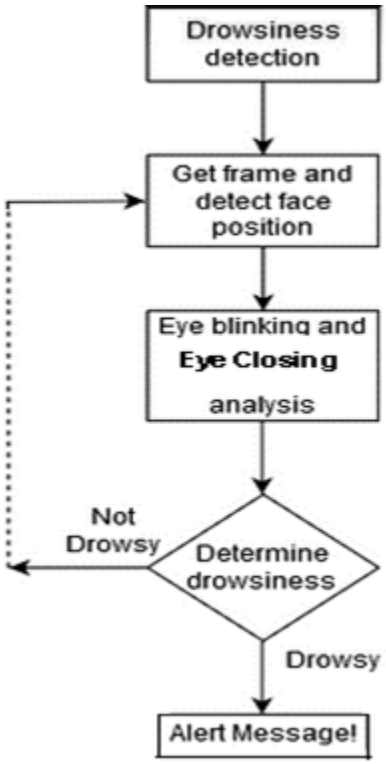

Fig 2: System Algorithm

landmark is the place of interest point within the face. The left eye, the right eye, and the base of the nose are all examples of landmarks.

The Face API provides the ability to detect local signs on a detected surface. Separation determines whether a particular facial feature exists. For example, whether the face is smiling or not.

Some adults between 18 to 60 years of age participated in many tests under different conditions. Insomnia, alcohol consumption, medication side effects, and lack of physical activity (rest) were the various conditions examined. Also, different times of the day were used for experiments. Drivers were tested while driving on rural roads on good roads, different weather conditions, and at different light Conditions.

3.3. APPLICATION IMPLEMENTATION

1. Camera features are set for face detection, the width, and height of the camera source preview, and the face directional camera is set.
2. Permissions are requested to enable access to the camera on android mobile.
3. Real-time face tracking, human face detection, and analysis are allowed by Google API. While using Google Face API we need to import some files which are:

```
com.google.android.gms.vision.CameraSource;
com.google.android.gms.common.images.Size;
com.google.android.gms.vision.MultiProcessor;
com.google.android.gms.vision.Tracker;
com.google.android.gms.vision.face.Face;
com.google.android.gms.vision.face.FaceDetector;
com.google.android.gms.vision.face.Landmark;
com.google.android.gms.vision.face.LargestFaceFocusingProcessor;
```

Fig 3: Importing files and libraries

4. Mode, classification landmarks, prominent face only, and tracking is done by face detector component. only one face is tracked when eye detection, smile detection, and ProminentFaceOnly is set to true.
5. The eye-opening probability and smiling probability are used to find Eye blink frequency and yawning detection.
6. EulerY and EulerZ is used for face positioning or face orientation.
7. Blinking of an eye is being monitored if there is irregular blinking and the eyes are closed for more than 2 seconds the alarm will ring continuously until the driver opens his eyes, once the eyes are opened the alarm will be automatically off.
8. With the help of this app, we can also send our GPS location to anybody we want and, also we can check the last location or send it to anyone easily.

Some public methods by Google Face API	Description
getLandmarks()	Returns the facial landmarks
getContours()	Used with setLandmarkType(int) to get the counters
getWeight()	Returns the face's width in pixels
getHeight	Returns the face's height in pixels
getId()	Gets the face ID to identify face from frames
getPosition()	Gets the top left face's position
getIsLeftEyeOpenProbability()	Gives probability of left eye being open
getIsRightEyeOpenProbability()	Gives probability of right eye being open
getIsSmilingProbability()	Gives the smiling probability by examining the mouth landmarks

Fig 4: Description of methods Google Face API

CameraSourcePreview.java section changes the image size overlay to give aspect ratio size in length as well the same width as the phone screen to get inside the screen displayed on the phone.
Image overlay gives a face shape, specified location symbols, and shapes. Dependence on vision is included in the AndroidManifest.xml file where GMS allows libraries to be downloaded for face detection.
Euler Y and Euler Z are face-to-face angles shape and allow facial detection.

Event occurrence	Condition is set true
Yawning	0.03<Face.getIsSmilingProbability()<0.07 And Face.getIsRightEyeOpenProbability()<0.85 And Face.getIsLeftEyeOpenProbability()<0.85
Eye blink	Face.getIsLeftEyeOpenProbability()<0.6 And Face.getIsRightEyeOpenProbability()<0.6
Left Wink	Face.getIsLeftEyeOpenProbability()<0.6 And Face.getIsRightEyeOpenProbability()>0.9
Right Wink	Face.getIsLeftEyeOpenProbability()>0.9 And Face.getIsRightEyeOpenProbability()<0.6

Fig 5: Yawning and eye blinking occurrences based on probabilities provided by Face API.

```
locationManager = (LocationManager)
this.getSystemService(Context.LOCATION_SERVICE);
   public void onLocationChanged(Location location)
{
        //Called when a new location is found by the
        //network Location parameter.

        Double newLat = location.getLatitude();
        Double newLng = location.getLongitude();
        Double newAlt = location.getAltitude();
        Long newTime = location.getTime();

        altitudeString = Couble.toString(newAlt);

        Float accuracy = location.getAccuracy();

        //Altitude too inaccurate so just use the
        //same altitude for calculating speed,
        //you're not moving that fast unless you fall
        //off a cliff

        locString = df.format(newLat) + ", "+
        df.format(newLng);
```

Fig 6: snippet code of location manager.

IV. CONCLUSION AND FUTURE SCOPE

The purpose of this work was to design and use the user Friendly driver alert and drowsiness application with the help of Android Studio 3.6.1 and vision API. The application is mostly tested in terms of physical analysis, driver facial analysis. Mobile vision Face API is applied for face detection, fragmentation, computing, and monitoring results usually. EulerY and EulerZ is used for face positioning or face orientation. Local services are allowed to use the car speed by distance and local features. An emergency call button is set to help the driver in difficult situations, also we have the option to send our current and last location to anyone we want. Previous projects were developed using machine learning and AI algorithms for training data and the final data separation provided the most accurate results while driving. This function, however, aims to provide convenient usage, availability, reduced costs and privacy since data became available to be stored on the user's phone before and while driving. A driver can be tested for drowsiness even before driving. It can be concluded as an analysis of

sleep life the discovery revealed about 88.5% accuracy and so on compared to the accuracy found in ECE and EEG senses. Results of detection of drowsiness by examining facial features before and while driving improve system performance and accuracy by around 94%. This android application can be easily used in any android mobile, it is user-friendly, does not require any internet connection for checking driver drowsiness, and can be used in any commercial or private vehicle. This app can prevent many critical or dangerous accidents which can be occurred by the drowsiness of the vehicle driver.

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Air Purifier and Humidifier Using Water as a Filtering Media

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ABSTRACT

Air pollution has crossed all bounds in 2021.WHO estimates that around 7 million people die every year from exposure to polluted air. The spread of air pollution is so high that about 91% of the world population is exposed to air pollution. Particulate pollution has important consequences for human health, and is an issue of global concern. Poor indoor air quality is commonly found in homes in larger cities, and it's result of a growing industrialization that pollutes air we breathe with contaminants like industrial dust, smoke and other particles from traffic. An air purifier can also be used to ease annoyance for people suffer from allergies. This research concerns the design and development of the next generation of the air purifier for indoor use. The project has been conducted with human centred design process and co-design approach. Air pollution occurs when gases, dust particles, fumes (or smoke) or odour are introduced into the atmosphere in a way that makes it harmful to humans, animals and plant. Air pollution threatens the health of humans and other living beings in our planet. The development of this project contains several methods commonly used in order to achieve a result that is trustworthy and in line with user needs. The filter also consumes less energy is smaller and more compact than competitors on the market. This leads to less material use which results in less negative environmental impact. To counter this issue we here develop a mini air purifier with that does not use expensive filters but rather uses water as an air filter. An air purifier is provided having a purifier housing and an air way housing mounted therein. Air purifiers occupy as prime factor to clean the air. It promotes our health against allergies, obnoxious odor and snoring. This article discus the need for air purifier and mechanism of working of air purifier.

Keywords: Air purifiers, Humidifiers, HEPA purifier, Air pollution, Filtering media.

I. INTRODUCTION

World Health Organization (WHO) evaluated in 2018 that nearly 7 million people die every year due to inhaling fine particles presented in polluted air. Thereby leading to diseases such as stroke, heart disease, lung

cancer, chronic obstructive pulmonary diseases and respiratory infections, including pneumonia. The WHO estimated that almost 700,000 children die each year due to air pollution. An air purifier is a device which removes contaminants from the air in a room to improve indoor air quality. These devices are commonly marketed as being beneficial to allergy sufferers and asthmatics, and at reducing or eliminating second-hand tobacco smoke. The major air pollutants are vehicular and industrial pollution, which in turn is closely linked to climate change due to global warming. To eliminate the health hazards caused by impure air quality, air purifiers have come into existence. Essentially, an air purifier or air cleaner is a device that removes the contaminants, including tobacco smoke present in the air. They are especially useful for people suffering from allergy and asthma. Rapidly rising pollution levels and increasing airborne diseases are the key factors driving the growth of global air purifier market, which is estimated to grow at a CAGR over 32.4% during the forecast period, 2018-2024.

The very first air-purifying apparatus was developed by Lewis P. Haslett and received its patent in 1848. In the 1850s, John Stenhouse used charcoal filters as an air purifier. Also. this led to the development of gas masks which were used in the London industries as a personal filter to protect workers from toxic gases. In 1940, the US Atomic Energy Commission invented the HEPA filter to clean air contaminated with radioactive particles. After World War II, the HEPA filter was released to the public and is now majorly being used by air purifier companies as a heavy-duty filtration device. First Indoor Air Purifier for Air Purification**.** In 1960s, a German engineer with his brother developed a simple air purifier system. Also, this system comprised of a filter pad and used magnets to attach the air filters. The filter trapped the dust present in the air. Moreover, his purifying system became the first air purifier system used within households. During the use of this system, consumers noticed that the filter system can reduce asthma and allergy symptoms. Commercially graded air purifiers are manufactured as either small stand-alone units or larger units that can be affixed to an air handler unit (AHU) or to an HVAC unit found in the medical, industrial, and commercial industries.

Air purifiers today have developed from an early gas mask to suit the need of early factory worker to the self-standing systems for cleaning the air, as the very air we breathe has become hazardous. One can group the current air purifier technologies into two categories:

A. **Air Purifiers with Filters** (Pre-filters, HEPA Filters, Activated Carbon Filters, Permanent/Washable Filters)
B. **Filter-less Air Purifiers** (Air Ionizers, Electrostatic Precipitator, Ozone Generators, Thermodynamic Sterilization, Ultraviolet Germicidal Irradiation, Ultraviolet Germicidal Irradiation, Photocatalytic Oxidation Cleaners)

II. TYPES OF AIR PURIFIERS

1. Ultraviolet Air Purifiers

Ultraviolet (UV) air purifiers use ultraviolet light to remove potentially harmful viruses, bacteria, and pathogens from your home. The inspiration for UV air purifiers came from hospitals that use special ultraviolet light bulbs to disinfect patient rooms and laboratories. Residential UV air purifiers are small, compact machines that filter the air in your home through a chamber filled with UV light. The UV light destroys pathogens by

breaking molecular bonds in their DNA. Ultraviolet air purifiers can cost as little as Rs.10000 or as much as Rs.65000 depending on the model you purchase.

Fig. 1: Ultraviolet Air Purifiers

2. HEPA Air Purifiers

HEPA air purifiers use an advanced air filter to remove 99.7% of all particles larger than 0.2 microns from the air in your home. That means that HEPA air purifiers are highly effective at removing particles like pollen, dander, mold, and dust from the air. HEPA air purifiers cost between Rs.6000 and Rs.20000 depending on the model that you buy.

Fig. 2: HEPA Air Purifiers

3. Activated Carbon Air Purifiers

Activated carbon air purifiers are effective at removing smoke, odours, fumes, and gasses from the air inside your home. People who are sensitive to odours like smoke or natural gas should consider an activated carbon air purifier. Most activated carbon air purifiers include HEPA filters that remove particles from the air as well. Activated carbon air purifiers are priced Rs 15000 and higher.

Fig.3: Activated Carbon Air Purifier

4. Ionic Air Purifiers

Ionic air purifiers are extremely quiet and operate without a motor. They emit negative ions into the air, which bond with positively charged, airborne particles like dust, making these particles so heavy that they eventually fall out of the air. Some ionic air purifiers have electrostatic precipitators that trap positively charged particles to a metal plate inside the air purifier. The price Rs.6000 to Rs.20000 on the model and size of the air purifier.

Fig.4: Ionic Air Purifier

5. Electronic Air Cleaners

An electronic air cleaner is a whole-home solution that works with your furnace or air conditioner to charge and trap airborne particles using static electricity. Electronic air cleaners can remove up to 99.98% of allergens from the air in your home using HEPA filters and positively charged ions. They purify the air in your entire home by using a HEPA filter in conjunction with your heating at cooling systems. In essence, an electronic air cleaner ensures that the air that passes through your HVAC systems also pass through a HEPA filter that can trap particles as small as .3 microns. Any remaining impurities are then zapped by positively charged ions generated by the electronic air cleaner.

Fig.5: Electronic Air Cleaners

6. Central Air Cleaner

Central air cleaners purify the air in your entire home by connecting to your central heating and cooling systems. Central air cleaners work silently in the ductwork of your home to remove up to 99% of the most and pollen in your home, 98% of the dust in your home and 94% of the viruses in your home. Central air cleaners

can greatly reduce the impact of allergies, asthma and viruses on your health. They also help extend the life of your heater and A/C by filtering out particles that might otherwise interfere with the equipment.

7. Air-To-Air Exchangers

Air-to-air exchangers actually ventilate your home by removing old, stale air and bringing in healthy, fresh air. Air-to-air exchangers can also help you regulate the temperature and humidity of your home using "energy recovery ventilators." For instance, in the winter an air-to air exchanger will trap the heat from the air before ventilating it out of your home. This heat will be used to warm and humidify clean air entering your home in order to maintain an even temperature. In the summer, and air to air exchanger cools and dehumidifies clean air from outside before Channelling it into your home.

Fig.7: Air to Air Exchanger

III. HUMIDIFIER

A humidifier is a device, primarily an electrical appliance, that increases humidity (moisture) in a confined space. In the home, point-of-use humidifiers are commonly used to humidify a single room, while whole-house or furnace humidifiers, which connect to a home's HVAC system, provide humidity to the entire house. Medical ventilators often include humidifiers for increased patient comfort. Large humidifiers are used in commercial, institutional, or industrial contexts, often as part of a larger HVAC system.

Air pollution is the introduction into the atmosphere of chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment.

A substance in the air that can be adverse to humans and the environment is known as an air pollutant. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made. Pollutants can be classified as primary or secondary. Usually, primary pollutants are directly produced from a process, such as ash from a volcanic eruption, the carbon monoxide gas from a motor vehicle exhaust or sulphur dioxide released from factories. Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact.

An important example of a secondary pollutant is ground level ozone – one of the many secondary pollutants that make up photochemical smog. Some pollutants may be both primary and secondary: that is, they are both emitted directly and formed from other primary pollutants. Air pollution can result from both human and

natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity. Sources of air pollution reference the various locations, activities or factors which are responsible for the releasing of pollutants into the atmosphere.

Types of Humidifiers

1. Ultrasonic Humidifier

An ultrasonic humidifier uses high-frequency sound vibrations to produce an extra-fine water mist that is then expelled to add moisture to the room. It's the quieter of the two types of humidifiers. The ultrasonic generally has no filter factored into its design, which saves operation costs.

Fig.1: Ultrasonic Humidifier

2. Cool Mist Humidifier

Cool mist humidifiers emit cool vapor to add moisture to the air. They utilize a filter that captures water impurities and is easy to clean. These humidifiers are ideal for use during warmer weather and in areas that experience a warmer climate.

Fig.2: Cool Mist Humidifier

3. Warm Mist Humidifier

A warm mist humidifier promotes clean vapours in your house and leaves the air smelling clean and fresh. Warm mist humidifiers are popular for promoting higher moisture levels within a room. They also kill germs and bacteria. They work with medicated products like essential oils to make the room smell better.

Fig.3: Warm Mist Humidifier

4. Evaporative Humidifier

The built-in fan draws in air that blows through a moist wick filter at the bottom of the humidifier. As the water evaporates into vapor, it's pushed out as water mist or spray into the air to increase humidity. Evaporative humidifiers have been in use for decades and are considered the most common humidifying appliance. The most basic way to humidify a room is to place a pot or jar of water in the room and allow the moisture to naturally evaporate into the air to relieve dryness. An evaporative humidifier works on basically the same principle, but it uses a fan to speed up the evaporation of water and increase humidity in a room.

Fig.4: Evaporative Humidifier

5. Vaporizer Humidifier

A vaporizer is a better option for people that have indoor allergens because the device heats water to create a mist that usually has fewer contaminants than a humidifier. A *vaporizer* is a type of warm mist *humidifier* that uses boiling water to create hot steam.

Fig.5: Vaporizer Humidifier

Problem Statement:

- As we all know in market the air purifiers and humidifiers are available as separate devices.
- There is no affordable device available in market which have functioning of both the air purifier and humidifier.
- To overcome this problem, We have created a working model which have both the functioning of an Air purifier and humidifier

Objective:

- To eliminate pollutants from inside the living space.
- Humidifier helps in maintaining an optimal level of humidity
- Sanitizing the air which may include pollutants, allergens and toxins
- Though an air purifier cannot helps an existing cold it might ease your symptoms by removing other respiratory irritants from the air.

Basic Principle:

An air purifier is usually equipped with a fan that absorbs air and lets the air pass through a filter media where particles get stuck. Usually there is a pre-filter that captures larger particles. Behind the pre-filter, some air cleaning technology, usually a finer filter, captures smaller sized particles (Figure 1). The air that comes through is clean from harmful particles.

Block Diagram:

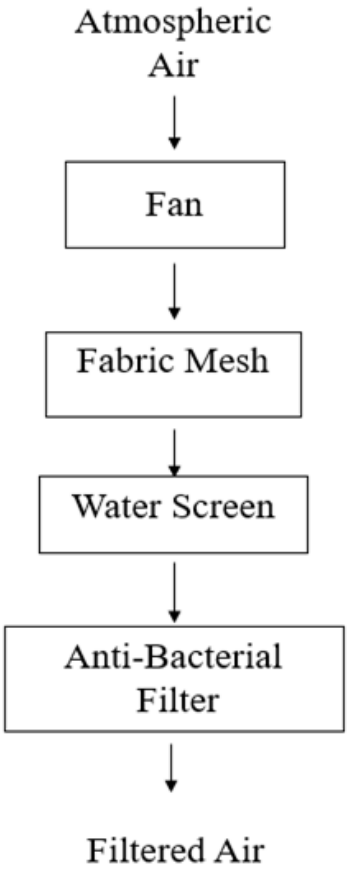

Diagram:

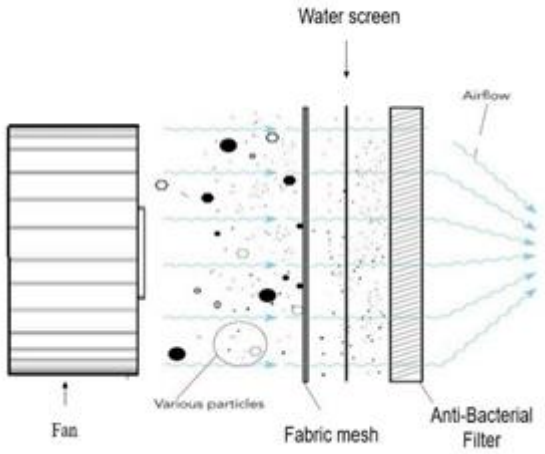

Fig. Schematic Representation of an Air Purifier

Construction and Working:

- The air purifier and humidifier work orbit similarly as normal air purifier available in the market.
- The fan in the machine suck air from the atmosphere and passes through a series of filters which mainly consists of a protective or fabric mesh, water screen used as a filtering media and an anti-bacterial filter
- First the fans suck the atmospheric air and sends it through protective or fabric mesh for filtering out the dust and debris particles from air.
- Then the air passes through water screen which is used as a filtering media as well as it works also as a humidifier. Water traps the fine dust particles and other impurities.
- It is proven that water spray can reduce the PM2.5 pollution in the atmosphere efficiently to 35 μg m-3 level in a very short time.
- Then these filtered and humidified air passes through an anti-bacterial filter for filtering out harmful bacteria. A HEPA (high efficiency particulate air) filter is used to filter out pollen, bacteria, airborne particles, mold, etc up to a size of 3μm.
- Then the clean air is provided to the confined space where the device is used.

IV. APPLICATION

Air Purifier:

- Some major industrial applications for air purifiers include removal of dust, toxic fumes, volatile organic matter, oil mist, and harmful odours to enhance performance of production machines as well as industrial occupants working in high precision environment.
- Air purifiers check levels of bacteria and virus and keep indoor air clean and sanitized for patients as well as general public.
- Relieves Symptoms of Asthma and Harmful Chemicals from Indoor Environments, Neutralizes Unpleasant Odours, Reduces the Chances of Airborne Diseases.

Humidifier:

- Humidifiers can be particularly effective for treating dryness of the skin, nose, throat, and lips.
- Maintaining proper humidity levels is essential in a wide variety of food and beverage industries, especially in cheese aging and the bread proofing process.
- Condor humidifiers and evaporative cooling systems have been helping improve productivity and health in many commercial and industrial applications throughout the World for over 60 years.

V. CONCLUSION

The above purifier is a low cost purifier, there is no expensive filters are used instead of that we used here water as a filter only. It is easy to maintain, it also act as a humidifier and it takes low power consumption.

The outcome of this project is a next generation air purifier with a new filter innovation. The new filter makes it possible to have a smaller housing compared with competitors but still having high performance. This means that it does not take up as much space and is easier for the user to move around from place to place inside the apartment; it is also equipped with a handle. The 360o Air is also easier to fit in more places in a home because its design does not restrict its position as much as competitors. That is, it has been given a round shape and have therefore no defined backside that needs to be placed towards a wall. The uniform round shape allows more varieties of how it can be positioned in a home. The filter is cleanable and does not need to be changed. Air pollution can be prevented only if individuals and businesses stop using toxic substances that cause air pollution in the first place. This would require the cessation of all fossil fuel-burning processes, The Air Purifiers help in eliminating pollutants from the air while generating clean air, essentially protects from chronic respiratory diseases, eliminates infecting mosquitoes to prevent infections and diseases, reduces levels of carbon dioxide in the house, eradicates allergens and even eliminates triggers of Asthma.

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Covid-19 Detection Using Machine Learning and Deep Learning

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ABSTRACT

The current COVID-19 pandemic threatens human life, health, and productivity. AI plays an essential role in COVID-19 case classification as we can apply machine learning models on COVID-19 case data to predict infectious cases and recovery rates using chest x-ray. Accessing patient's private data violates patient privacy and traditional machine learning model requires accessing or transferring whole data to train the model. In recent years, there has been increasing interest in federated machine learning, as it provides an effective solution for data privacy, centralized computation, and high computation power. In this paper, we studied the efficacy of federated learning versus traditional learning by developing two machine learning models (a federated learning model and a traditional machine learning model) using Keras and TensorFlow federated, we used a descriptive dataset and chest x-ray (CXR) images from COVID19 patients. During the model training stage, we will try to identify which factors affect model prediction accuracy and loss like activation function, model optimizer, learning rate, number of rounds, and data Size, we kept recording and plotting the model loss and prediction accuracy per each training round, to identify which factors affect the model performance, and we found that softmax activation function and SGD optimizer give better prediction accuracy and loss, changing the number of rounds and learning rate has slightly effect on model prediction accuracy and prediction loss but increasing the data size did not have any effect on model prediction accuracy and prediction loss. finally, we build a comparison between the proposed models' loss, accuracy, and performance speed, the results demonstrate that the federated machine learning model has a better prediction accuracy and loss but higher performance time than the traditional machine learning model.

Keywords—Chest X-ray, Covid19, Convolutional Neural Network, etc.

I. INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) pandemic continues to have a devastating effect on the health and well-being of the global population, caused by the infection of individuals by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). A critical step in the fight against COVID-19 is effective screening of

infected patients, such that those infected can receive immediate treatment and care, as well as be isolated to mitigate the spread of the virus.

The main screening method used for detecting COVID-19 cases is reverse transcriptase-polymerase chain reaction (RT-PCR) testing, which can detect SARS-CoV-2 ribonucleic acid (RNA) from respiratory specimens (collected through a variety of means such as nasopharyngeal or oropharyngeal swabs). While RT-PCR testing is the gold standard as it is highly specific, it is a very time-consuming, laborious, and complicated manual process that is in short supply.

Furthermore, the sensitivity of RT-PCR testing is highly variable and have not been reported in a clear and consistent manner to date2, and initial findings in China showing relatively poor sensitivity3. Furthermore, subsequent findings showed highly variable positive rate depending on how the specimen was collected as well as decreasing positive rate with time after symptom onset.

II. MOTIVATION

This research focuses on development of a machine learning model for predicting COVID-19 in patients. We also work to identify the features from the clinical information of patients that would influence the predictive result of COVID-19. This study does not focus on outer factors such as weather or any environmental factors that might influence results. The motivation of this research is to conduct an experiment to identify the features that will influence the results of prediction of Corona virus in human beings

III. LITERATURE SURVEY

3.1. A literature review on COVID-19 disease diagnosis from respiratory sound data:-

Dawei Wang et al. in this research has described the epidemiological, demographic, clinical, laboratory, radio-logical and treatment data from Zhongnan Hospital, Wuhan China. The data was analysed and documented to be used to track the infections. The author gives better insights about the radio-logical and treatment data that could be used for our prediction of COVID-19 in our model.

3.2. AI Enabled Preliminary Diagnosis for COVID-19 from Cough Samples via an App:-

According to the results obtained from the Systematic Literature Review (SLR), RQ1 could not be answered thoroughly. In many works, a clear comparison between various machine learning algorithms has been conducted deliberately but the conclusion couldn't be achieved.

3.3. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health – the latest 2019 novel coronavirus outbreak in Wuhan, China

A systematic literature through the guidelines of Claes Wohlin and Barbara Kitchenham, has been conducted to analyze and answer RQ1. This literature review focuses on the understanding of several machine learning algorithms and also identifying appropriate machine learning algorithms that can be used for prediction. There are several steps that we performed in our research, which are:

3.4 Severe acute respiratory syndrome-related coronavirus: the species and its viruses – a statement of the Coronavirus Study Group

The present outbreak of lower respiratory tract infections, including respiratory distress syndrome, is the third spillover, in only two decades, of an animal coronavirus to humans resulting in a major epidemic

3.5 Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China

Recent cluster of pneumonia cases in Wuhan, China, was caused by a novel beta coronavirus, the 2019 novel coronavirus (2019-nCoV). We report the epidemiological, clinical, laboratory, and radiological characteristics and treatment and clinical outcomes of these patients.

IV. ALGORITHMS USED

For this project, various classification algorithms are used:

1. Convolution Neural Network (CNN)
2. Transfer Learning

4.1. Support Vector Machine (SVM):

It is a set of Supervised getting to know methods used for classification, regression and outliers' detection. There are unique styles of SVMs you can use for precise ML troubles like Support Vector Regression (SVR) which is an extension of Support Vector Classification (SVC). In SVM, each information factor is plotted in an n-dimensional space (n is the wide variety of capabilities) with the value of a specific coordinate. The classification is performed via finding hyper plane that differentiates the training pleasant.

The goal of the SVM set of rules is to create the pleasant line or selection boundary that could segregate n-dimension space into instructions in order that we can effortlessly put the brand new information factor in the right category in the destiny. This quality decision boundary called a hyperplane. SVM chooses the acute points/vectors that assist in developing the hyperplane. These excessive cases are referred to as as aid vectors, and as a result set of rules is termed as Support Vector Machine. Consider the below diagram in which there are two special categories which are labeled the use of a choice boundary or hyperplane.

WHY Support Vector Machine (SVM)?

SVM are used in numerous packages like handwriting reputation, face detection classification and plenty of more. This is one of the motives we use SVMs in Machine Learning. It handles both Classification & Regression on linear & non-linear data. It finds extra correct effects when in comparison with other algorithms because of their potential to deal with small and complex datasets.

4.2. k-Nearest Neighbour's (k-NN):

K Nearest Neighbor algorithm falls below the Supervised Learning category and is used for classification (maximum commonly) and regression. It is a flexible algorithm extensively utilized for imputing missing values

and resampling datasets. As the name (K Nearest Neighbor) suggests it considers K Nearest Neighbors (Data factors) to predict the elegance or continuous fee for the new Datapoint.

4.3. DEEP LEARNING ARCHITECTURE

There are primary considerations even as working with the deep getting to know:

- Processing is multilayer non-linear and studying shape may be supervised or unsupervised. The famous architectures used to create deep mastering models are Convolution Neural Network.
- For preferred type problems, Deep Belief Network is extensively used. Convolution Neural Network is one of the most popular deep gaining knowledge of architectures used for classification of image, text and sound. Moreover, Recurrent Neural Network is used while statistics is extra in the shape of Sequential.

4.3.1. Convolution Neural Network (CNN):

Convolution Neural Network (CNN), are deep neural networks used to method information that have a grid-like topology e.g., pictures that may be represented as a 2-D array of pixel. A CNN model includes four important operations:

Convolution: The purpose of convolution is to extract features from the input image. It preserves the spatial relationship between pixels by learning images features using small squares of input data.

Relu: It is an element-wise operation that replaces all negative pixel values in the feature map by zero. Its purpose is to introduce non-linearity in a convolution network.

Pooling: Also called ad down sampling reduces the dimensionality of each feature map but retains important data.

Fully-connected layer: It is multi-layer perception that uses softmax function in the output layer. Its purpose is to use features from previous layers for classifying the input image into various classes based on training data.

V. METHO

VI. DOLOGY

In this section, we present the proposed methodology for classifying an X-ray as being of a healthy patient or a patient affected by COVID-19. First, we describe the datasets of images used in this study. Then, we explain the process of feature extraction, which is based on the transfer learning theory. After that, we present the classification techniques applied and the steps of their training process. Lastly, we define the metrics we use to evaluate the results and to compare it to other approaches. Fig. 1 presents the infographics of the proposed approach; each step is explained in the next subsections.

5.1. Preprocessing:

After collecting the database from the user we need to preprocess that image. For removing low-frequency background noise, normalizing the intensity of the individual particle images we use the preprocessing technique, by using **MATLAB** Firstly, we convert RGB images into grey scale images (rgb to gray converter). This will convert RGB images to high intensity Grey scale images. In this step we can perform noise removal and segmentation operation. The main aim of preprocessing is to reduce unwanted distortion and an improvement in input data (sign language images).

The Image preprocessing technique uses the considerable redundancy in images. Neighboring pixel corresponding to one object in real image has adjusted some or similar brightness value. For preprocessing median filter is used for reduce „salt and pepper" noise in images. By using median filter smoothing, sharpening and edge enhancement operation are performed. The main use of median filter is that it can run through signal entry by entry or it can replace each entry with median of neighboring entries. Each output pixel contains the median value in the 3-by-3 neighborhood around the corresponding pixel in the input image.

$$g(x,y)=\begin{cases}1 \; if \; f(x,y) \geq T \\ 0 \; Otherwise\end{cases}$$

Here g (x, y) represents threshold image pixel at (x, y) and f (x, y) represents grayscale image pixel at (x, y).

5.2. Segmentation:

Training on skin segmentation dataset. We used the pores and skin segmentation dataset from UCI containing approximately 2,00000 points for training the usage of gaining knowledge of algorithms like SVM. The trained models are then used to phase out the non-skin labeled pixels.

5.3. Feature Extraction:

Feature extraction is a set of methods that map input features to new output features. It is a process of dimensionality reduction by which an initial set of raw data is reduced to more manageable groups for processing. A characteristic of these large data sets is a large number of variables that require a lot of computing resources to process. Feature selection is for filtering irrelevant or redundant features from your dataset. Feature extraction describes the relevant shape information contained in a pattern so that the task projected of classifying the pattern is made easy by a formal procedure. In pattern recognition and in image processing, feature extraction is a special form of dimensionality reduction.

5.4. Classification:

It refers to a predictive modeling problem where a class label is predicted for a given example of input data. Classification is a task that requires the use of machine learning algorithms that learn how to assign a class label to examples from the problem domain.

VII. RESULTS

Fig.6.1. Output (Positive)

Fig.6.2. Output (Negative)

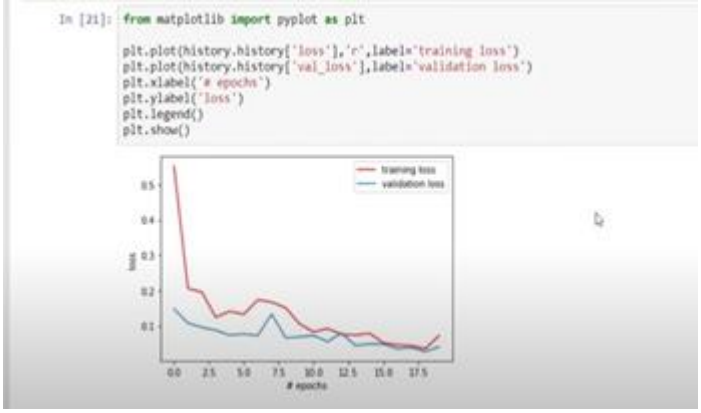

Fig.6.3. 1 Graph Showing Loss Per Epochs (Loss)

Fig.6.4. Graph Showing Loss Per Epochs (Accuracy)

VIII. DISCUSSIONS

The records set divided into two corporations, one used for training and different for trying out. The training set consists of 70% of the aggregate records and remaining 30% are used as checking out. We also perform experiments on equal (30% or 70%) dataset that is training in addition to testing for KNN classifier.

IX. FUTURE WORK

For future work, we intend to increase the size of the dataset by adding new X-ray images of patients with COVID-19, as soon as these images are available, and by adding X-ray exams of other lung-related diseases, thus reassuring the efficiency of the proposed approach. Besides, we aim to test the proposed method using an imbalanced dataset.

X. CONCLUSION

The results showed that the convolutional neural network with minimized convolutional and fully connected layers is capable of detecting COVID-19 imag within the two AUC scores of 96.51 and 96.33%, respectively. In addition, the second proposed architecture, which had the second-lightest architecture, is capable of detecting COVID-19 in three-class, COVID-19/Pneumonia/Normal images, with a macro-averagedF1 score of 94.10%. Therefore, the use of AI-based automated high-accuracy technologies may provide valuable assistance to doctors in diagnosing COVID-19.

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Automatic Hand Sanitizer Using Face Mask Detection With IOT and Machine Learning

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ABSTRACT

Today, the demand for sanitizer is very high because of Covid-19 Pandemic. Everywhere people are using a sanitizer bottle, when one presses the bottle, a large amount of sanitizer is spread-out, which gets wasted and whenever an infected person triggers the sanitizer bottle may be chances of someone else getting the virus from it. This paper discusses how things can be easy with an automatic machine. An automatic hand sanitizer machine is designed in two stages, the first stage is about the face mask detection and the second stage is about the hardware part that is called hand sanitizer machine. The developed machine is automatic, portable and easily operatable that can be used by many people. In this project, both modules- first is face mask detection and second is hand sanitizer are working satisfactory. The machine is correctly detecting whether the person is wearing a mask or not and accordingly dispensing the sanitizer.

Keywords: covid-19, sanitizer, face detection, security check, automation.

I. INTRODUCTION

Today, there is a lot of demand for sanitizer due to Covid-19. Usually, everywhere people are using sanitizer bottles, when one presses the bottle, a large amount of sanitizer is spread-out, which gets wasted and whenever an infected person triggers the sanitizer bottle, there will be chances of someone else getting the virus from it. This paper tells us how easy things can be with an automatic machine. In this machine many different features are present and some of them are as follows:

- Instant sanitization
- Smart sensor Touch free
- Easy to install
- User friendly
- Low power consumption

As we know, in the market this machine is already available, but we are making this machine compact and easy to operate. As we can see, there is a separate machine for face mask detection and the hand sanitizer system present in the market. But we developed a machine by combining the two separate machines. That's why we named it "Automatic Hand Sanitizer Machine with Face Mask Detection System. In appearance, it will be smaller than the rest of the machines, due to which we can fix it easily anywhere and also can be taken anywhere, it means it is portable. There are many different types of application of this Automatic Sanitizer Machine :-

- Hospitals
- Colleges
- Schools
- Airports
- Banks

We can easily install this machine in different places and it is very safe and easily usable.

II. LITERATURE SURVEY

Naveen kumar on Pyton AI[1]: Artificial intelligence (AI) is a technique, which makes machines to mimic the human behavior. Machine learning is an AI technique to train complex models, which can make the system or computer to work independently without human intervention. This paper is a survey on Machine learning approaches in terms of classification, regression, and clustering. The paper concludes with a comparative analysis between different classification techniques based on its applications, advantages, and disadvantages.

Mohammad Marufur Rahman[2]: A new strain which has not previously been identified in humans is novel coronavirus (nCoV). Coronaviruses (CoV) are a wide group of viruses which cause illness that range from colds to deadly infections like Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) [1]. The first infected patient of coronavirus has been found in December 2019. From that period, COVID-19 has become a pandemic all over the world [2]. People all over the world are facing challenging situations due to this pandemic. Every day a large number of people are being infected and died. At the time of writing this paper, almost 16,207,130 infected cases have been confirmed where 648,513 are death [3]. This number is increasing day by day. Fever, dry cough, tiredness, diarrhea, loss of taste, and smell are the major symptoms of coronavirus which is declared by the World Health Organization (WHO) [4]. Many precautionary measures have been taken to fight against coronavirus. Among them cleaning hands, maintaining a safe distance, wearing a mask, refraining from touching eyes, nose, and mouth are the main, where wearing a mask is the simplest one. COVID-19 is a disease that spread from human to human which can be controlled by ensuring proper use of a facial mask. The spread of COVID-19 can be limited if people strictly maintain social distancing and use a facial mask. Very sadly, people are not obeying these rules properly which is speeding the spread of this virus. Detecting the people not obeying the rules and informing the corresponding authorities can be a solution in reducing the spread of coronavirus.

A face mask detection is a technique to find out whether someone is wearing a mask or not. It is similar to detect any object from a scene. Many systems have been introduced for object detection. Deep learning

techniques are highly used in medical applications [5], [6]. Recently, deep learning architectures [7] have shown a remarkable role in object detection. These architectures can be incorporated in detecting the mask on a face. Moreover, a smart city [8] means an urban area that consists of many IoT sensors to collect data. These collected data are then used to perform different operations across the city. This includes monitoring traffic, utilities, water supply network, and many more. Recently, the growth of COVID-19 can be reduced by detecting the facial mask in a smart city network.

Toshanlal Meenpal [3]: This paper aims at designing a system to find out whether a person is using a mask or not and informing the corresponding authority in a smart city network. Firstly, CCTV cameras are used to capture real-time video footage of different public places in the city. From that video footage, facial images are extracted and these images are used to identify the mask on the face. The learning algorithm Convolutional Neural Network (CNN) is used for feature extraction from the images then these features are learned by multiple hidden layers. Whenever the architecture identifies people without face mask this information is transferred through the city network to the corresponding authority to take necessary actions

III. PROPOSED METHODOLOGY

This project is divided into two modules-

A. Face Mask Detection System (Module I):

The first module that we created is mask detection. We all know that before this pandemic, the mask was not essential to all, but now the mask is very essential, without wearing the mask we are not allowed to go anywhere, So for that reason we are introducing this module. In this we are using some tensorflow external libraries, webcam, numpy-imutils , CV2, haar-cascade files and so on, by using this we are writing a code in python for face mask detection. When we run the program we are the getting output i.e. Find who is wearing a mask in a workplace, and who is not wearing a mask.

- **Design a Face Mask Detection System.**

As we can see in both figures 1.1 and 1.2, in the first image that the person is not wearing a mask, and in the second image that the person is wearing a mask and this whole process is detected by this detection system. So that it can be easily detected who wears a mask and who does not wear a mask, which is proven by that figures.

-In Face Mask Detection, we used following algorithm:

Convolutional Neural Network (CNN Algorithm)

CNN Algorithm is a Deep Learning algorithm. It is used for analysing visual imaginary things. CNN's use is relatively low compared to other image classification algorithms.

a. Webcam

It is a video camera that streams an image or video in real time through the internet. Webcam is used for face detection and open-cv python.

b. Import CV2 Package

This CV2 package helps to open the webcam, and also CV2 is used to open the webcam frame, and after opening the webcam frame then it starts to recognize the face.

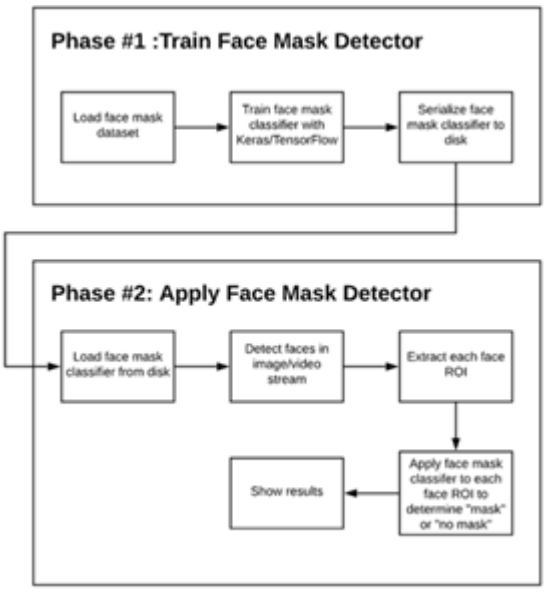

Fig 1.1. Face Mask Detection flow diagram

B. Hand Sanitizer System (Module 2):

The second module of our project is the hand sanitizer machine. In this module, we are designing a touchless machine, which includes hardware based on the Raspberry Pi module.

IV. RESULT

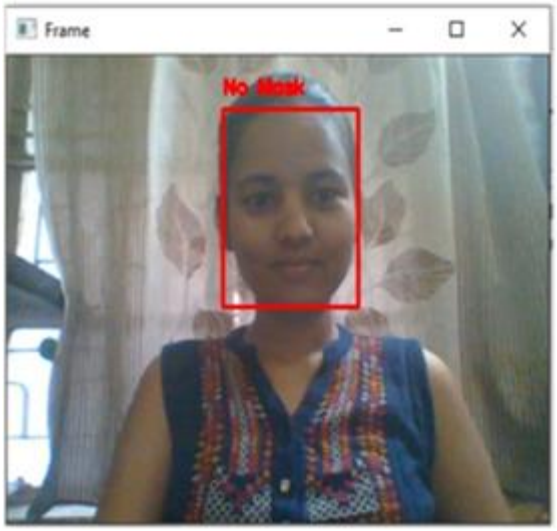

Fig.1.2. Face detected without mask

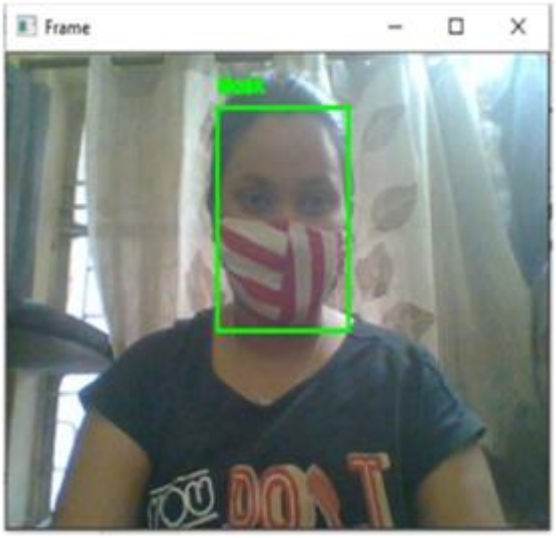

Fig. 3 Face Detected with mask

V. CONCLUSION

In this face mask detection model, the training and development of the image dataset and data divided into two categories of the people having masks and people not having masks have been implemented successfully. So the conclusion of this project is that this machine is developed for the people, so that people can use them well and it reduces the risk of spreading the virus. We can install it in various places and it is also eco-friendly, decreasing waste emissions.

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Unsolicited SMS Recognition : A Web Application

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ABSTRACT

The unsolicited SMS recognition is a big issue in mobile message communication due to which mobile message communication is insecure. In order to tackle this problem, an accurate and precise method is needed to detect the spam in mobile message communication. We proposed the applications of the machine learning-based spam detection method for accurate detection. In this technique, machine learning classifiers such as Logistic regression (LR), K-Nearest Neighbour (K-NN), and decision tree (DT) are used for classification of ham and spam messages in mobile device communication. The SMS spam collection data set is used for testing the method. The dataset is split into two categories for training and testing the research.

Keywords —Natural Language Processing, K- Nearest Neighbour, Machine Learning Techniques, etc.

I. INTRODUCTION

In the developing period of the Internet, individuals are involving increasingly in free online services. Individuals tend to share their data on different sites, though that data imported to different organizations that spam individuals to offer their services. Short Messaging Service (SMS) is mainly used for unofficial communication such as promoting new products and services but at times also used for official communication like information about any bank transaction or the order on an online portal etc. Due to advancements in technology, the costs of sending an SMS have reduced drastically. This has proved to be a boon for some whereas a bane for many. misusing the SMS facility to promote products, services, schemes and so on. How People are annoying this has become can be assessed by the fact that people have started ignoring they receive because annoying this has become can be assessed by the fact that people have started ignoring SMS they receive because 20-30 percent of the total SMS received is spam. In this research study, we proposed a spam detection method using machine learning algorithms such as LR, k-Nearest Neighbour, and decision tree for classification of ham and spam messages. The SMS spam collection dataset was considered for testing of the current research. The dataset was divided into two categories: 30% for testing and 70% for training purpose for the predictive models. The evaluation metrics for performance such as specificity, accuracy, and sensitivity

were considered evaluating the proposed study. The results obtained from experiments confirmed that the proposed research achieved high accuracy. The motive behind this project is to apply machine learning algorithms to separate spam messages from genuine ones. Machine learning techniques along with Natural Language Processing techniques was used to make the process more agile and efficient.

II. MOTIVATION

The main objective of this project is to detect the message whether it is ham or spam by using different Algorithms. By using machine Algorithms like Naïve bayes, Random Forest, AdaBoost with Decision Tree, Support Vector Machine, K-NN we can detect the Accuracy. Spam content is obviously changing with time: spammers try to fool to overcome we need spam filtering algorithms. To modify machine learning algorithm in computer system settings and to leverage modified machine learning algorithm in knowledge analysis software. To test the machine learning algorithm real data from machine learning repository data.

III. LITERATURE SURVEY

SMS spam detection is relatively a brand-new studies region than e-mail, social tags, and twitter and web Spam detection. These researches are in the main carried out after 2011. There are several hooked up e mail spam detection techniques. SMS junk mail detection method has a few demanding situations over e-mail spam detection including limited message length, use of local and shortcut phrases and restricted header records. These challenges want to be solved. There is scope of studies in this discipline and some research works had been conducted on it. There are distinctive categories of SMS junk mail filtering inclusive of white list and black listing, content material based, non-content primarily based, collaborative tactics. The strategies are used in consumer aspect, server side or in both patron and server facet. Several Machine Learning Algorithms such as Naïve Bayes, Support Vector Machine (SVM), Logistic Regression, Decision Trees, K-Nearest Neighbour are used to classify between Spam and valid SMS named as Ham. Discussion about the gadget mastering algorithms, manner and strategies of spam filtering is mentioned inside the following subsections. A. Machine getting to know Algorithm: Bayesian is a probabilistic technique that begins with a prior belief, observes a few records after which updates that belief. The possibility being junk mail and no longer junk mail of a word can be calculated with the frequency of that word in ham and junk mail messages the usage of the Bayesian set of rules. If a set of education example containing unsolicited mail and valid SMS is given, then an SVM education set of rules builds a model that can assign new examples into unsolicited mail and valid category The set of rules consists of the following steps. Pre-processing Removing beside the point contents like forestall words are the part of data pre-processing. Tokenization: Segmenting the message consistent with phrases, characters or symbols called tokens. There are one-of-a-kind tokenization techniques inclusive of word tokenization, sentence tokenization, word or character N-grams and orthogonal sparse bigrams. Representation: Conversion to characteristic price pairs. Selection: Selecting important characteristic values that have effect on classification in preference to deciding on all pairs of attribute cost. Training: Train the set of rules with the chosen characteristic values. Testing: Test the newly arrived statistics with the education model.

IV. ALGORITHM USED

4.1 Naïve Bayes:

NB algorithm is applied to the final extracted features. The speed and simplicity along with high accuracy of this algorithm makes it a desirable classifier for spam detection problems. Applying Naïve Bayes with multinomial event model to the dataset.

Applying gullible Bayes with multinomial occasion model and Laplace smoothing to the dataset and utilizing 10-crease cross approval brings about 1.12% in general blunder, 94.5% of SC, and 0.51% of BH. Utilizing the information priors and applying Bayesian credulous Bayes with same occasion model will diminish SC (93.7%) and BH (0.44%) just barely, however generally speaking blunder will remain something very similar. This is what we would expect, since Bayesian model works on the calculation in the event of high change. Figure 2 shows the expectation to learn and adapt for multinomial NB applied on the last elements removed from dataset. The blunders for various datasets in this plot are created utilizing cross approval with 70% of the examples as the preparation set

Overall Error %	1.12
Accuracy %	98.88
SC [spams caught] %	94.50
BH [Blocked hams] %	0.51

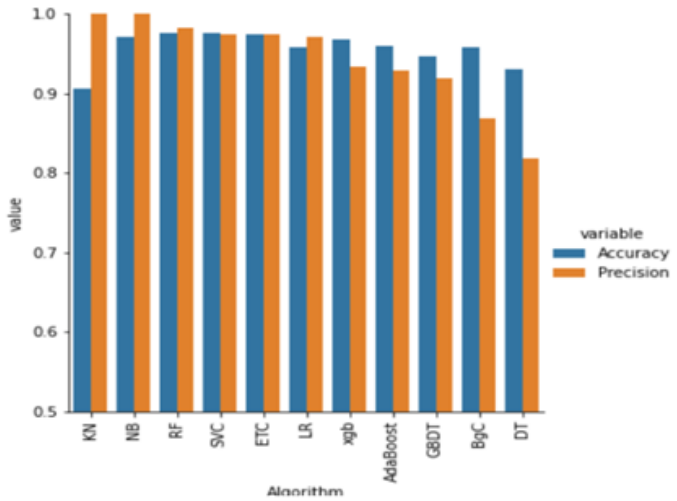

Fig 4.1 Classification of Algorithms

In the above figure graph visualization is about Accuracy and Precision of different Algorithm for Database.

V. METHODOLOGY

Text mining, conjointly spoken as text data processing, kind of corresponding to text analytics, is that the technique of account terrific statistics from textual content. High-fine information is often derived via the

fashioning of styles and tendencies via indicates that like implemented arithmetic sample gaining knowledge of. Text mining every so often entails the technique of structuring the enter text (usually parsing, at the aspect of the addition of a few derived linguistic options and also the removal of others, and sequent insertion right into a database), derivation styles the various based data, and at ultimate evaluation and interpretation of the output. 'High first-rate' in textual content mining every now and then refers to some mixture of connection, novelty, and electricity fulness. Typical text mining tasks include text categorization, text clustering, concept/entity extraction.

- Gathering unstructured information from a couple of statistics resources like undeniable textual content, net pages, pdf documents, emails, and blogs, to name a few.
- Detect and get rid of anomalies from facts through carrying out pre-processing and cleansing operations. Data cleaning permits you to extract and hold the treasured statistics hidden in the facts and to assist discover the roots of particular phrases.
- Convert all the relevant facts extracted from unstructured information into based formats.
- Analyse the styles in the facts through Management Information System (MIS).
- Store all the precious records into a stable database to drive fashion analysis and beautify the selection-making system of the employer into numerous supervised getting to know fashions for education after which ultimately use the trained models for class.

5.1 Block Diagram:

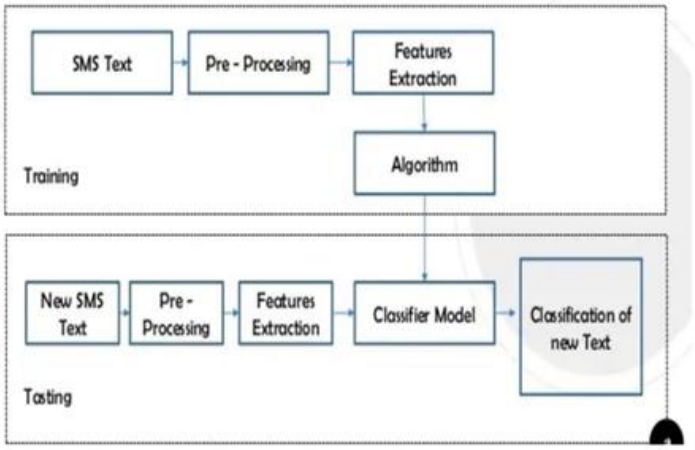

Fig. 5.1. Block Diagram of SMS Spam Detection

In data collection this phase authors have collected a dataset based on which they have performed the Kaggle Repository. In data cleaning phase the authors have cleansed all the data which were taken into consideration. Authors have removed all the white-spaces, lowered the alphabet so that words like equal and equal become the same, remove the remaining punctuation. Generating testing and training data sets to it create the testing and training data on the converted cleansed datasets. In word cloud vector we have to use the TF-IDF vectorization for creating the word vector and Bag of words, which is a way of extracting the features from the set of text messages. Feature is extracted using Unigram and Bigram matrix

5.2 Pre-processing:

In the wake of storing up the information base from the client, we really want to pre-process that photo. For putting off low recurrence verifiable past commotion, normalizing the power of the man or lady molecule pictures we utilize the pre-processing approach, through the use of MATLAB Firstly, we convert RGB photographs into dark scale photos (rgb to dim converter). This will change RGB pix over to unnecessary profundity grayscale pix. In this progression we will do commotion expulsion and division activity. The fundamental point of pre-processing is to diminish bothersome contortion and an improvement in input realities (signal language pictures). The Image pre-processing procedure utilizes the monster overt repetitiveness in pics. Adjoining pixel relating to one thing in genuine picture has changed a couple or comparable brilliance expense.

5.3 Feature Extraction:

Feature extraction is a set of methods that map input features to new output features. It is a system of dimensionality reduction via which an initial set of raw information is reduced to extra achievable agencies for processing. A feature of those large facts units is a huge quantity of variables that require quite a few computing sources to method. Feature selection is for filtering inappropriate or redundant features from your dataset. Feature extraction describes the applicable form records contained in a sample so that the task projected of classifying the pattern is made smooth by using a formal manner. In pattern popularity and in photo processing, function extraction is a unique shape of dimensionality reduction.

5.4 Classification:

It refers to a predictive modelling problem in which a category label is expected for a given example of input data. Classification is a project that requires the use of gadget learning algorithms that discover ways to assign a class label to examples from the problem area.

VI. RESULT

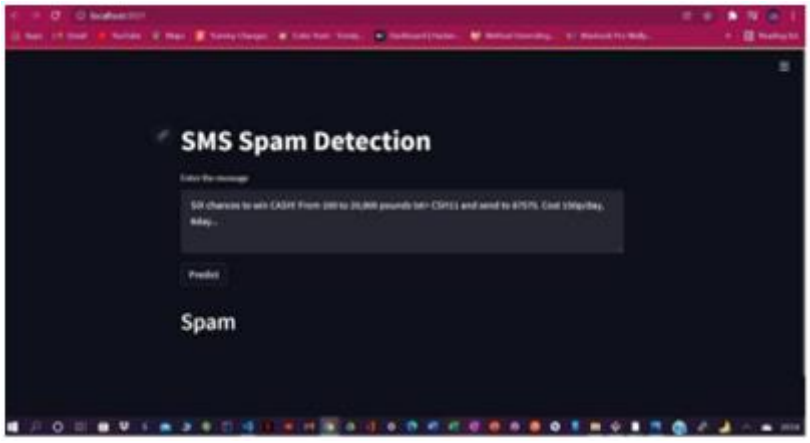

Fig.6.1. Spam Message Detection

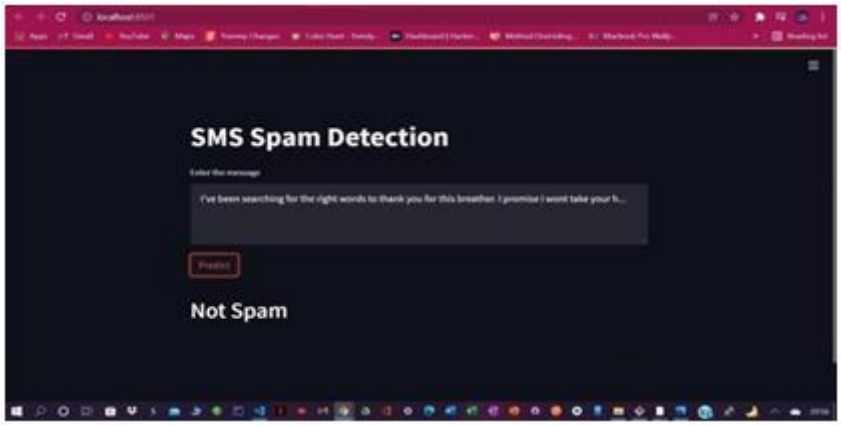

Fig.6.2. Not-Spam [Ham] Message Detection

	num_characters	num_words	num_sentences
count	653.000000	653.000000	653.000000
mean	137.891271	27.667688	2.969372
std	30.137753	7.008418	1.488910
min	13.000000	2.000000	1.000000
25%	132.000000	25.000000	2.000000
50%	149.000000	29.000000	3.000000
75%	157.000000	32.000000	4.000000
max	224.000000	46.000000	9.000000

Fig.6.3. Statistics of Spam Message

	num_characters	num_words	num_sentences
count	4516.000000	4516.000000	4516.000000
mean	70.459256	17.123339	1.815545
std	56.358207	13.491315	1.364098
min	2.000000	1.000000	1.000000
25%	34.000000	8.000000	1.000000
50%	52.000000	13.000000	1.000000
75%	90.000000	22.000000	2.000000
max	910.000000	220.000000	38.000000

Fig.6.3. Statistics of Not-Spam Message

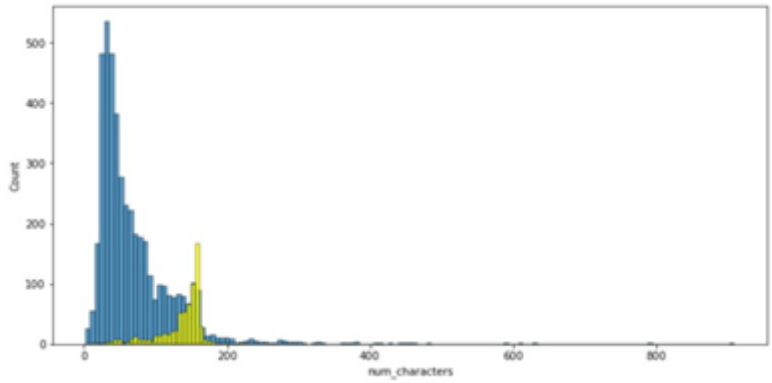

Fig.6.4. Graphical Representation of num-character

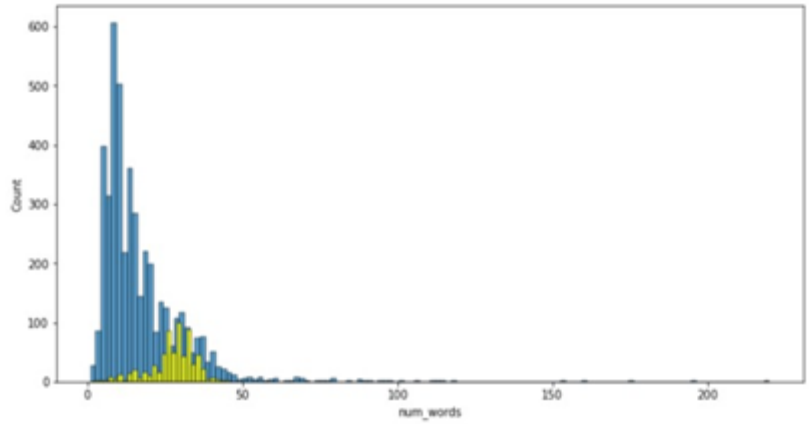

Fig.6.4. Graphical Representation of num-words

VII. FUTURE WORK

The features extraction phase is a critical task in the detection of spam messages since the choice of features can significantly affect the performance of machine learning techniques. Therefore, in most cases, it is a challenging task to discover the most useful features that can efficiently classify SMS spam messages
Hence, features with the best correlation should be selected to improve the detection rate and produce a shorter process time.

VIII. CONCLUSION

A few SMS spam sifting techniques have been examined from the element extraction step to the order.
The examination targets were achieved and the spam SMS were sifted with high precision inside a brief time frame. The outcomes segment showed that the recommended models like Bernoulli Naive Bayes and Light GBM joined with TF-IDF were able for settling the exploration question since they delivered a precision of 96.5% and 95.4% individually. In the underlying stage, Exploratory Analysis was led on the dataset wherein it was laid out that the length include was a contributing component in distinguishing the ham and spam.

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Improving Efficiency of Conveyor Belts in Fly Ash Brick Making Machines

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ABSTRACT

Conveyor belts are widely used for transportation of material from one place to another. In fly ash brick making machines, these are used to transport fly ash as a material from mixer to the die press machine for casting of bricks. Spillage and carry back problems are the common issues seen while transportation of fly ash from mixer to die machine. Generally in the fly ash brick making machines V-shaped conveyor belts are used for transportation of fly ash from mixer to the die machine. In this conveyor there is a lot of inefficient work and lack of productivity in the material handling system. Hence in order to solve this problem and improve the efficiency of the conveyor belt system we will be using the U-shaped conveyor belt. The spillage of material and the material carrying capacity of the U-shaped conveyor belt is increased and hence the efficiency of the belt is also increased.

Keywords: Enhanced productivity, conveyor belts, Fly ash brick making machine.

I. INTRODUCTION

Conveyor belts are used for transportation of fly ash from mixer to die machine. This type of conveyor belts are used in many industries for transportation of material. Due to latest developments in conveyor belts the efficiency of conveyor belts have been improved. In this research paper we are comparing V-shaped and U-shaped conveyor belt and comparing the material carrying capacity for both the conveyor belt. We are making calculations using belts and idlers. This are considered as main contributing components of resistance of belt conveyor system motion where they are responsible for indentation rolling resistance.

II. LITERATURE REVIEW

Conveyor belts are durable and reliable components used in automated distribution system as well as manufacturing system. In combination with computer-controlled pallet handling equipment this allows for

more efficient retail, wholesale and manufacturing distribution. Conveyor belts are basically used as a labour saving system that allows to transport large volume of material with small storage space and less labour expense. Rubber conveyor belts are commonly used to transport the material from one place to another with less labour expense. Belt conveyor are generally fairly similar in construction consisting of a metal frame and a rollers at either end of flat metal bed. The belt is looped around each of the rollers and when one of the roller is powered the belting slides across solid metal frame bed, moving the product. In heavy use applications the beds which the belting is pulled over and replaced with rollers. The rollers allow weight to be conveyed as they reduce the amount of friction generated from the heavier loading on the belting.

Belt conveyor consists of two or more pulleys, with a continuous loop of material. One or both of the pulleys are powered, moving the belt and thus moving the materialforward.The powered pulley is a drive pulley while unpowered is idler. In industry there are two types of bel conveyor one is used for material handling (for transporting Agriculture materials) and the other one is used for transporting bulk material

III. METHODOLOGY

Conveyor belts used in the belt conveyor system are basically wide and are attached in a loop of two rollers which are driven by the motors. The loop which is generated is a actual conveyor belt, and it is generally made up of two or more layers of rubber. One rubber is use to give the shape and structure of the belt and one is use to transport the load. The conveyor loop is attached to two wheels which are called as rotors which are spun by motors. These conveyor belt has enough friction between it and motor that it sticks to the rotor.

Fig 1.1 Idler image for V-shaped conveyor belt

Fly ash brick making machine uses conveyor belts for transportation of fly ash mixture from mixture to the die casting machine. There are different types of conveyor belts used for the purpose of transportation of material. Mostly in industries the V-shaped conveyor is used for transportation of material. But in the material carrying capacity of this conveyor is comparatively less. This belt is having a penetration at one point due to which the life of this conveyor belt is less. As the amount of material carried is less there is omitting of large amount of material.

Fig 1.2 Idler image for U-shaped conveyor belt

For improving the efficiency of the conveyor belt and to reduce the labor work we will be using a U-shaped conveyor belt. This belt carries more material as compared to the V-shaped conveyor belt. The benefit of using this belt is penetration due to material is at two points sue to which the life of conveyor belt is comparatively high. As the amount of material carried is more the amount of material to be omitted is less.

We are calculating the volume of conveyor belt for both U-shaped and V-shaped conveyor belt for different material carrying capacity. Along with that we are also calculating the capacity of material for both the conveyor for different capacities. From this calculations we are deriving that the U-shape conveyor belt is more efficient than V-shaped conveyor belt.

V- shaped conveyor belt :

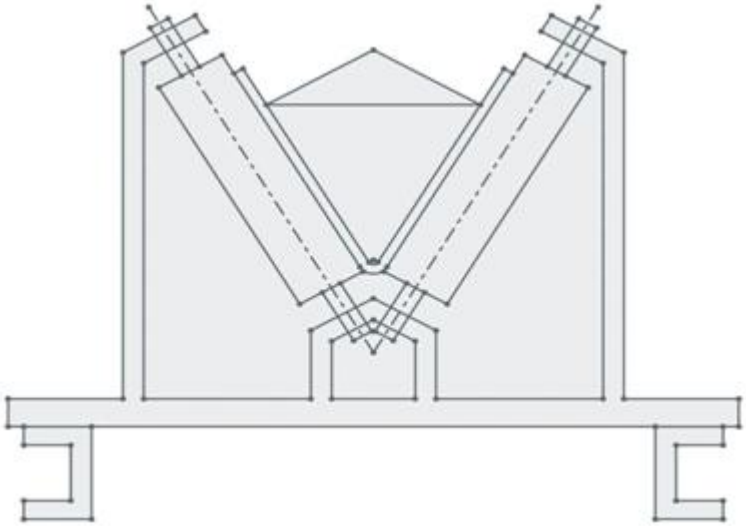

Fig 1.3 V-shaped conveyor belt

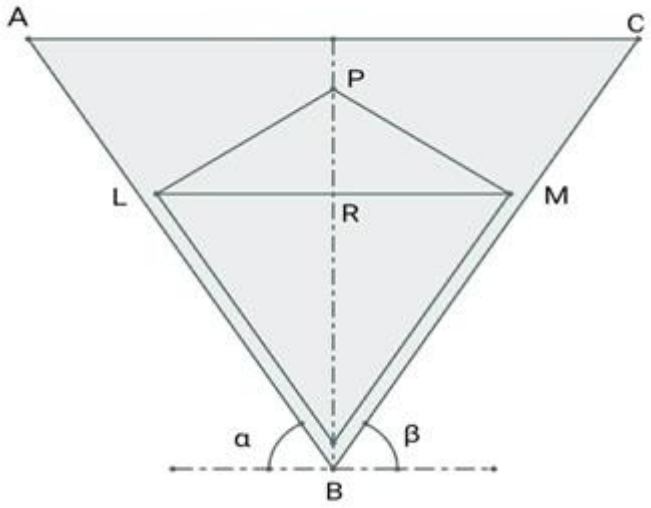

Fig 1.4 V-shaped conveyor belt.

Description :

In figure : 1.4

AB = BC = 20cm = 0.2 m(idler length)

α = β = 60 degree (Angle between idler axis

And horizontal axis)

AC= cm= 0.2 m

LB=BM= 22cm=0.22m (actual width of conveyor belt which carries the material)

L=500cm=5m (length of conveyor belt) W=50cm=0.5m (width of conveyor belt) D=22cm=0.22m (diameter of head & tail pulley) ρ_b= 650 kg/m^3 (bulk density of fly ash)

RPM =1440

From figure: 1.4

To Triangle LRB,

Angle LRB= 30 degree, angle L = 60 & angle LRB =90 degree

Therefore using 30-60-90 theorem

LR:LB:BR similar to x:2x:x√3

Therefore LR = BR/2 =0.22/2

∴ LR = 0.11m

BR=x√3 =0.11 *√3

∴ BR=0.19m

Angle B= 0.22m

Triangle LRB similar Triangle MRB,

∴ l(LR)=l(MR)

∴ l(LB)=l(MB)

∴ LM = LR+RM = 0.11+0.11

∴ LM = 0.22m
From figure , 1.5
In triangle RLP ,
Angle R = 90 degree
∴ using py. Theorem
LP^2 = LR^2+PR^2
LP^2 = (0.11)^2+ (0.02)^2
∴ LP = PM = 0.111m (∴△LPR similar △MRP)
PR = 2 cm = 0.02m (height 0f material above LM) Speed = (S) = π/2 * D * RPM / 60
= π/2 * 0.22 * 1440/60
S = 8.29 m/s

Procedure :
Total area (At) = A1 + A2
= Area of triangle LBM + Area of triangle LPM
= ½ * LM * BR + ½ * LM *PR
At = ½ * LM * (BR + PR) (m^2)
2) Volume (V) = At * L (M^3)
3) Capacity of conveyor belt (Q) = Total area * Speed * density of fly ash
4) Repeat above three step for various capacity by altering l(BR) For 100% :

Calculation table for V-shaped conveyor belt :

Sr no.	Capacity and dimensions	At = A1+A2 (NQ = 0.02m^2)	V = At* L (m^3)	Q = At* S * P (kg/s)
1	100 % BR = 0.19 m LM = 0.22 m	0.023 m^2	0.115 m^2	123.935 kg/s
2	90 % BR = 0.171 m LM = 0.197 m	0.018 m^2	0.094 m^2	96.993 kg/s
3	80 % BR = 0.152 m LM = 0.175 m	0.015 m^2	0.075 m^2	80.827 kg/s

4	70 % BR = 0.133 m LM = 0.153 m	0.011 m^2	0.058 m^3	59.273 kg/s
5	60 % BR = 0.114 m LM = 0.131 m	8.77 * 10^-3 m^2	0.043 m^3	47.294 kg/s
6	50 % BR = 0.095 m LM = 0.109 m	6.267 * 10^-3 m^2	0.031 m^3	33.772 kg/s
7	40 % BR = 0.076 m LM = 0.087 m	4.176 * 10^-3 m^2	0.0208 m^3	22.502 kg/s
8	30 % BR = 0.057 m LM = 0.065 m	2.502 * 10^-3 m^2	0.012 m^3	13.482 kg/s

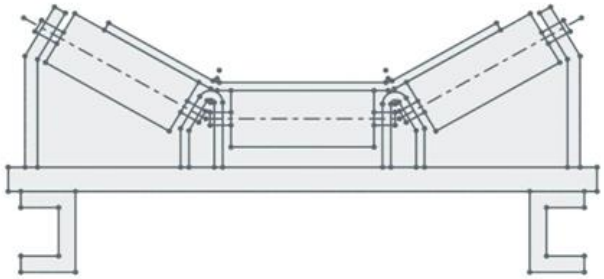

Fig 1.5 U-shaped conveyor belt.

U- shaped conveyor belt

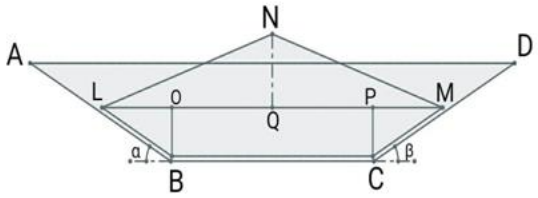

Fig 1.6 U-shaped conveyer belt

Description:

In fig 1.6
AB = BC = CD = 20cm = 0.2m
(Idlers length) α = β = 30 degrees (angle between idlers axis and horizontal axis)
LB = CM (width of conveyor belt on Idlers)
L = 500cm = 5m (Length of conveyor belt)
W = 50cm = 0.5 m (width of conveyor belt)
D = 22cm = 0.22 m (Diameter of head and tail pulley)
P = 650 kg/m^3 (Bulk density of fly ash)
RPM = 1440
NQ = 2cm = 0.02 m (vertical length of material above LM)
W = LB+BC+CM
SO = 2LB+20
LB = 15cm = 0.15m
Actual working LB or CM = LB - Allowance to avoid omitting of
LB = CM = 13cm = 0.13 m
From fig 1.6
In Triangle BOL,
Angle O = 90 degree
Angle LBO = 60 degree Angle BLO = 30 degree l(LB) = 0.13m
Hence, using 30-60-90 degree theorem
OL:LB:Ob = x√3 : 2x: x
LB = 0.13m
OB = LB/2 = 0.13/2 = 0.065 m
OL = OL * √3 = 0.065 * √3 = 0.113m
Triangle BOL = Triangle CPM l(LB) = l(CM) = 0.13m l(BO) = l(CP) = 0.065m
l(OL) = l(PM) = 0.113m
In Rectangle BCPO, l(BC) = l(OP) = 0.2m
LM = LO+OP+PM
= 0.113+0.2+0.113
LM = 0.426 m
Speed(S) = (π)/2 * D * (RPM)/60
= (π)/2 * 0.22 * (1440)/60 = 8.29 m/s

Procedure :

1) Total Area = Area of trapezium LBCM (A1) + Area of triangle LMN (A2)
= (BO/2) * (BC+LM) + (½) * (LM*NQ)
2) Volume = Total Area * L

3) Capacity of Conveyor belt = Total area * Speed * Density of fly ash

= Total area * 8.29 * 650

= Total area * 5388.05 kg/s

4) Repeat sample calculations for different capacity of material.

Calculation table for U-shaped conveyor belt :

Sr no.	Capacity and dimensions	At = A1+A2 (NQ = 0.02m^2)	V = At* L (m^3)	Q = At* S * P (kg/s)
1	100 % BO = 0.065 m LM = 0.426 m	0.025 m^2	0.125 m^2	134.713 kg/s
2	90 % BO = 0.059 m LM = 0.404 m	0.023 m^2	0.115 m^2	123.936 kg/s
3	80 % BO = 0.052 m LM = 0.38 m	0.019 m^2	0.095 m^2	102.382 kg/s
4	70 % BO = 0.046 m LM = 0.36 m	0.016 m^2	0.08 m^3	86.216 kg/s
5	60 % BO = 0.039 m LM = 0.336 m	0.014 m^2	0.07 m^3	75.439 kg/s
6	50 % BO = 0.033 m LM = 0.314 m	0.012 m^2	0.06 m^3	64.662 kg/s
7	40 % BO = 0.026 m LM = 0.29 m	0.009 m^2	0.045 m^3	48.497 kg/s
8	30 % BO = 0.02 m LM = 0.269 m	0.007 m^2	0.037 m^3	39.720 kg/s

IV. CONCLUSION

In the proposed calculation we are calculating material carrying capacity for U-shaped conveyor belt and V-shape conveyor belt. From the above calculations we can seen that the material carrying capacity for the U-shaped conveyor belt is higher than the material carrying capacity for V-shaped conveyor belt. From this we can derive that the efficiency for the U-shaped conveyor belt is greater than V-shaped conveyor belt.

V. ACKNOWLEDGEMENT

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Implementation of Object Detection Technique for Image Processing using Deep Learning

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ABSTRACT

Object detection can be defined as a branch of computer vision which deals with the localization and the identification of an object. Object localization and identification are two different tasks that are put together to achieve this singular goal of object detection. Object Localization deals with specifying the location of an object in an image or a video stream, while Object Identification deals with assigning the object to a specific label, class, or description. With computer vision, developers can flexibly do things like embed surveillance tracking systems for security enhancement, real-time crop prediction, real-time disease identification/ tracking in the human cells, etc. Technique to identify an object considering the deep learning pre-trained model MobileNet for Single Shot Multi-Box Detector (SSD). In order to implement the module, combination of the MobileNet and the SSD framework for a fast and efficient deep learning-based method of object detection. We will use MobileNet SSD v3 version for training a model. We will Implement Using Python as a programming language. This pretrained Deep Learning Module will be load using OpenCV DNN module. We will re-retrain this module using Transfer Learning.

Keywords— Object localization, Object identification, Single shot multibook detector, Mobilenet, Open CV DNN Module, Transfer learning.

I. INTRODUCTION

Imparting intelligence to machines and making robots more and more autonomous and independent has been a sustaining technological dream for the mankind. It is human goal to let the robots take on tedious, boring, or dangerous work so that we can commit our time to more creative tasks. Unfortunately, the intelligent part seems to be still lagging behind. In real life, to achieve this goal, besides hardware development, we need the software that can enable robot the intelligence to do the work and act independently. One of the crucial components regarding this is vision, apart from other types of intelligences such as learning and cognitive thinking. A robot cannot be too intelligent if it cannot see and adapt to a dynamic environment.

The searching or recognition process in real time scenario is very difficult. So far, no effective solution has been found for this problem. Despite a lot of research in this area, the methods developed so far are not efficient, require long training time, are not suitable for real time application, and are not scalable to large number of classes. Object detection is relatively simpler if the machine is looking for detecting one particular object. The motive of object detection is to recognize and locate all known objects in a scene. Preferably in 3D space, recovering pose of objects in 3D is very important for robotic control systems. However, recognizing all the objects inherently requires the skill to differentiate one object from the other, though they may be of same type. Such problem is very difficult for machines, if they do not know about the various possibilities of objects.

The field of computer vision has existed since the late 1960s. Image classification and object detection are some of the oldest problems in the field of computer vision that researchers have tried to solve for many decades.

Using neural networks and deep learning, we have reached a stage wh ere computers can start to actually understand and recognize an object with high accuracy, even surpassing humans in many cases. And to learn about neural networks and deep learning with computer vision, the OpenCV's DNN module provides great platform. Our project focus on Object Detection using Deep Learning Model Architecture.

II. LITERATURE SURVEY

Research Paper Object Detection with Deep Learning: A Review published in 2019 In this paper, we get a review on Deep Learning based object detection frameworks. Review begins with a brief introduction on the history of deep learning and its representative tool, namely Convolutional Neural Network (CNN). Then it focusses on typical generic object detection architectures. One such architecture is SSD (Single Shot MultiBox Detector).

Research Paper SSD: Single Shot MultiBox Detector Published in 2016 talk about a method for detecting objects in images using a single deep neural network. This approach, named SSD, discretizes the output space of bounding boxes into a set of default boxes over different aspect ratios and scales per feature map location. In the original paper, Wei Liu and team used VGG-16 network as the base to extract feature maps. This algorithm is used for real-time detection, and for webcam feed to detect the purpose webcam which detects the object in a video stream.

Research Paper MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications published in 2017, in this they present a class of efficient models called MobileNets for mobile and embedded vision applications. MobileNet is a light-weight deep neural network architecture that uses depth wise separable convolutions to build light weight deep neural networks.

Research Paper Real-Time Object Detection Using Pre-Trained Deep Learning Models MobileNet- SSD, published in 2020 In this paper, it talks about a technique to identify an object considering the deep learning pre-trained model MobileNet for Single Shot Multi-Box Detector (SSD). In order to implement the module, we combine the MobileNet and the SSD framework for a fast and efficient deep learning-based method of object detection also briefly discussed. Method used in this paper are deep pose, VGG Neural Network, Alexnet, Resnet. This paper reviewed the progress made in pose estimations for human beings with selected and most notable researches made to our knowledge. It also presents a review of most outstanding and influential models

in human pose estimation progress. The main purpose of this research is to elaborate the accuracy of an object detection method SSD and the importance of pre-trained deep learning model MobileNet To further tackle the practical limitations of running high resource and power-consuming neural networks on low-end devices in real-time applications. Research Paper A Survey on Deep Transfer Learning published in 2018 talks about difficulty to construct a large-scale well-annotated dataset due to the expense of data acquisition and costly annotation, which limits development of model. Transfer learning relaxes the hypothesis that the training data must be independent and identically distributed with the test data, which motivates us to use transfer learning to solve the problem of insufficient training data. This paper focuses on reviewing the current researches of transfer learning by using deep neural network and its applications.

III. METHODOLOGY

OBJECT DETECTION

Object Detection is the process of finding and recognizing real-world object instances such as car, bike, TV, flowers, and humans out of an images or videos. An object detection technique lets you understand the details of an image or a video as it allows for the recognition, localization, and detection of multiple objects within an image. It is usually utilized in applications like image retrieval, security, surveillance, and advanced driver assistance systems (ADAS). Object Detection is done through many ways: Feature Based Object Detection, Viola Jones Object Detection, SVM Classifications with HOG Features, Deep Learning Object Detection. Object detection from a video in video surveillance applications is the major task these days. Object detection technique is used to identify required objects in video sequences and to cluster pixels of these objects. The detection of an object in video sequence plays a major role in several applications specifically as video surveillance applications. Object detection in a video stream can be done by processes like pre-processing, segmentation, foreground and background extraction, feature extraction. Humans can easily detect and identify objects present in an image. The human visual system is fast and accurate and can perform complex tasks like identifying multiple objects with little conscious thought. With the availability of large amounts of data, faster GPUs, and better algorithms, we can now easily train computers to detect and classify multiple objects within an image with high accuracy.

RELATED TECHNOLOGY:

SINGLE SHOT MULTI BOX DETECTOR

SSD discretizes the output space of bounding boxes into a set of default boxes over different aspect ratios and scales per feature map location. At the time of prediction, the network generates scores for the presence of each object category in each default box and generates adjustments to the box to better match the object shape. Additionally, the network combines predictions from multiple feature maps with different resolutions to naturally handle objects of various sizes evaluation. Since the full detection pipeline is a single network, it can be optimized end-to-end directly on detection performance.

VGG

VGG network is another convolution neural network architecture used for image classification.

MOBILENETS

To build lightweight deep neural networks MobileNets are used. It is based on a streamlined architecture that uses depth-wise separable convolutions. MobileNet uses 3×3 depth-wise separable convolutions that uses between 8 times less computation than standard convolution at solely a little reduction accuracy. Applications and use cases including object detection, fine grain classification, face attributes and large scale-localization.

TENSOR FLOW

Tensor flow is an open-source software library for high performance numerical computation. It allows simple deployment of computation across a range of platforms (CPUs, GPUs, TPUs) due to its versatile design also from desktops to clusters of servers to mobile and edge devices. Tensor flow was designed and developed by researchers and engineers from the Google Brain team at intervals Google's AI organization, it comes with robust support for machine learning and deep learning and the versatile numerical computation core is used across several alternative scientific domains.

To construct, train and deploy Object Detection Models TensorFlow is used that makes it easy and also it provides a collection of Detection Models pre-trained on the COCO dataset, the Kitti dataset, and the Open Images dataset. One among the numerous Detection Models is that the combination of Single Shot Detector (SSDs) and Mobile Nets architecture that is quick, efficient and doesn't need huge computational capability to accomplish the object Detection.

OBJECT DETECTION WORKFLOW AND FEATURE EXTRACTION

Every Object Detection Algorithm works on the same principle and it's just the working that differs from others. They focus on extracting features from the images that are given as the input at hands and then it uses these features to determine the class of the image.

DEEP LEARNING

Deep learning is a machine learning technique. It teaches a computer to filter inputs through layers to learn how to predict and classify information. Observations can be in the form of images, text, or sound. The inspiration for deep learning is the way that the human brain filters information. Its purpose is to mimic how the human brain works to create some real magic. In the human brain, there are about 100 billion neurons. Each neuron connects to about 100,000 of its neighbors. We're kind of recreating that, but in a way and at a level that works for machines. In our brains, a neuron has a body, dendrites, and an axon. The signal from one neuron travels down the axon and transfers to the dendrites of the next neuron. That connection where the signal passes is called a synapse. Neurons by themselves are kind of useless. But when you have lots of them, they work together to create some serious magic. That's the idea behind a deep learning algorithm! You get input from observation and you put your input into one layer. That layer creates an output which in turn becomes the input for the next layer, and so on. This happens over and over until your final output signal! The

neuron (node) gets a signal or signals (input values), which pass through the neuron. That neuron delivers the output signal.

Think of the input layer as your senses: the things you see, smell, and feel, for example. These are independent variables for one single observation. This information is broken down into numbers and the bits of binary data that a computer can use. You'll need to either standardize or normalize these variables so that they're within the same range. They use many layers of nonlinear processing units for feature extraction and transformation. Each successive layer uses the output of the previous layer for its input. What they learn forms a hierarchy of concepts. In this hierarchy, each level learns to transform its input data into a more and more abstract and composite representation. That means that for an image, for example, the input might be a matrix of pixels. The first layer might encode the edges and compose the pixels. The next layer might compose an arrangement of edges. The next layer might encode a nose and eyes. The next layer might recognize that the image contains a face, and so on.

CONVOLUTIONAL NEURAL NETWORK

INTRODUCTION TO CONVOLUTIONAL NEURAL NETWORKS (CNN)

ARTIFICIAL NEURAL NETWORKS

The idea of ANNs is based on the belief that working of human brain by making the right connections, can be imitated using silicon and wires as living neurons and dendrites.

The human brain is composed of 86 billion nerve cells called neurons. They are connected to other thousand cells by Axons. Stimuli from external environment or inputs from sensory organs are accepted by dendrites. These inputs create electric impulses, which quickly travel through the neural network. A neuron can then send the message to other neuron to handle the issue or does not send it forward.

ANNs are composed of multiple nodes, which imitate biological neurons of human brain. The neurons are connected by links and they interact with each other. The nodes can take input data and perform simple operations on the data. The result of these operations is passed to other neurons. The output at each node is called its activation or node value. Each link is associated with weight. ANNs are capable of learning, which takes place by altering weight values.

NEURAL NETWORK:

A neural network is a network or circuit of neurons, or in a modern sense, an artificial neural network, composed of artificial neurons or nodes. Thus, a neural network is either a biological neural network, made up of real biological neurons, or an artificial neural network, for solving artificial intelligence (AI) problem. The connections of the biological neuron are modelled as weights. A positive weight reflects an excitatory connection, while negative values mean inhibitory connections. All inputs are modified by a weight and summed. This activity is referred as a linear combination. Finally, an activation function controls the amplitude of the output. For example, an acceptable range of output is usually between 0 and 1, or it could be - 1 and 1.

These artificial networks may be used for predictive modelling, adaptive control and applications where they can be trained via a dataset. Self-learning resulting from experience can occur within networks, which can derive conclusions from a complex and seemingly unrelated set of information

A deep neural network (DNN) is an artificial neural network (ANN) with multiple layers between the input and output layers. The DNN finds the correct mathematical manipulation to turn the input into the output, whether it be a linear relationship or a non-linear relationship.

OVERALL ARCHITECTURE:

CNNs are comprised of three types of layers. These are convolutional layers, pooling layers and fully-connected layers. When these layers are stacked, a CNN architecture has been formed. A simple CNN architecture, comprised of just five layers The basic functionality of the example CNN above can be broken down into four key areas. 1. As found in other forms of ANN, the input layer will hold the pixel values of the image. 2. The convolutional layer will determine the output of neurons of which are connected to local regions of the input through the calculation of the scalar product between their weights and the region connected to the input volume. The rectified linear unit (commonly shortened to ReLU) aims to apply an 'elementwise' activation function such as sigmoid to the output of the activation produced by the previous layer. 3. The pooling layer will then simply perform down sampling along the spatial dimensionality of the given input, further reducing the number of parameters within that activation. 4. The fully-connected layers will then perform the same duties found in standard ANNs and attempt to produce class scores from the activations, to be used for classification.

CONVOLUTIONAL LAYERS:

The convolutional layers serve as feature extractors, and thus they learn the feature representations of their input images. The neurons in the convolutional layers are arranged into feature maps. Each neuron in a feature map has a receptive field, which is connected to a neighborhood of neurons in the previous layer via a set of trainable weights, sometimes referred to as a filter bank. Inputs are convolved with the learned weights in order to compute a new feature map, and the convolved results are sent through a nonlinear activation function. All neurons within a feature map have weights that are constrained to be equal; however, different feature maps within the same convolutional layer have different weights so that several features can be extracted at each location.

As the name implies, the convolutional layer plays a vital role in how CNNs operate. The layers parameters focus around the use of learnable kernels.

These kernels are usually small in spatial dimensionality, but spreads along the entirety of the depth of the input. When the data hits a convolutional layer, the layer convolves each filter across the spatial dimensionality of the input to produce a 2D activation map. These activation maps can be visualized.

As we glide through the input, the scalar product is calculated for each value in that kernel. From this the network will learn kernels that 'fire' when they see a specific feature at a given spatial position of the input. These are commonly known as activations. Visual representation of a convolutional layer is shown in the below figure.

The center element of the kernel is placed over the input vector, of which is then calculated and replaced with a weighted sum of itself and any nearby pixels.

Every kernel will have a corresponding activation map, of which will be stacked along the depth dimension to form the full output volume from the convolutional layer. As we alluded to earlier, training ANNs on inputs such as images results in models of which are too big to train effectively. This comes down to the fully connected manner of stan are ANN neurons, so, to mitigate against this every neuron in a convolutional layer is only connected to small region of the input volume. The dimensionality of this region is commonly referred to as the receptive field size of the neuron. The magnitude of the connectivity through the depth is nearly always equal to the depth of the input. For example, if the input to the network is an image of size $64 \times 64 \times 3$ (aRGBcoloured image with a dimensionality of 64×64) and we set the receptive field size as 6×6, we would have a total of 108 weights on each neuron within the convolutional layer. ($6 \times 6 \times 3$ where 3 is the magnitude of connectivity across the depth of the volume) To put this into perspective, a standard neuron seen in other forms of ANN would contain 12, 288 weights each. Convolutional layers are also able to significantly reduce the complexity of the model through the optimization of its output. These are optimized through three hyperparameters, the depth, the stride and setting zero-padding. The depth of the output volume produced by the convolutional layers can be manually set through the number of neurons within the layer to the same region of the input. This can be seen with other forms of ANNs, where the all of the neurons in the hidden layer are directly connected to every single neuron beforehand. Reducing this hyperparameter can significantly minimize the total number of neurons of the network, but it can also significantly reduce the capabilities of the model. pattern recognition capabilities of the model.

We are also able to define the stride in which we set the depth around the spatial dimensionality of the input in order to place the receptive field. For example, if we were to set a stride as 1, then we would have a heavily overlapped receptive field producing extremely large activations. Alternatively, setting the stride to a greater number will reduce the amount of overlapping and produce an output of lower spatial dimensions.

Zero-padding is the simple process of padding the border of the input, and is an effective method to give further control as to the dimensionality of the output volumes.

It is important to understand that through using these techniques, we will alter the spatial dimensionality of the convolutional layers output.

Despite our best efforts so far, we will still find that our models are still enormous if we use an image input of any real dimensionality. However, methods have been developed as to greatly curtail the overall number of parameters within the convolutional layer.

Parameter sharing works on the assumption that if one region feature is useful to compute at a set spatial region, then it is likely to be useful in another region. If we constrain each individual activation map within the output volume to the same weights and bias, then we will see a massive reduction in the number of parameters being produced by the convolutional layer.

As a result of this as the backpropagation stage occurs, each neuron in the output will represent the overall gradient of which can be totaled across the depth - thus only updating a single set of weights, as opposed to every single one.

POOLING LAYERS

The purpose of the pooling layers is to reduce the spatial resolution of the feature maps and thus achieve spatial invariance to input distortions and translations. Initially, it was common practice to use average pooling aggregation layers to propagate the average of all the input values, of a small neighborhood of an image to the next layer. However, in more recent models, max pooling aggregation layers propagate the maximum value within a receptive field to the next layer.

Pooling layers aim to gradually reduce the dimensionality of the representation, and thus further reduce the number of parameters and the computational complexity of the model.

The pooling layer operates over each activation map in the input, and scales its dimensionality using the "MAX" function. In most CNNs, these come in the form of max-pooling layers with kernels of a dimensionality of 2×2 applied with a stride of 2 along the spatial dimensions of the input. This scales the activation map down to 25% of the original size - whilst maintaining the depth volume to its standard size.

Due to the destructive nature of the pooling layer, there are only two generally observed methods of max-pooling. Usually, the stride and filters of the pooling layers are both set to 2×2, which will allow the layer to extend through the entirety of the spatial dimensionality of the input. Furthermore, overlapping pooling may be utilized, where the stride is set to 2 with a kernel size set to 3. Due to the destructive nature of pooling, having a kernel size above 3 will usually greatly decrease the performance of the model.

It is also important to understand that beyond max-pooling, CNN architectures may contain general- pooling. General pooling layers are comprised of pooling neurons that are able to perform a multitude of common operations including L1/L2-normalisation, and average pooling. However, this tutorial will primarily focus on the use of max-pooling. Fully Connected Layers

Several convolutional and pooling layers are usually stacked on top of each other to extract more abstract feature representations in moving through the network. The fully connected layers that follow these layers interpret these feature representations and perform the function of high-level reasoning. For classification problems, it is standard to use the softmax operator on top of a DCNN. While early success was enjoyed by using radial basis functions (RBFs), as the classifier on top of the convolutional towers found that replacing the softmax operator with a support vector machine (SVM) leads to improved classification accuracy.

The fully-connected layer contains neurons of which are directly connected to the neurons in the two adjacent layers, without being connected to any layers within them. This is analogous to way that neurons are arranged in traditional forms of ANN.

Despite the relatively small number of layers required to form a CNN, there is no set way of formulating a CNN architecture. That being said, it would be idiotic to simply throw a few of layers together and expect it to work. Through reading of related literature, it is obvious that much like other forms of ANNs, CNNs tend to follow a common architecture, where convolutional layers are stacked, followed by pooling layers in a repeated manner before feeding forward to fully-connected layers. Convolutional Neural Networks differ to other forms of Artificial Neural Network in that instead of focusing on the entirety of the problem domain, knowledge about the specific type of input is exploited. This in turn allows for a much simpler network architecture to be set up.

This paper has outlined the basic concepts of Convolutional Neural Networks, explaining the layers required to build one and detailing how best to structure the network in most image analysis tasks.

Research in the field of image analysis using neural networks has somewhat slowed in recent times. This is partly due to the incorrect belief surrounding the level of complexity and knowledge required to begin modelling these superbly powerful machine learning algorithms. The authors hope that this paper has in some way reduced this confusion, and made the field more accessible to beginners.

TRAINING:

CNNs and ANN in general use learning algorithms to adjust their free parameters in order to attain the desired network output. The most common algorithm used for this purpose is backpropagation. Backpropagation computes the gradient of an objective function to determine how to adjust a network's parameters in order to minimize errors that affect performance. A commonly experienced problem with training CNNs, and in particular DCNNs, is overfitting, which is poor performance on a held-out test set after the network is trained on a small or even large training set. This affects the model's ability to generalize on unseen data and is a major challenge for DCNNs that can be assuaged by regularization

MOBILENET SSD ARCHITECTURE AND IMPLEMENTATION

THE SINGLE SHOT DETECTOR (SSD)

This section describes our proposed SSD framework for detection model details.

SSD FRAMEWORK. (a) SSD only needs an input image and ground truth boxes for each object during training. In a convolutional fashion, we evaluate a small set of default boxes of different aspect ratios at each location in several feature maps with different scales (e.g. (b) and (c)). For each default box, we predict both the shape offsets and the confidences for all object categories ((c1; c2;---- ; cp)). At training time, we first match these default boxes to the ground truth boxes. For example, we have matched two default boxes with the cat and one with the dog, which are treated as positives and the rest as negatives. The model loss is a weighted sum between localization loss.

SSD MODEL

The SSD approach is based on a feed-forward convolutional network that produces a fixed-size collection of bounding boxes and scores for the presence of object class instances in those boxes, followed by a non-maximum suppression step to produce the final detections. The early network layers are based on a standard architecture used for high quality image classification (truncated before any classification layers), which we will call the base network2. We then add auxiliary structure to the network to produce detections with the following key features:

MULTI-SCALE FEATURE MAPS FOR DETECTION.

We add convolutional feature layers to the end of the truncated base network. These layers decrease in size progressively and allow predictions of detections at multiple scales. The convolutional model for predicting detections is different for each feature layer (cf Overfeat[4] and YOLO[5] that operate a single scale feature map).

CONVOLUTIONAL PREDICTORS FOR DETECTION

Each added feature layer (or optionally an existing feature layer from the base network) can produce a fixed set of detection predictions using a set of convolutional filters. These are indicated on top of the SSD network

architecture. For a feature layer of size m * n with p channels, the basic element for predicting parameters of a potential detection is a 3 * 3 _*p small kernel that produces either a score for a category, or a shape offset relative to the default box coordinates. At each of the m *n locations where the kernel is applied, it produces an output value. The bounding box offset output values are measured relative to a default We use the VGG-16 network as a base, but other networks should also produce good results. box position relative to each feature map location (cf the architecture of YOLO[5] that uses an intermediate fully connected layer instead of a convolutional filter for this step). Default boxes and aspect ratios We associate a set of default bounding boxes with each feature map cell, for multiple feature maps at the top of the network. The default boxes tile the feature map in a convolutional manner, so that the position of each box relative to its corresponding cell is fixed. At each feature map cell, we predict the offsets relative to the default box shapes in the cell, as well as the per-class scores that indicate the presence of a class instance in each of those boxes.

MobileNet Architecture

In this section we first describe the core layers that MobileNet is built on which are depth wise separable filters. We then describe the MobileNet network structure and conclude with descriptions of the two-model shrinking hyperparameters width multiplier and resolution multiplier. Depth wise Separable Convolution. The MobileNet model is based on depth wise separable convolutions which is a form of factorized convolutions. which factorize a standard convolution into a depth wise convolution and a 1*1 convolution called a pointwise convolution.

MOBILENET SSD ARCHITECTURE:

In this section, feature extractor and detector of the proposed object detection model are described. For feature extraction we use MobileNet and SSD as a detector. We have used this architecture for our project.

INPUT TO MODEL

The model input is a blob that consists of a single image of 1x3x300x300 in RGB order. The model output is a typical vector containing the tracked object data.

Image, name - image tensor, shape - 1, 300, 300, 3, format is B,H,W,C where:

- B - batch siz
- H – height
- W - width
- C - channel

Channel order is BGR.

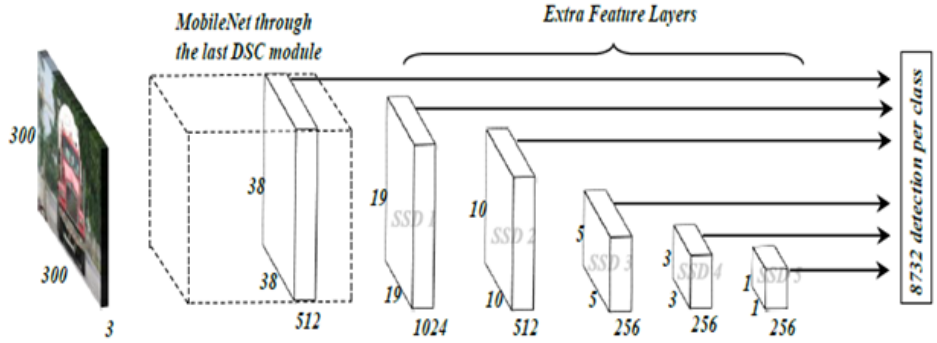


Fig: MobileNetSSD Architecture

OUTPUT OF MODEL

The array of summary detection information, name - detection out, shape - 1, 1, N, 7, where N is the number of detected bounding boxes. For each detection, the description has the format: [image_id, label, conf, x_min, y_min, x_max, y_max], where:

- image_id - ID of the image in the batch
- label - predicted class ID in range [1, 91], mapping to class names provided in Label file
- conf - confidence for the predicted class
- (x_min, y_min) - coordinates of the top left bounding box corner (coordinates are in normalized format, in range [0, 1])
- (x_max, y_max) - coordinates of the bottom right bounding box corner (coordinates are in normalized format, in range [0, 1])

General Workflow followed in this project as a Deep Learning Mode for Object Detection.

IV. DEVELOPMENT PHASE

In this section, data gathering and pre-processing and model proposing, training, and evaluation are covered.

Data Gathering

This Model is pre trained on MS COCO dataset, MS COCO dataset is a large dataset having train 118K, val 5K, test-dev 20K, test-challenge 20K containing 172 classes. Here we will use transfer learning technique to re-train this model and replaces the last layer, which has the classes/objects from the trained model, with our own classes/objects. By doing that, we can use all the feature detectors trained in that model to detect our new classes/objects. Data has been gathered using two major processes. First, it can be gathered from available large-scale datasets, such as ImageNet and the Open Source Image Dataset.

Prepared Data for training.

The dataset was split to train, validate, and test datasets. It was ensured that 20% of the initial dataset devotes to test dataset, while 80% of it secured for training and validation. Within the training and validation chuck, 20% of the data devoted to validation and 80% to training. We have collected total 22,750 images out of which 14,560 as train image, 3,640 as val image and 4,550 as test image. Now it's time for the labelling our dataset. We will use a software called LabelImg for labelling our dataset.

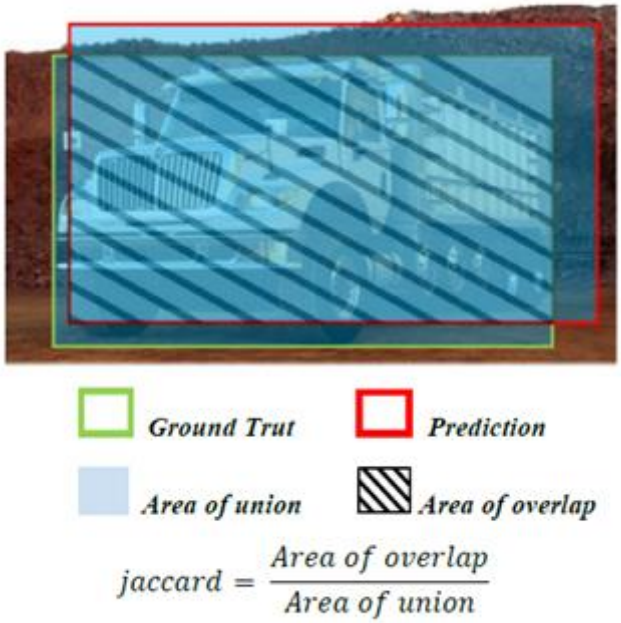
Model Training :

In this phase we will train this model using Transfer Learning technique. The training process has been carried out by using a high-performance GPU NVIDIA GeForce GTX 2080Ti 11GB and 8 Core i7-10870HE 2.3GHz - 5 GHz 16 M Cache Intel CPU. TensorFlow-GPU 2.0 and CUDA 10 was used for the training. Transfer learning was used to speed up and enhance the training process. So, the weights were initialized from MobileNet pretrained weights value.

Evaluation :

The PASCAL VOC challenge evaluation metric is used to evaluate the localization and classification performance of the detector. The output of the detector model for each image is a set of bounding boxes and their associated confidence score indicating the probability of belonging to a certain class. Classification is evaluated by identifying weather the predicted class is identical with the ground truth class while localization is measured by using the jaccard overlap. Based on the PASCAL VOC metrics, any detection with jaccard overlap ≥ 50% and identical prediction label with ground truth, is considered as a correct detection.

The Precision and Recall are the main building blocks of this evaluation and can be expressed as Illustration of Jaccard overlap calculation.



Precision=TP/(TP+FP) **,** ***Recall=TP/(TP+FN)***

where TP,FP,FN are true positive, false positive, false negative.

Intuitively, Precision measures how accurate the detection is, while Recall measures how complete the detection is; So, the ideal detector is the one which has the highest accuracy (Precision=1) and completeness (Recall=1). The value of *FP*, *FN* and *TP* can be changed by setting different threshold values for confidence score. Consequently, it is important to evaluate Precision and Recall at different thresholds to measure the overall performance of the detector model for each category. Interpolated Average Precision (AP) could be defined as the average of maximum precision at different recalls and can be defined as:

$$AP = \frac{1}{11} \sum_{r \in \{0.0,\ldots,1.0\}} \max_{\tilde{r} \geq r} p(\tilde{r})$$

where $p(r)$ is Precision at the Recall r. By using the test dataset, AP was calculated for each category, the value of AP for each category is given in the table below. The Mean Average Precision (mAP) of the model is 67.62.

During the development of the project certain pre-trained libraries were employed that make it easier in developing the models. The prominent libraries are mentioned below:

- Open CV

Open Source Computer Vision Library commonly known as OpenCV is a collection of programming functions which is prominently used for Real time Computer Vision. As the name states, it is commonly used for capturing video's or images live. It includes several interfaces like MatLab, Python, Java and C++. It can be implemented on various Operating systems like Linux, MACOS, Windows, and android. The library widely

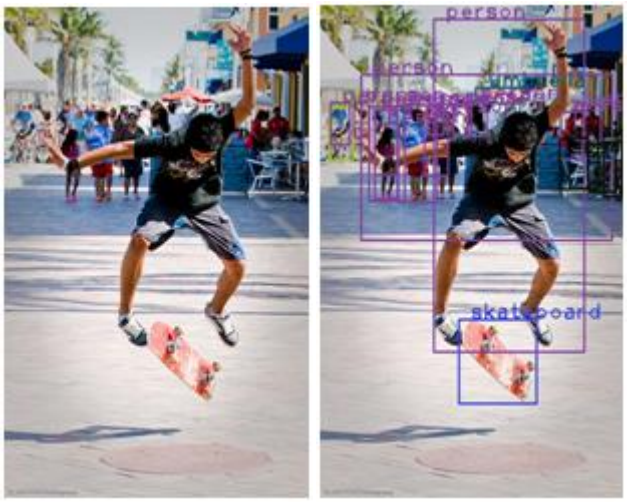
takes the advantages of SSE and MMX instruction for Real-Time computer vision applications. Many interfaces are built and developed using OpenCV such as OpenCL and CUDA. The latest version of OpenCV includes 10 times as many features and functions that compose or support those algorithms. There also also over 500 algorithms available in this library which related to Machine Learning and Computer Vision Applications. OpenCV works efficiently with STL containers and has a templated interface. It is natively written in C++. Open Source Computer Vision Library contains over 2,500 tailored algorithms, including a detailed collection of both traditional and state-of-the-art computer vision and machine learning algorithms. OpenCV has more than 47 thousand people in the user community and an estimated number of downloads of more than 18 million. The library is widely used by companies, research groups and government agencies.

- **NumPy**

Numpy is a software library mainly used for Array Vectorization. It is implemented using Python programming language. It supports large multidimensional arrays and matrices. It also includes many Mathematical functions to operate on single and multidimensional arrays. Numpy was originally written as Numeric and was created by Jim Huguin with support from several other Developers. It is known to be as an ancestor of Numpy. In 2005, Travis Oliphant created NumPy by incorporating features of the competing Numarray into Numeric, with extensive modifications. NumPy is open-source software and has many contributors.

V. RESULT

Below Images show the input and output :



VI. CONCLUSION

Deep learning-based object detection has been a research hotspot in recent years. This project starts on generic object detection pipelines which provide base architectures for other related tasks. With the help of this the three other common tasks, namely object detection, face detection and pedestrian detection, can be accomplished. Authors accomplished this by combing two things: Object detection with deep learning and

OpenCV and Efficient, threaded video streams with OpenCV. The camera sensor noise and lightening condition can change the result as it can create problem in recognizing the object. The end result is a deep learning- based object detector.

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IoT Based Pest Controlling System for Smart Agriculture

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ABSTRACT

In India, the agrarian monetary misfortune is fundamentally because of creepy crawlies and bugs. Subsequently, pesticides are broadly utilized by ranchers to control weeds, bugs and plant infections. Abundance use of pesticides isn't just an antagonistic for the climate yet additionally for human and economy of the country. In this paper, we proposed a bug control framework that utilizes IOT (Web of Things) and picture handling innovations to control bothers, accordingly decreasing the utilization of pesticides. The proposed framework utilizes infrared sensor (PIR) to recognize the presence of creepy crawly by the hotness emanated by their body. Picture handling is utilized to catch pictures of the irritation to affirm their quality in the field. Subsequent to affirming the presence of creepy crawly by Picture handling and PIR sensor, the ultrasonic generator is utilized to produce ultrasonic waves which are unbearable to bugs and bugs, drive them away from the horticultural field. The proposed framework assists the ranchers with working on the farming creation and the executives in an eco-amicable manner.

I. INTRODUCTION

Pesticides are a significant issue for Indian ranchers contrasted with bothers. There is consistently a touch of toxin in the food we burn-through. Pesticides are specialists used to annihilate bothers, which are negative to people or human worries like farming. Nearly 30,000crores deserving of harvests are obliterated by vermin and creepy crawlies in India consistently, which make ranchers to utilize pesticides. Specialists accept that persistent low level pesticide openness is related with a wide scope of sensory system side effects, for example, cerebral pain, strain, wooziness, discouragement, anger. Agriculture researchers overall are chipping away at organic options in contrast to substance pesticides with pressing the two ranchers and grocery stores to limit the utilization of compound pesticides.

With the development of natural market, individuals are taking substantially more revenue on what ranchers use to control bugs. These days ranchers are supported for rehearsing natural cultivating. Natural cultivating produces great quality food however creation costs are extremely higher, required more laborers and they can't deliver sufficient food that the total populace need to get by. Both the methodologies have their upsides and downsides. As Avoidance is superior to fix, the better answer for this issue could be forestalling utilization of pesticides rather than treating for its incidental effects.

One of the serious issues in agribusiness that restricts the yield of harvests is vermin infections which brought about by bothers including rodents. Rancher despite contending with bugs for a really long time, the Yield misfortune brought about by bugs has been expanding which undermine from one side of the planet to the other. It has been assessed that 70% of harvests could be lost because of bugs. These bugs are constrained by applying either actual measures, for example, catching or substance measures like use of pesticides. Despite the fact that pesticides help the yields and is best, it makes the harvests poisonous. In this paper, we give a creative answer for control bugs by repulsing it from the field as opposed to utilizing pesticides. This is finished by creating ultrasonic waves utilizing ultrasonic sound generator.

The term ultrasonic or ultrasound alludes to the sound with frequencies over 20,000 Hz or perceptible sound. The Ultrasonic sound generator utilizes different strategies including piezoelectric strategy, magneto striction technique to create sound waves over 20,000 Hz. The interest for more food is expanding. Savvy horticulture through utilization of IOT advances will assist the ranchers with lessening created squanders and improve efficiency. IOT assists the ranchers with catching ongoing information in regards to crops utilizing sensors and to break down the situation with yield to settle on choices prior which expands the nature of creation. It empowers better observing of harvests and keeps away from crop misfortunes because of illnesses or antagonistic climate.

In this paper, we proposed an irritation controlling framework which affirms the presence of bugs in the field through PIR sensor and picture handling method and creates ultrasound which is unbearable to rodents and bugs. By doing this, we can forestall the nuisances benefiting from the plants which brings about the expansion of harvest's wellbeing and creation hence expanding the monetary degree of farmers. In segment II, the writing overview is examined, in segment III, the vermin controlling framework dependent on IOT is proposed and the execution is depicted, in segment IV, we close the entire work.

II. RELATED WORK

Dileep Kumar Tiwari, etal, [1] have proposed an electronic vermin repellent that is fit for creating ultrasonic sound waves to repulse rodents, bugs and bugs. The proposed framework basically intends to forestall bother in an eco-friendly and climate amicable manner. The proposed gadget can be utilized in both little and enormous scope. The framework is option in contrast to compound pesticides and repeller which adversely affect human wellbeing.

Ibrahim, etal, [2] have examined on the utilization of electronic irritation control gadget, different measures, benefits and disadvantages of the gadget. Electronic irritation control is an electronic gadget utilized for repulsing vermin. The benefit of this gadget is that, they are modest, eco-accommodating and not unsafe to people. This gadget varies from different gadgets by focusing on the consultation scope of vermin and work dependent on it. Consequently, this gadget is more proficient.

J. Mahalakshmi, etal,[3] has proposed a picture handling calculation for crop examination and irritation control. This work fundamentally centre around recognization of paddy plant sicknesses. Utilizing this strategy different paddy sicknesses are distinguished.

Johnny L. Miranda, etal, [4] has proposed a framework that utilizes picture handling strategies to distinguish bother in rice fields. Utilizing the framework, the ranchers can make observing interaction more straightforward. The proposed framework is basic and effective and completely robotized the trial results shown by the model is dependable. As future work, neural organization can be utilized to further develop execution of the proposed framework.

Kanishk Sisodiya and Mandeep Singh,[5] have planned an ultrasonic creepy crawly identifier framework that utilizes ultrasonic sensor and infrared sensor to distinguish the presence of bug and nuisance in the field. The framework likewise utilizes GSM module to advise the ranchers about the presence regarding nuisance in the field. This framework is planned particularly for oilseed crop. This model assists the ranchers with expanding rural administration and creation. Later on, a portion of different sensors can be interfaced with the model framework for more exact outcomes and picture handling can likewise be utilized to take ongoing pictures of the vermin.

KhapareNilima Kailas, etal,[6] have proposed a framework that utilizes electronic gadgets, for example, ultrasonic sound wave to repulse the nuisance from the farming area. The disadvantages of substance strategy, the utilization of bio-pesticides is likewise talked about in this paper. The fundamental point of the framework is to control bother in an eco-accommodating way.

Murali Krishnan, etal, [7] have proposed a picture handling based, programmed bother control calculation. This proposed calculation intends to forestall espresso berry from creepy crawly and sicknesses. Fast discovery of creepy crawlies can be accomplished through this framework.

Navin, etal, [8] have proposed a nuisance control framework utilizing remote sensor network that utilizes acoustic gadget remote sensor to identify the clamor level of the irritation and show ranchers about the presence of bug through caution. The proposed framework is exceptionally low energy burning-through and can cover greatest field region. The fundamental focal point of the framework is to control and screen bug for sugarcanes utilizing remote sensor network innovation.

Nicholas Aflitto and Tom DeGomez,[9] have talked about on sonic vermin anti-agents which are gadgets that discharge sound to repulse creepy crawlies, irritations and rodents from the horticultural land. They momentarily examined on their working, benefits and disadvantages. The appeal of sound for counteraction of bugs will be an effective methodology later on and will be more secure for people.

RichardW.Mankin, etal, [10] have examined the design of acoustic framework for creepy crawly identification in plant stems, by joining an accelerometer to the plant stem. The accelerometer framework is utilized for distinguishing development of creepy crawlies.

Saeed Azfar, etal, [11] have talked about on a remote sensor network for bother control and agrarian checking. Different vermin control strategies have been examined in this paper. Farming regions will utilize WSN innovation in the future for recipient yield. The planned framework can be worked on in the future to really look at the vermin at beginning phase and pass on the data to the ranchers, hence diminishing the manual weight of checking the field.

III. PROPOSED SYSTEM AND RESULT

In India, the yields that require high use of pesticides are paddy (17%), wheat (10%) and cotton (45%). So, our proposed framework basically centres around these harvests. There are various bugs, for example, creepy crawlies, bugs, moth and rodents including rodents, squirrels, mouse, hares that feed on crops which makes a huge obliteration the yield of harvests. In our proposition, these irritations in the field are repulsed by producing ultrasound as opposed to utilizing pesticides.

The proposed framework involves

1. Passive Infrared (PIR) sensor
2. Image processing
3. Acoustic sensor
4. Microcontroller
5. Ultrasonic generator.

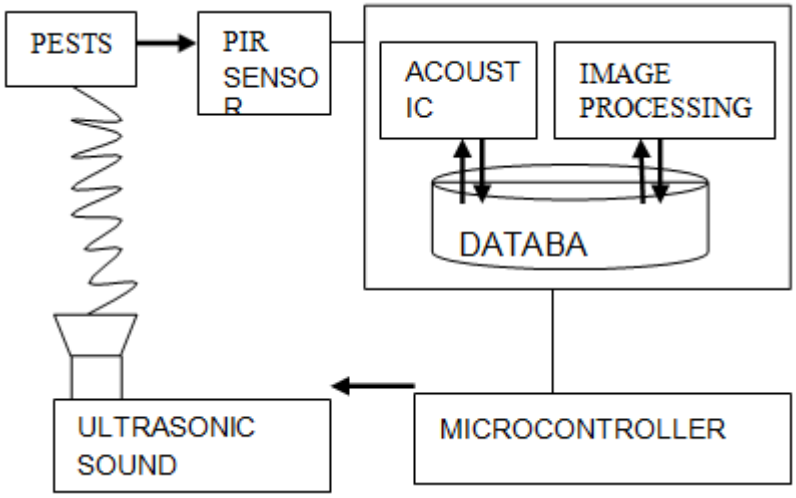

Figure1: Proposed System – IOT based Pest Control

1. Passive Infrared (PIR) sensor:

PIR sensor is utilized to identify the movement of vermin around specific climate. All articles with temperature above outright zero emanate heat energy as radiation. PIR sensor distinguishes the movement by estimating the progressions in the infrared levels transmitted by the article, for example, bothers in the environment. PIR sensor conceals a distance of to 20 feet (6 m). They are little, cheap and simple to utilize.

2. Image processing:

Picture handling is utilized to extricate some helpful data from pictures caught by playing out certain procedure on it. It issued to identify the presence of irritations in field by catching pictures of vermin and contrasting it and put away pictures. The picture handling incorporates the accompanying advances:

- Capturing image and send it to the microcontroller.
- Processing the image to detect the object in microcontroller.

Picture handling is ordered into two kinds, simple and advanced picture handling. It empowers to get a visual record of moving article.

3. Acoustic sensor:

Acoustic wave sensor is utilized to identify the commotion level of the bugs in the field. It likewise recognizes the intrusion of nuisances on crops in beginning phase. Acoustic sensor identifies sound by utilizing amplifier.

4. Microcontroller:

Microcontroller is an incorporated circuit comprising of processor, memory and info/yield peripherals to control actuators. It is utilized to handle the information gatheredby the sensors and control the ultrasound generator to create ultrasound of high recurrence.

5. Ultrasonic Generator:

Ultrasonic sound alludes to the sound with recurrence more prominent than the 20,000 Hz or perceptible sound. Ultrasonic can be delivered by various strategies which incorporates mechanical strategy, piezoelectric technique, magnetostriction technique. In piezoelectric strategy, the ultrasonic waves are produced by a transducer which changes electric flow over to sound waves. In magnetostriction, iron or nickel is polarized to deliver ultrasound.

6. Working:

The proposed framework displayed in Figure1 produces a distress yet not destructive, high recurrence sound waves which isn't perceptible to people. Each nuisance has tangible designs to deliver and distinguish ultrasound. For instance, cockroaches have tactile hairs, bugs, bugs, flies have tympanic film to detect ultrasound. The ultrasound sensors are available in the receiving wires or genetalia of the bugs. Bats and rodents convey through ultrasonic recurrence. The ultrasonic sound being produced by the framework will make a weight on the sensory system of the bugs and jam their own ultrasound recurrence. Thus, the vermin get confounded, frightened and attempt to escape from the wellspring of ultrasonic sound. Each bug has its own endurable decibel. Rodents react to ultrasound with a recurrence 60K Hz while insects, mosquitoes, scarabs react to ultrasound with recurrence 38-44K Hz.

In our proposed framework, the presence of the bugs is recognized utilizing PIR movement sensors which are conveyed in the fields. The PIR sensor distinguishes the irritations by observing the progressions in how much infrared radiation (heat) produced by the bugs. Heat is emanated from any article with temperature above outright zero. The PIR sensor can cover a distance of 20 feet (6 m). When the presence of bug is distinguished, the pictures of the nuisances are caught through the cameras in the field and afterward contrasted and the pictures of the vermin in the data set. A proficient picture handling calculation is utilized for the recognizable proof of the irritations. The principle point of the picture handling is to notice the nuisances that are not apparent to natural eyes.

For more exactness, in equal, the sounds waves exuding by the vermin during taking care of, laying eggs are gathered with the assistance of acoustic sensor and is examined with the sounds in the data set with which it is guaranteed that the eco- accommodating irritations won't get impacted. This is finished by utilizing receivers which recognizes the sound signals and converts them into electrical signs. The result from both the interaction

is joined to recognize the bug type and their horrendous sound level is given as a contribution to the microcontroller. This large number of activities is done in microseconds.

At last, the microcontroller mechanizes the ultrasonic sound generator which is customizable to deliver incredible ultrasonic floods of various recurrence. The result is coupled to the tweeter which repulses away the irritation in the field. The Ultrasonic waves ranges up to 15 feet. The ultrasonic waves above 20K Hz is indiscernible to people and it additionally animates the plant development. Hence whole framework won't make any issue the individuals just as eco- friendly vermin and harvests. The recipient of the framework is that it is mechanized so that there is no human intercession hence decreasing work and labor.

The reason for the undertaking is to plan a ultrasonic bug repellent. Such a gadget can be exceptionally helpful to counter the different issues brought about by subterranean insects, bugs, bothers, rodents to the harvests. This framework is proposed pointing the objective valuable for ranchers, buyers, yields and land. The ranchers are benefited as it builds the likelihood to have improved sound plants and lessen the expense of information spent on purchasing manures and pesticides. This advances sound design and solid toxic substance free plants for human utilization. The framework expecting to diminish the natural dangers related with bug the executives by empowering the reception of biological practice. The fundamental objective of the proposition is to lessen the capability of air and ground water tainting and increment the yield. This can do an incredible beneficial outcome on climate through diminishing the utilization of pesticide. The drawn-out objective is assisting the ranchers with diminishing the works associated with bug the executives projects and furthermore to kill bug buildup issues. The subjective result of this thought in is relied upon to support ranchers as cultivators embrace and energize non harmful pesticides cultivating.

The teaching of IOT in bug the board upholds for gadget-to- gadget correspondence without human intercession and diminish labor and work. The proposed framework has been tried inside the limits of pastureland and the results are investigated. The assumed outcomes are obtained with an exactness of 87%.

IV. CONCLUSION AND FUTURE WORK

Horticulture is viewed as a spine of India. Thusly, the advancement of towns primarily relies upon the increment horticultural creation and food security. The fundamental goal of the framework is, to mindful the ranchers about the nuisances and state of the horticultural field. In the proposed framework, for more precision picture handling innovation has been utilized and acoustic, PIR sensors are interfaced. The proposed framework is a best option in contrast to compound pesticides and can ready to diminish the difficult work of checking the agrarian field.

Accordingly, this proposition would assist the ranchers with expanding their yield creation via mechanized bug the executives at low expenses and guarantees a good food. Our proposed framework predominantly centres around three yields (paddy, wheat and cotton). Thus, our concentration in future is to broaden the execution of framework, which will be permissible to variety of yields with fluctuating statures and nuisance assaults. Our future objective is to give the ranchers a proficient bug control framework with reasonable expense to dispose of bugs and in this way increment their harvest efficiency.

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A Review Study on Tractor Operated BBF Planter

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ABSTRACT

In the latest years, it's far imperious to improve sowing techniques through desired seedbed practice and early crop growth. The various types of sowing machines and different sowing techniques play an important role in seed deposition and seedling emergence which finally effect on crop growing and grain yield. The selection of appropriate planting techniques is dependent upon the time of planting, irrigation strategies, amount of residues on the farm, type of planting machine. The present work deals with the review of research work done by using broad bed furrow (BBF)planter to study the effect of these plantingmechanism on soil health, yield, water saving, fertility of soil etc. From the study it is discovered that BBF planting method combines most of the elements of saving agriculture and have produced boosting production results under various environmental conditions. This planting method offers the opportunity of reducing field compaction and restoring physically degraded soil structure, as well as, the potential toreduce irrigation water and maximize crop yield while sinking the risk of water logging. Different BBF planting conformations are used throughout the world depending on soil type, available machinery, farmer preference and knowledge. In general, increasing the width of the bed reduces total water used and increases land use efficiency and yield by reducing the uncropped furrow area.

I. INTRODUCTION

Farmmechanization is an important element of modern agriculture. Mechanization can help in increasing the production by timely farm operations, reducing losses, reducing the cost of operations. This Planter is known as Broad Bed Furrow Planter (BBF). It precisely plant seed on the bed which is created with help of the ridge formed by this seed planter serves the purpose of water supply as well as water storage which ultimately gives best yield of crops.The modern method of sowing is planting with a help of planter. Planter is a device that deposits seeds at equal distance in rows at specified rates and covers them with soil. Raut et al., (2000) and Autkar et al., (2006) reported that ridge-and-furrow sowing was significantly superior to conventional flat sowing in increasing plant height. Precision planting ensures that only the requisite amount of seed is used during a planting season. This is beneficial that it reduces seed waste as well as ensure that plants are spaced properly.

Broad Bed Furrow (BBF) farming has many advantages in regard to water saving, mechanical weeding, fertilizer placement, and available moisture conservation, less lodging and better crop stand, Astatke et al., (2002).In dry land agriculture simultaneous preparation of broad bed furrow and sowing operation with saving in production cost it is recommended to use tractor drawn PKV BBF planter. The role of the BBF was to make raised seedbeds and furrows more efficiently and effectively, thus reducing water logging and encouraging early planting of a cereal crop of an improved cereal variety which could then be followed by a second crop of pulses in the same growing season. The broad bed furrow method encourages moisture storage in profile of soil. Safely disposing off surplus runoff without causing soil erosion. Providing a better drained and more easily cultivated soil in beds. It is necessary to adopt suitable technology to conserve the rain water in-situ to ensure adequate moisture during the various growing stages of the crop in rain fed farming. Animal drawn broad bed-furrow former are available but their efficiency is very less, therefore, it is necessary to develop suitable tractor operated BBF planter to overcome this problem, Srinivas, (2005). By this machine, the performance of high yielding improved varieties is optimized as the deep furrows created under BBF provides effective drainage during excess rains, while serves as in situ moisture conservation during dry spells, thus mitigating the detrimental effects of both extreme situations. Rain fed crops are often subjected to extreme stresses of soil saturation as well as poor moisture due to erratic rainfall pattern.The placement of seed at correct depth is very important for proper germination and for obtaining optimum plant population per unit area of the crop especially under dry land farming where soil moisture is at greater depth, Khambalkar et al., (2010).Crops like cereals, pulses and oil seeds are the main crops in dryland farming. There is scope to cultivate such crops using BBF.

II. METHODOLOGY

Various types of papers had been reviewed on design considerations of BBF Planter, development of a BBF planter. The problem definition of the project is saving the seeds and application of precision planter in the planting operation. Also, the labor required for planting is expensive, time consuming and difficult to organize, while the main objective is to build a machine that will overcome the above bottlenecks. In this project we are going to prepare a planting machine for agricultural land, to reduce the human effort of planting operation and to create a machine for low cost by saving a seeds. Later model design and fabrication will be done.

III. DESIGN CONSIDERATION OF BBF PLANTER

3.1 Design Consideration and development of BBF planting mechanism

The design of the planter mainly depends on various parameters such as draft requirement, seed box capacity, number of furrow openers (width of sowing), depth of sowing, soil properties, , size of seed, forward speed of planter and type of metering mechanism used for planting. In case of BBFplanter, the design of Ridger is also considered. The power requirement of the planter mainly depends on the depth of planting, width of sowing, soil resistance, unit draft and speed of machine. Singh et al., (2011) developed the tractor-drawn broad bed furrow seed drill machine (Fig. 1) to overcome moisture stress for soybean in vertisols. It is attachable to 40-45

PTO hp range.This tractoroperated BBF seed drill is capable of making furrows of desired depth and width at both the sides of the bed (Fig.2) and can be used for simultaneous sowing of crop in one operation.The seed drill has been made of box section mild steel (8 mm). This seed drill is capable of sowing 5,4 or 3 rows as desired on the bed with rail mechanism frame provided on the machine. The seed covering device has a V notch at the lower end which is precisely designed to put desired soil over the dropped seed which is attached to the individual tines. The machine has a provision of a weeding device (horizontal shearing type) between the rows which helps weeding simultaneously along with sowing operation. The weight of the seed drill is 470 kg. Length of the frame is 3.10 m and width is 0.56 m.

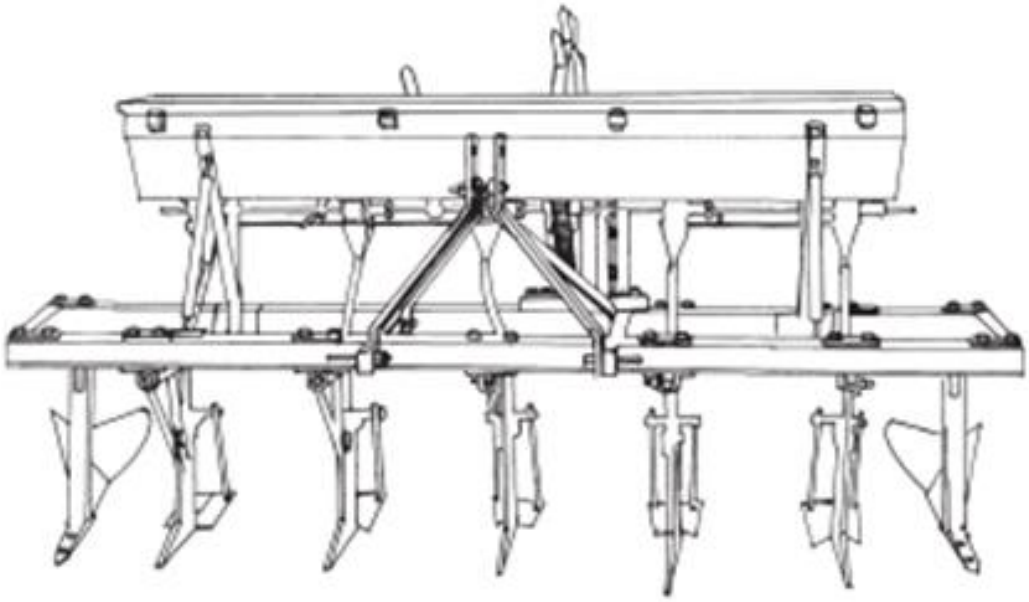

Fig. 1 Broad bed furrow seed drill

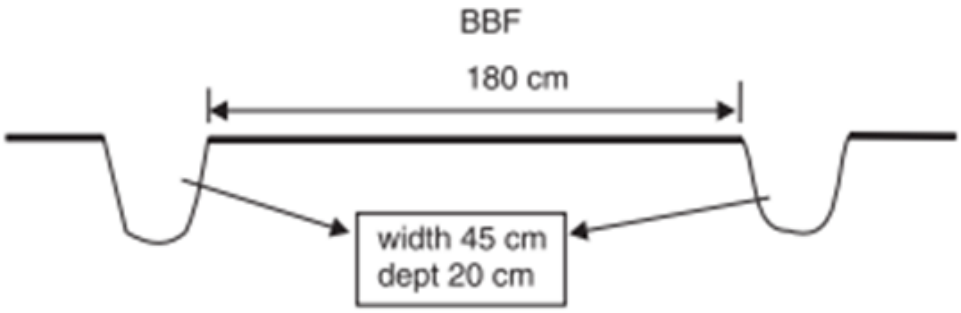

Fig. 2 The profile of broad bed furrow land preparation method

One of the major constraints is availability of row planting machines to meet timeliness and precision needs. The most important factors to increase production are the seed germination distribution uniformity at proper depth. These results in a better crop stand there by increasing the crop yield (Behera et al., 1995).Gosa Bekele and Ayalew Bekele (2019) fabricated and evaluated tractor drawn wheat row planter. A tractor drawn wheat row planter was fabricated in Asella Agricultural Engineering Research Center workshop and evaluated at Munesaworeda of Oromia region at farmer's field level. The fabricated tractor mounted row planter could have components like main frame, metering flute, hopper, ground wheel, delivery tube and furrow opener. Frame

was constructed from 8 mm mild steel square pipe welded together to form a rectangular chassis. The top of the frame carries the seed and fertilizer hopper while the front provides hitching points for attachment to the tractor. Trapezoidal shape of seed and fertilizer hoper was fabricated from 2 mm mild steel sheet metal. A lugged ground wheel was provided to drive seed and fertilizer metering flute. The wheel is located at middle of the frame. It is made from 3 mm mild steel plate of 370 mm diameter and fitted with twelve triangular shaped lugs on the periphery in order to improve traction both on dry and muddy lands for the positive rotation under the stubble field conditions. N. Rakesh et al.,(2018) developed and evaluated small tractor drawn seed planter with battery operated seed metering mechanism. Small tractor operated seed planter with battery drive consists of a frame, furrow openers, individual seed boxes and battery drive, vertical rotor type seed metering mechanism, push button switch, and speed regulator. Seed metering mechanism gets a drive from the dc motor with aids of chain and sprocket arrangement instead of from ground wheel. As per the design calculations, the width of seed planter was 1.25 m. Shoe type furrow openers were selected to open the furrow. No. of furrow openers and row to row spacing was 5no.s and 25 cm respectively. Length of simplex chain, the pitch of the chain and no. of links was 43 cm, 1.5 cm, and 29 respectively. No. of teeth on sprocket and gear ratio was 12 and 1:1 respectively. Capacity of the seed box was 1kg per one furrow, length, and diameter of the feeder shaft was 104 cm and 1.5 cm respectively, 12vDc motor was selected for operating the seed metering mechanism instead of a ground wheel. Speed of the dc motor was 100 rpm and regulator was selected for setting Dc motor speed according to tractor rear wheel speed in different gears.

3.2 Performance evaluation BBF planter

The performance of BBF planter was evaluated by taking the laboratory tests and field tests, as per standard, i.e., Regional Network for Agricultural Machinery (RNAM) test code.Khambalkaret al., (2014) were evaluated performance of broad bed furrow planter in winter season of dryland crops. The planter was tested in laboratory and in field as per Regional Network for Agricultural Machinery (RNAM) test code for JAKI 9218, AKS-207 and AFLR variety of chickpea, safflower and onion, respectively. The field efficiency of planter was 72%, 74% and 71% at working width of 1.40, 1.70 and 1.40 m and at speed of 3.38, 3.20 and 4.03 km/h for chickpea, safflower and onion, respectively. Seed rate of 77, 13.5 and 5.5 kg/ha for chickpea, safflower and onion crop respectively, was obtained during the test. The moisture conservation on broad beds was higher than traditional method of sowing. Energy requirement for sowing of chickpea, safflower and onion by BBF planter was 146, 130 and 121 kWh/ha. Also, there was an increase in yield 12.50% and 10.71% in chickpea and safflower, respectively using BBF planting method compared with the traditional flat bed method of sowing.The dimensions and complete design are given in Figure 3.

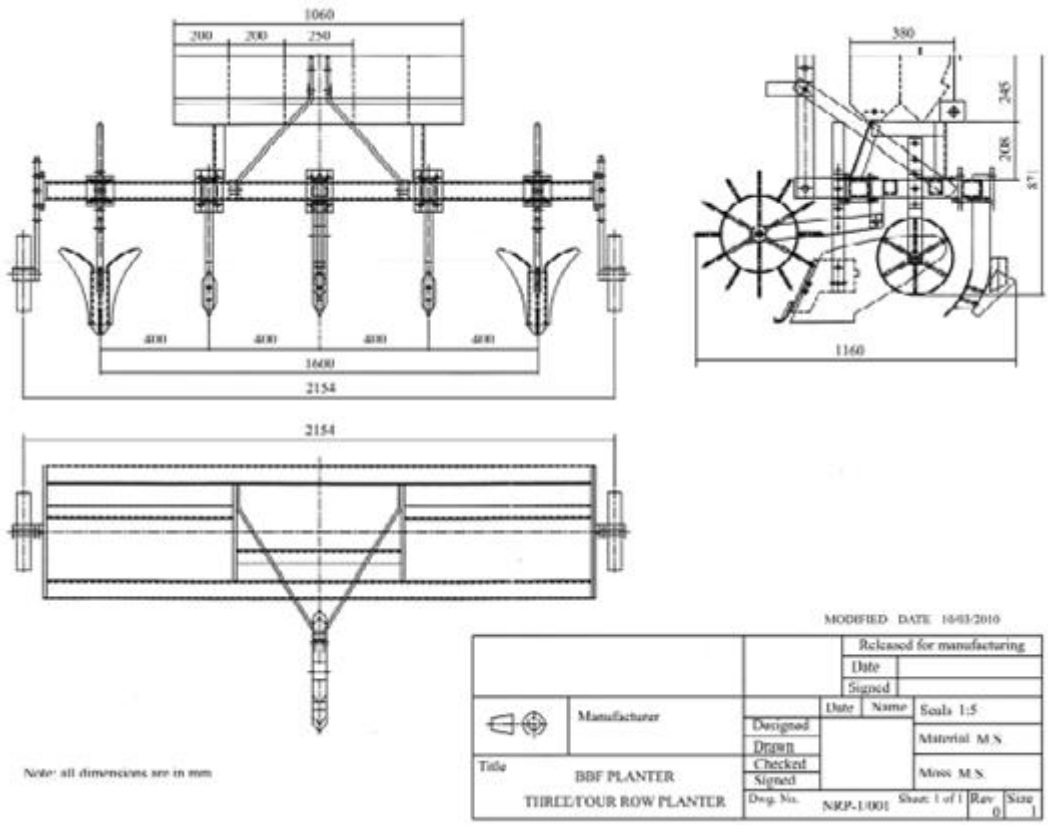

Fig. 3 Plane of broad bed furrow planter

The field performance of BBF method shows effective conservation of soil moisture than in traditional method.Verma et al., (2017) were studied the Effect of broad bed furrow method for rainfed soybean cultivation at Balodabazar district of Chhattisgarh. Six-row broad bed furrow machine was used to plant soybean having top bed width of 2.35 cm. Result showed that growth character (plant height, number of branches per plant and number of root nodules per plant) and yield contributing character viz., number of pods per plant, seed yield weight per plant, seed index, seed yield, straw yield and harvest index (%) were found higher in broad bed furrow compared to the normal flat bed sowing which subsequently resulted in yield enhancement to the extent of 28.38 % for soyabean crop. The average yield in broad bed furrow method recorded 15.20 q ha-1. Similarly, 40 to 50% saving in irrigation water was recorded with broad bed furrow method of soybean in comparison with flood irrigation of controlled plots.Waghmare and talokar (2013) were tested the broad bed furrow planter for different crops in laboratory as per RNAM test code for the crops sunflower, soybean and chickpea, respectively. The planter was used for preparing broad bed furrows and simultaneously sowing of seeds on beds. The laboratory test was conducted in which the average number of plants per metre was observed to be 5.38, 13.79 and 13.33 and plant population 122775, 459770 and 444444 per hectare for sunflower, soybean and chickpea, respectively. The seed rate was calibrated and found to be 7.7 kg/ha, 78.27 kg/ha and 77.20 kg/ha for sunflower, soybean and chickpea, respectively. The visible damaged is very less in the planter and found to be 1.5% for sunflower, 1.41% for soybean and 1.58% for chickpea. The average width of broad bed and furrow was recorded as 1.95 m, 1.50 m and 1.50 m for sunflower, soybean and chickpea, respectively. The average row to row spacing was found to be 45 cm, 30 cm and 30 cm for sunflower,

soybean and chickpea, respectively.Khambalkar et al., (2010) evaluated the performance of mechanical sowing of safflower on broad bed furrow. The average soil moisture in BBF method and traditional method was observed 29.99 % and 27.36%, respectively. Row to row spacing between crop rows on broad bed was kept 30 cm with 60 cm of bed width. The plant to plant spacing (20 cm) was kept same as in traditional method of sowing safflower crop. The average depth of placement of seed in BBF method was observed to be 4.44 cm and in traditional method it ranges from 2 to 2.5 cm. The observed yield of crop in BBF method was 8.81 q/ha and in traditional method it was 8.27 q/ha. It has seen that adoption of BBF sowing for safflower resulted in higher yield (6.50 % more) than traditional method of sowing.The sowing pattern in BBF method is shown in Fig.4.

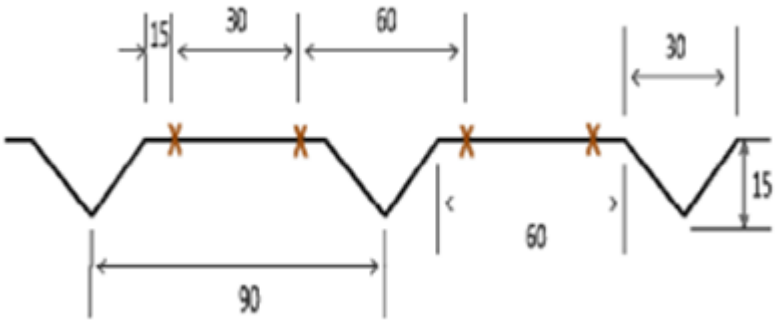

Fig 4. Pattern of sowing for safflower crop in broad bed furrow. All dimensions in cm, X – Seed planted

The study revealed that planter can be used for preparing the broad beds and simultaneously sowing the seeds on the beds at required row and plant spacing. The moisture conservation on broad beds was higher than traditional method of sowing. The performance evaluation of planter concluded that BBF planter was suitable for the selected crops namely sunflower, soybean and chickpea. The performance of the planter for plant to plant distance, plant population, seed rate per hectare and visible damage was satisfactory and it could be used for the field trials.The application of technology developed by Dr. PDKV for sowing of seed with BBF planter shows increase in yield by 26.66 per cent, seed saving of 37.5 kg/ha and increase in ANR of rupees 36705 per hectare of groundnut crop in comparison with local practice (Table 1).The use of PDKV BBF planter cum inter row cultivator for groundnut crop sowing is recommended for farmers as it shows increased production and seed saving when compared to local practice.

Broad bed and furrow (BBF) farming is a novel concept for conservation of rain water in of dry land areas. Hence, a comparative analysis of the BBF method of cultivation vis-a-vis traditional method of flat-bed sowing was has been made during Rabi 2014-15 with the main objectives to study the yield and economics of safflower and to assess the moisture conservation efficiency of the system (Sudhakar et al., 2017). The field experiment was conducted on a medium black soil at Agricultural Research Station, Tandur, Telangana state during Rabi 2014-15. The performance of Safflower was studied under 2 treatments (T1- BBF method of cultivation and T2 - Traditional method of flat-bed sowing). Safflower hybrid DSH-185 was sown in an area of 0.2 ha each under BBF and traditional system. The study revealed that broad bed and furrow method of sowing thus, offers a better opportunity to maximize the yield and economics of safflower. BBF method shows effective conservation of soil moisture than in traditional method which was reflected in improved seed yields of safflower in Rabi season under receding soil moisture conditions. Maximum attainable available soil moisture at different crop growth stages is possible with BBF method of sowing.

3.3 Cost economics of BBF planter

Cost estimation depends upon fixed costs and operating costs.Verma et al.,(2017) studied that average cost of cultivation with flat bed method (farmers practice) and broad bed furrow method (recommended practice) was 40848 Rs./ha and 52440 Rs./ha respectively. The benefit cost ratio was observed 2.05(BBF method) due to drainage of excessive rain water from the fields and stronger plant anchorage on the beds. The B:C ratio as observed more in BBF field (2.05) as compared to conventional method (1.54) of sowing of soybean. It is because of reduction in primary tillage operation BBF method as well as due to higher production.Khambalkar et al.,(2014) studied the total cost of operation of tractor operated BBF planter for sowing of chickpea, safflower and onion per hour is the addition of cost of operation of tractor and planter per hour respectively. It is seen that total cost of operation for tractor is Rs.328, Rs.339 and Rs.328 per hour and for planter is Rs.62 per hour for chickpea, safflower and onion respectively. The total cost of operation of sowing by using BBF planter on broad bed furrow was computed to be Rs.390, Rs.400 and Rs.390 per hour respectively. The sowing cost of chickpea, safflower and onion in BBF method was Rs.1140, Rs.1000 and Rs.975 and by traditional method was Rs.1350, Rs.563 and Rs.9000 per hectare respectively. Khambalkar et al.,(2010) studied the cost of sowing safflower crop with tractor operated BBF marker cum seed drill was determined over the traditional method. It was observed that the cost of operation per hour of operation of tractor and BBF marker cum seed drill was found to be $ 5.54 and $ 0.69, respectively (Exchange rate 1 USD = 47.60 INR). The total cost of operation for BBF method was found to be 6.239 $/h. The cost of operation per hectare for BBF method was calculated to be $ 16.39. In traditional method of sowing of safflower crop, cost of operation per hectare was found to be $ 26.50. The net saving in cost of operation in BBF method over traditional method was found to be 58 %.

IV. CONCLUSION

The planter can be used for preparing the broad beds and simultaneously sowing the seeds on the beds at required row and plant spacing. The moisture conservation on broad beds was higher than traditional method of sowing.The main purpose of any planterto open the planting furrow, meter the seeds, deposit them in the furrow, cover them and compact the soil around them. So, in first step design of planting mechanism should be carried out. Then, the design of power system should be done. From the study of developed BBF planter, it had been found that the field performance of BBF method shows effective conservation of soil moisture than in traditional method. The cost of operation of BBF method was less as compared to traditional method of sowing of crop. From the above study it is concluded that sowing of crop using the BBF method is feasible to enhance the crop yield with saving in cost of operation.

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Face Mask Detection with Inception Resnet using Transfer Learning Approach

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ABSTRACT

After the breakout of the worldwide pandemic COVID-19, there arises a severe need of protection mechanisms, face mask being the primary one. According to the World Health Organization, the corona virusCOVID-19 pandemic is causing a global health epidemic, and the most successful safety measure is wearing a face mask in public places. Convolutional Neural Networks (CNNs) have developed themselves as a dominant class of image recognition models. The aim of this research is to examine and test machine learning capabilities for detecting and recognize face masks worn by people in any given video or picture or in real time. This project develops a real-time, GUI-based automatic Face detection and recognition system. It can be used as an entry management device by registering an organization's employees or students with their faces, and then recognizing individuals when they approach or leave the premises by recording their photographs with faces. proposed methodology makes uses of Principal Component Analysis (PCA) and HAAR Cascade Algorithm. Based on the performance and accuracy of our model, the result of the binary classifier will be indicated showing a green rectangle superimposed around the section of the face indicating that the person at the camera is wearing a mask, or a red rectangle indicating that the person on camera is not wearing a mask along with face identification of theperson.

Keywords – Face Recognition and Detection, Convolutional Neural Network, GUI, Principal Component Analysis, HAAR Cascade Algorithm

I. INTRODUCTION

Face Recognition is a technique that matches stored models of each human face in a group of people to identify a person based on certain features of that person's face. Face recognition is a natural method of recognizing and authenticating people. Face recognition is an integral part of people's everyday contact and lives. The security and authentication of an individual is critical in every industry or institution. As a result, there is a great deal of interest in automated face recognition using computers or devices for identity verification around the clock and

even remotely in today's world. Face recognition has emerged as one of the mostdifficultand intriguing problems in pattern recognition and image processing. With the aid of such a technology, one can easily detect a person's face by using a dataset of identical matching appearance. The most effective approach for detecting a person's face is to use Python and a Convolutional Neural Network in deep learning. This method is useful in a variety of fields, including the military, defense, schools, colleges, and universities, airlines, banks, online web apps, gaming, and so on. Face masks are now widely used as part of standard virus- prevention measures, especially during the Covid-19 virus outbreak. Many individuals or organizations must be able to distinguish whether or not people are wearing face masks in a given location or time. This data's requirements should be very real-time and automated. The challenging issue which can be mentioned in face detection is inherent diversity in faces such as shape, texture, color, got a beard\moustache and/or glasses and even masks. From the experiments it is clear that the proposed CNN and Python algorithm is very efficient and accurate in determining the facial recognition and detection of individuals.

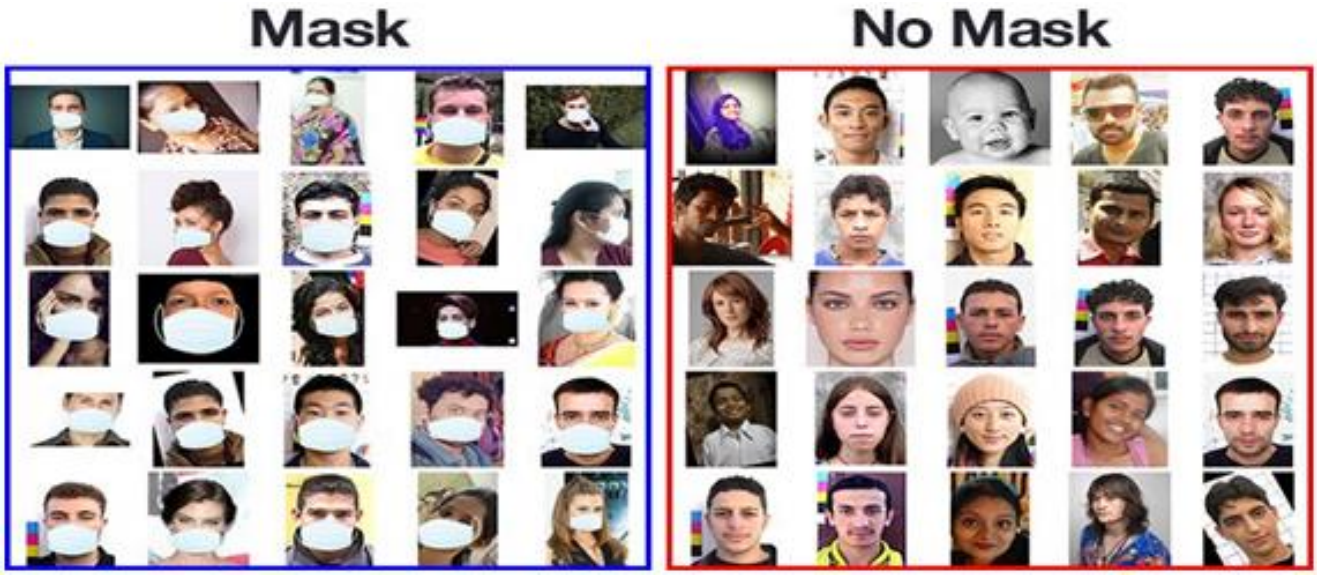

Fig 1 dataset used for the model.

II. LITERATURE SURVEY

Transfer learning generally refers to a process where a model trained on one problem is used in some way on a second related problem.In deep learning, transfer learning is a technique whereby a neural network model is first trained on a problem similar to the problem that is being solved. One or more layers from the trained model are then used in a new model trained on the problem of interest.

Transfer Learning for Image Recognition

A range of high-performing models have been developed for image classification and demonstrated on the annual ImageNet Large Scale Visual Recognition Challenge, or ILSVRC.

This challenge, often referred to simply as ImageNet, given the source of the image used in the competition, has resulted in a number of innovations in the architecture and training of convolutional neural networks. In addition, many of the models used in the competitions have been released under a permissive license.

These models can be used as the basis for transfer learning in computer vision applications. This is desirable for a number of reasons, not least:

- **Useful Learned Features:** The models have learned how to detect generic features from photographs, given that they were trained on more than 1,000,000 images for 1,000 categories.
- **State-of-the-Art Performance:** The models achieved state of the art performance and remain effective on the specific image recognition task for which they were developed.
- **Easily Accessible:** The model weights are provided as free downloadable files and many libraries provide convenient APIs to download and use the models directly.

The model weights can be downloaded and used in the same model architecture using a range of different deep learning libraries, including keras.

The Residual Network, or Resnet for short, is a model that makes use of the residual module involving shortcut connections.

It was developed by researchers at Microsoft and described in the 2015 paper titled "Deep Residual Learning for Image Recognition."

The model expects color images to have the square shape 224×224.

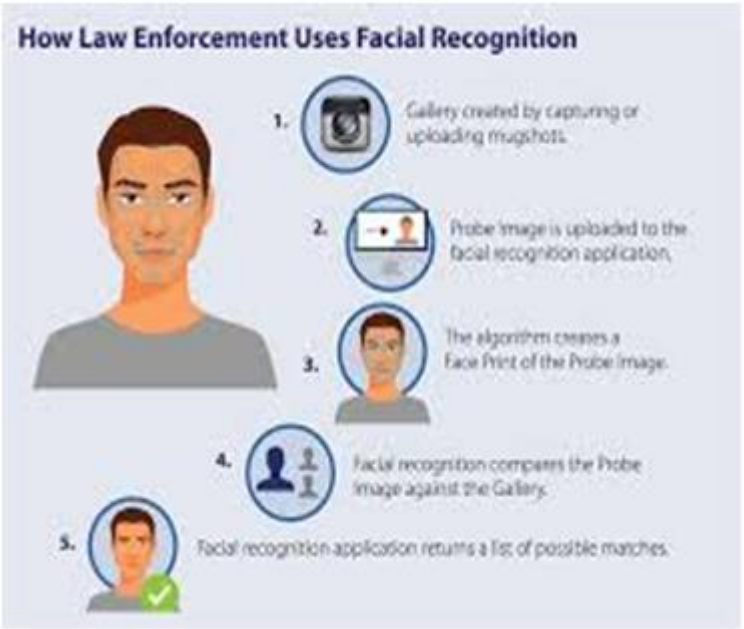

Fig 2, enforcement for facial recognition.

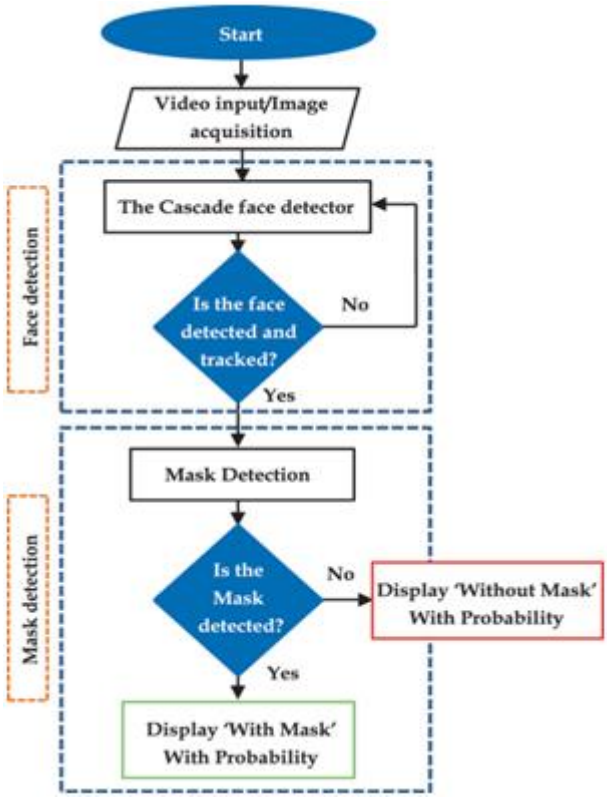

Fig 3,flowchart displaying algorithm used.

III. PROPOSEDMETHODOLOGY

We use Convolutional Neural Network and Deep Learning for Real Time Detection and Recognition of Human Faces, which is simple face detection and recognition system is proposed in this paper which has the capability to recognize human faces in single as well as multiple face images in a database in real time with masks on or off the face. Pre-processing of the proposed frame work includes noise removal and hole filling in colour images. After pre-processing, face detection is performed by using CNNs architecture. Architecture layers of CNN are created using Keras Library in Python. Detected faces are augmented to make computation fast. By using Principal Analysis Component (PCA) features are extracted from the augmented image. For feature selection, we use Sobel EdgeDetector.

A. The Input Image

Real-time input images are used in this proposed system. Face of person in input images must be fully or partially covered as they have masks on it. The system requires a reasonable number of pixels and an acceptable amount of brightness for processing. Based on experimental evidence, it is supposed to perform well indoors as well as outdoors i.e. passport offices, hospitals, hotels, police stations and schoolsetc.

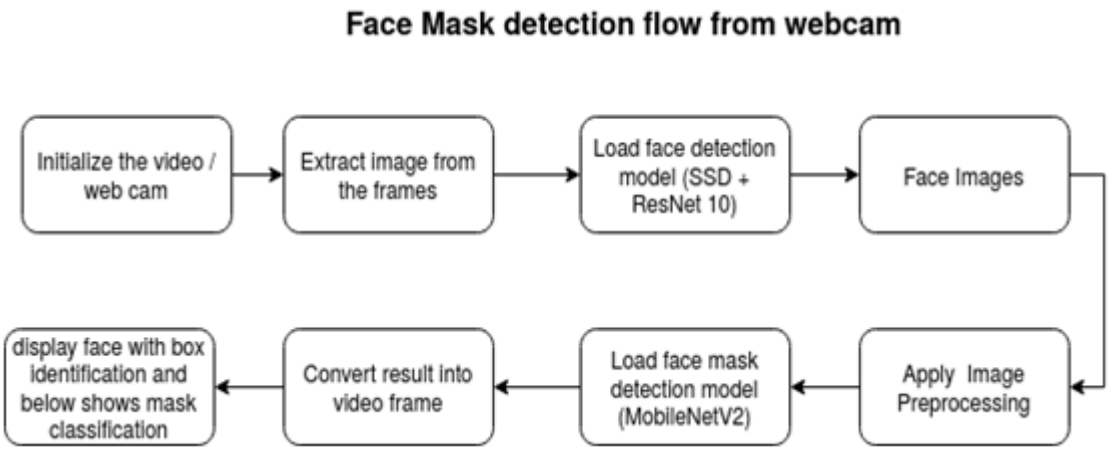

Fig 4 face mask detection via webcam,

B. The Pre-processing Stage

Input image dataset must be loaded as Python data structures for pre-processing to overturn the noise disturbances, enhance some relevant features, and for further analysis of the trained model. Input image needs to be pre-processed before face detection and matching techniques are applied. Thus pre-processing comprises noise removal, eye and mask detection, and hole filling techniques. Noise removal and hole filling help eliminate false detection of face/ faces. After the pre-processing, the face image is cropped and re-localized. Histogram Normalization is done to improve the quality of the pre- processed image.

C. The Face Detection Stage

We perform face detection using HAAR Cascade algorithm. This system consists of the value of all black pixels in greyscale images was accumulated. They then deducted from the total number of white boxes. Finally, the outcome is compared to the given threshold, and if the criterion is met, the function considers it a hit. In general, for each computation in Haar-feature, each single pixel in the feature areas can need to be obtained, and this step can be avoided by using integral images in which the value of each pixel is equal to the number of grey values above and left in the image.

Feature =Σie{1..N}wi.RecSum(x, y,w,h),

where RecSum (x, y, w,h) is the summation of intensity in any given upright or rotated rectangle enclosed in a detection window and x, y,w,h is for coordinates, dimensions, and rotation of that rectangle, respectively. Haar Wavelets represented as box classifier which is used to extract face features by using integralimage

The Feature-Extraction Stage

Feature Extraction improves model accuracy by extracting features from pre-processed face images and translating them to a lower dimension without sacrificing image characteristics. This stage allows for the classification of human faces.

The Classification Stage

Principal Component Analysis(PCA) is used to classify faces after an image recognition model has been trained to identify face images. Identifying variations in human faces is not always apparent, but PCA comes into the picture and proves to be the ideal procedure for dealing with the problem of face recognition. PCA does not operate classifying face images based on geometrical attributes, but rather checks which all factors would influence the faces in an image. PCA was widely used in the field of pattern recognition for classification of problems. PCA demonstrates its strength in terms of data reduction and perception.

A. Training Stage

The method is based on the notion that it learns from pre- processed face images and utilizes CNN model to construct a framework to classify images based on which group it belongs to. This qualified model is saved and used in the prediction section later. In CNN model, the stages of feature extraction are done by PCA and feature selection done by Sobel Edge Detector and thus it improves classification efficiency and accuracy of the training model.

B. Prediction Stage

In this stage, the saved model automatically detects the of the face mask image captured by the webcam or camera. The saved model and the pre-processed images are loaded for predicting the person behind the mask. CNN offers high accuracy over face detection, classification and recognition produces precise and exact results .CNN model follows a sequential model along with Keras Library in Python for prediction of humanfaces.

IV. MODULES

The proposed system contains the following modules:

A. Pre-processing Images
B. Capture image ()
C. Upload image()
D. Prediction(image)

A. Pre-processing Images

The input image is captured from a webcam or camera in real-time world. The frames (images)from the dataset are loaded. Face images are cropped and resized after they have been loaded. Later, noise distortions in the images are suppressed. Normalization is then done to normalize the images from 0-255 to 0-1 range.

B. Capture image()

In this Module we are able to capture real time images. We do this by the help of Flutter and applying in to the Classifier Model.

C. Upload image()

Here we can browse the image and upload for finding the Plant disease. We need to fetch the image. And this image passes to Classifier Module.

Input: Nothing

Output: image

D. Classifier(image)

Following data Prepossessing of the images, will apply to the Classifier. Here it will find out the feature of the images. Mainly in this module feature extraction occurs. Image similarity features will be stored in to the model which gets created.

Input: Image

Output: Model

E. Prediction(image)

In this Module prediction of person take place. Here the browsed image will be placed in to the model and output will be shown as based on which label its get matched themost.

Input: Image

Output: Predicted Label

Fig 5.actual working of model.

V. SYSTEMARCHITECTURE

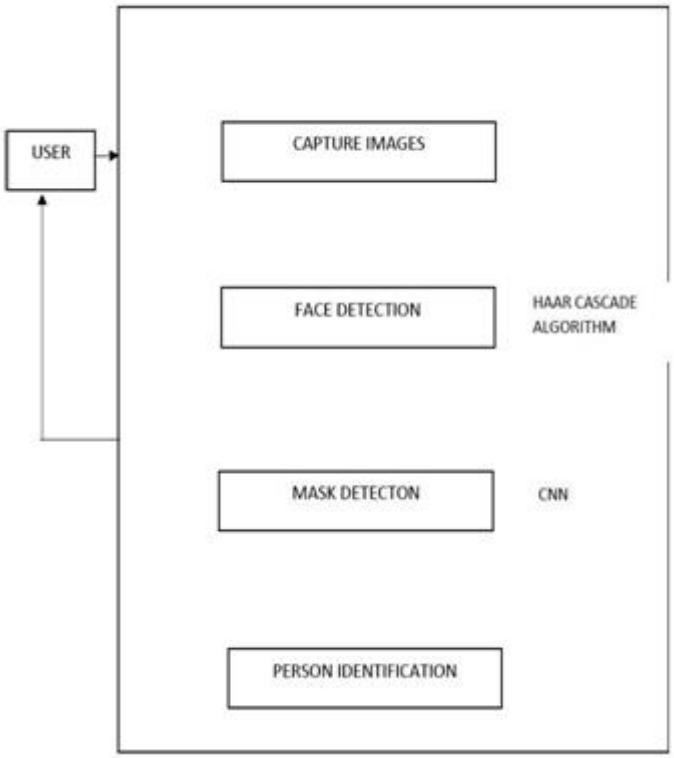

Fig 6. system architecture required for facial recognition.

A. User

User refers to person standing in front of a webcam or camera in a real world scenario.

B. Capture Images

The webcam or camera captures images which are then used as dataset to train the model. If the dataset captures human faces in different masks and in different backgrounds along with large number of human face images, then the accuracy of the training model increases.

C. Face Detection

For face detection, we use HAAR Cascade algorithm. In this method all black pixels in greyscale images was accumulated. They then deducted from the total number of white boxes. Finally, the outcome is compared to the given threshold, and if the criterion is met, the function considers it a hit.

D. Mask Detection

For Mask Detection, we use a sequential CNN model along with inbuilt Keras Library in Python. The sequential CNN model is trained from dataset of human faces with or without masks on the faces. It forms a logic from the pre-processed images like a human brain, then the model detects the face along with mask using feature extraction and feature selection. After identification of the mask along with face of the person, it forwards to the prediction or identification stag

E. Person Identification

In this stage, the trained model predicts the face of the person behind the mask according to the trained model. The prediction is based on the number of images trained by the model and its accuracy. Finally, the system displays that the person's name along with the indication of he or she wearing a mask ornot.

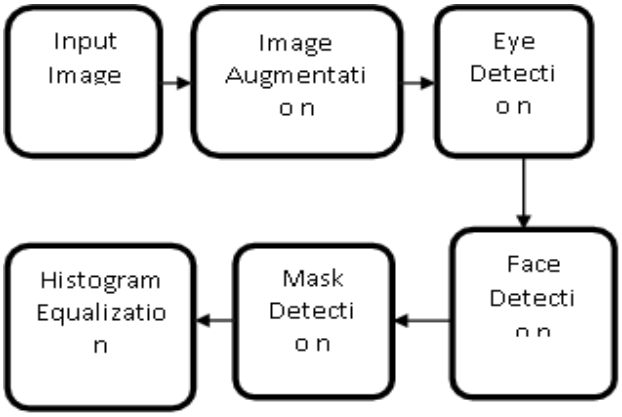

Fig . preprocessing of input image

F. Dataset

The proposed model has datasets captured from individual's person. The dataset of faces is classified into with masks and without masks and is stored in different databases. Each folder consists 40 to 60 images of an individual person respectively. The individual's person face images should have images captured from different masks and different backgrounds so the accuracy of training model increases The dataset is integrated with Keras Library in Python. Larger the dataset more accurate the training model. So dataset images are directly congruent to accuracy of the trainingmodel.

G. Data Pre-Processing

This module is used for read image. After reading we resize the image if needed me rotate the image and also remove the noises in the image. Gaussian blur (also known as Gaussian smoothing) is the result of blurring an image by a Gaussian function. It is a widely used effect in graphics software, typically to reduce image noise. Later normalization is done to clean the images and to change the intensity values to pixel format. The output of this stage is given to trainingmodel.

Input: image Output: pixel format

H. Segmentation

Segment the image, separating the background from foreground objects and we are going to further improve our segmentation with more noise removal. We separate different objects in the image with markers.

Input: pixel format Output: image

I. Edge detection

Sobel edge detector is using. It is based on convolving the image with a small, separable, and integer valued filter in horizontal and vertical direction and is therefore relatively inexpensive in terms of computations. 2-D spatial gradient measurement on the image is performed by Sobel operator. Each pixel of the image is operated by Sobel operator and measured the gradient of the image for each pixel. Pair of 3×3 convolution masks is used by Sobel operator; one is for x direction and other is for y Direction. The Sobel edge enhancement filter has the

advantage of providing differentiating (which gives the edge response) and smoothing (which reduces noise) concurrently.

Input: image

Output: image

Localization

Find where the object is and draw a bounding box around it.

Input: image Output: localized image

Feature Selection

The biggest advantage of Deep Learning is that we do not need to manually extract features from the image. The network learns to extract features while training. You just feed the image to the network (pixelvalues).

What you need is to define the Convolutional Neural Network architecture and a labelled dataset. Principal Component Analysis (PCA) is a useful tool for doing this. PCA checks all the factors influencing the faces rather just checking its geometrical factors. Thus, using PCA gives accurate and precise detection and recognition result offaces.

Input: image pixel format Output: labels

J. CNN Architecturecreation

A sequential CNN model is designed specifically for analyzing the human faces with mask on it or not. The Convolutional Neural Network Architecture layers will be created using the Keras library in Python. The convolutional layer is used for mask detection. It extracts the features off ace images using Principal Component Analysis (PCA)and converts them into a lower dimension without losing the image characteristics. The output of the convolutional layer will be the input of the next Batch Normalization layer. The Batch Normalization layer standardizes the inputs to a layer for each mini-batch. This has the effectof stabilizing the learning process and dramatically reducing the number of training epochs. After this, the face images undergo classification. If the images are tested, then model accuracy calculations and predications takes place. If non-test images come, then first the images are trained along with it its validation testing is also done. If it is validating, then the model is trained and saved for further calculations. Otherwise, if it is non- validate, then it undergoes network training and calculations are done for losing weights and are adjusted accordingly. Finally, the CNN model gives accuracy and prediction of the human face behind themask.

K. Training

The pre-processed face images are directed to the CNN model for training. Based on the dataset given, a logic is formed in the CNN to categorize the faces according to their features. This trained model is saved. The trained model is capable of categorizing human faces based on with or without masks on it. Training model is done with the help of a sequential CNN model and HAAR Cascade Algorithm.

L. Predication

In this phase, when a person comes in front on a webcam, the image is captured and predicted by the CNN model according to the logic learned by the sequential model. The image undergoes pre-processing. This pre-processed images and the saved CNN model are then loaded. Based on the algorithm interpreted by the system predicts and detects the human faces according to trained model.

VI. RESULT

This proposed work uses a sequential Convolutional Neural Network for detecting and recognizing human faces of individuals with mask or without it. CNN model and Haar Cascade Algorithm facilitates automatic detection and recognition of human face which overcome the noise variations and background variations caused by the surrounding and provide more accurate and precise result. It also helps to overcome the uneven nature of the current trend of face recognition and detection. From the experiments it is clear that the proposed CNN achieves a high accuracy when compared to other architectures. The proposed algorithm works effectively for different types of images. These results suggest that the proposed CNN model reduces complexity and make method computationally effective. The proposed system works well effectively for grayscale as well as for the colour image with masks on it or without masks on it.

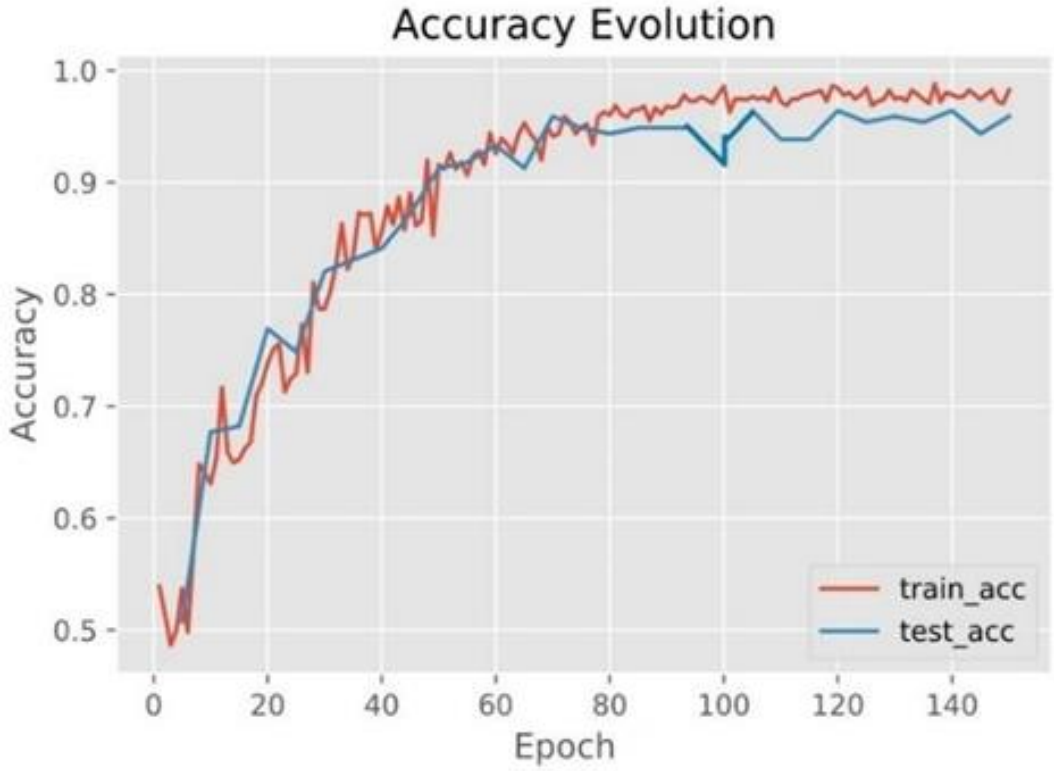

Fig3. Accuracy analysis

	Precision	Recall	F1- Score	Support
With mask	0.99	0.99	0.99	138
Without Mask	0.99	0.99	0.99	138
Accuracy			0.99	276
Macro Avg	0.99	0.99	0.99	276
Weighted Avg	0.99	0.99	0.99	276

Table1. PerformancAnalysis

VII. CONCLUSION

Our proposed system can detect and recognize human face(s) in real-time world. Compared to the traditional face detection and recognition system, the face detection and recognition based on CNN model along with the use of Python libraries has shorter detection and recognition time and stronger robustness, which can reduce the miss rate and error rate. It can still guarantee a highest rate in a sophisticated atmosphere, and the speed of detection can meet the real time requirement, and achieve good effect. The proposed CNN model shows greater accuracy and prediction for detecting and recognizing human faces. The results show us that the current technology for face detection and recognition is compromised and can be replaced with this proposed work. Therefore, the proposed method works very well in the applications of biometrics andsurveillance.

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Machine Learning Approach for Orange Fruits Grading System

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ABSTRACT

Upcoming system in Agriculture uses concepts like Machine learning,Internet of Things (IoT), computer vision, and artificial intelligence (AI) for farming making it Smart.In this paper we are developed smart approach for orange fruit grading system using machine learning and computer vision. ML algorithms solves a diverse set of problems. We are using ML algorithms which have two category supervised learning, unsupervised learning, and reinforcement learning Supervised learning is learning with the supervisor. Supervised learning algorithms used for predicting the category. Unsupervised learning algorithms use unlabeled data and discovers unknown objects by grouping similar objects. It extract hidden knowledge from the training data set. Computer vision is also part of our system it is digital systems that can process, analyze, and make sense of visual data (images or videos). computer vision is process an image at a pixel level and understand it interpret results. In our grading system we are making use of both Computer vision and Machine Learning Algorithms

Key words: Machine Learning, Computer vision, fruit grading

I. INTRODUCTION

Quality evaluation and grading is necessary for fruits to be produced in market for good price, physical classification of orange fruits are time consuming and labor expensive. In this paper we are developing AI based system for orange fruits separation based on their grades also applying machine learning approach for orange fruits prediction.Machine learning approaches construct various algorithm to make effective decision for orange fruits separation problem domain. For problem evaluation we need sample set of data as training Data and for making model we need sample accurate data for testing model. Data set divided into Train-Test(70% and 30%) data. This model is trained using 1000 oranges when fruit is proposed for system it shows 95% accuracy for fruit grading.

II. II LITERATURE SURVEY

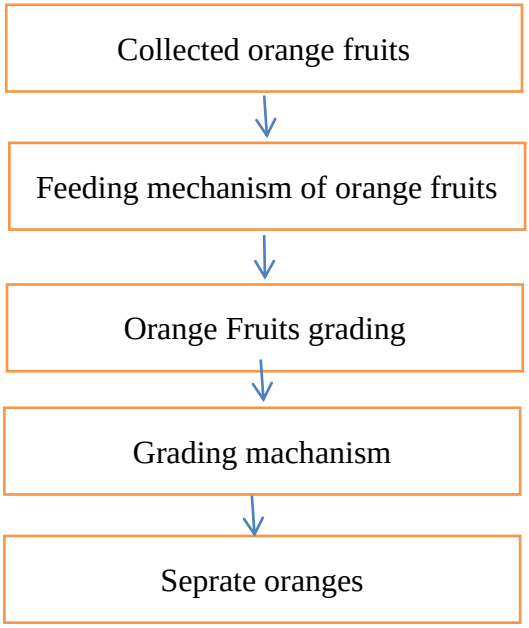
In conventional system oranages were graded by human, now rotar machine is used which was more expensive need more labour which cost more.

Filiberto Pla et al.[2] has developed system base on size and color sorting of fruits based on values of red–green–blue (RGB) and infrared (IR) using a machine vision unit as part of a distributed control system in which several machine vision modules are integrated with a central control unit and a user interface module.
Aleixos et al.[3] has developed a machine vision system using a multispectral camera consisting of two charge coupled devices (CCDs) for the color and near infrared (NIR) information.
Sirisathitkul et al.[4],An automated orange maturity sorting system using color grading was developed by The system consisted of a color CCD camera for image acquisition and a computer for image processing. The hue saturation intensity (HSI) color model was used and decision rules were derived from the hue color.
Tao[5] has developed a method to sort fruits based on color by obtaining a single hue value from red, green, and blue components measured on the fruits and comparing this hue value to user programmed grading criteria.
Lino et al.[6] used electronic systems which consisted of a CCD camera and a personal computer for color analysis of tomatoes based on RGB values.
Ahmad et al.[7] and Khojastehnazhand et al.[14] have developed citrus fruits sorting system based on color and size, using image processing with CCD cameras.

III. PROPOSED SYSTEM

Our aim to produce fully automated cost effective machine for fruit grading. Computer vision identify fruits and machine learning classify them.

System design for automated fruit Grading



IV. ORANGE FRUIT IDENTIFICATION USING COMPUTER VISION

1. Selection of DataSet

A public dataset available by the name of "Fruits-360" [1]. The model consisted of 100 × 100 pixel images of various fruits. The trained model, provided an average precision of 95.6% with an F1 score of 0.9795, as reported in Table I. Now, the input image to the fruit identification module was captured by the Raspberry Pi Camera at a resolution of 3280 × 2464 pixels. The image was cropped to 2464 × 2464 pixels (408 pixels from each side) and was re-scaled down to 100 × 100 pixels,using the PIL Python Library.

Fruit Size	Image count	Precision	F1 Score
small	402	0.99	0.98
medium	395	0.982	0.991
large	286	0.98	0.99

PERFORMANCE E VALUATION SCORES OF TRAINED ORANGE FRUITS

Fruit Size	Image count	Precision	F1 Score
small	75	0.92	0.96
medium	80	0.87	0.871
large	90	0.86	0.886

PERFORMANCE E VALUATION S CORES OF THE VISION

	Predicted Label 1	Predicted Label 1	Predicted Label 1	Error
Actual Label1	5	10	0	62
Actual Label2	20	155	21	19
Actual Label 3	2	35	60	30

MODEL ON THE TEST DATASET

2. Dataset

These oranges were pre-graded into three categories 1, 2 and 3, (also s, m and l) according to acceptable local standards [20]. A lot of 1000 oranges were acquiredwhich were pre-sorted into their grades using rotar machine . The sensor was able to capture 18 readings, of each oranges, represent-
ing different wavelengths label encoded as - ["A": 65mm,"B": 55mm, "C": 45mm, "D": 35mm] These values are for orange gradation. As the sensor is able to rotate and take in data from three different sides of the orange, A data sample can be shown. In order to determine if the three classes are statistically significant and separable, p-value estimation was done using the t-test. The average p-value= 0.0033 , threshold=0.0. 5. the data acquired was statistically significant and a model could be used to fit on the data for classification purposes. The data was also further analyzed using the ANOVA test, to get the most significant features. The result provided the following trend as shown in Fig. 5 indicating highest correlation with the label in the visible region and a good correlation with the label in the UV/IR region.

3. Machine Learning Model

Step I:Data collection

The entire dataset was randomly split in a 3:7 ratio representing the test and the training dataset.

Step II:Data Cleaning

Data Pre-Processing:The training dataset was preprocessed for to remove any errors due to human and machine error.

Step III Machine Learning Model

K-fold cross validation are used considered k=3. using these particular features, multiple models were trained, ranging from traditional ML Models such as Logistic Regression to more modern ones such as gradient boosting. AI used engineering features for transformers, such as ClusterDistTransformer, TruncSVDNumTransformer and Interactions Transformer used.

Step IV Proposed Ensemble

re-iteratively trainingof models. The proposed ensemble can be used. The Models used for the ensembling are XGBoost Model , LightGBM Model and Constant Model with different weights were considered. Validation and Test score has been found

Model Name	Model Weight	Fitted Feature	Learning rate	Maximum Leaves	Colspan by Tree	Maxium Dept	subsa mple	Growth Policy
XG Boost Model	0.23	40	0.2	0	0.6	8	1	depthwise
LightGBM Model	0.14	12	0.2	67	0.3	0	0.6	
Constant Madel	0.18	7	0.2	1223	0.8	0	0.6	depthwise

V. RESULT AND DISCUSSION

THE PROPOSED ENSEMBLE MODEL

THE PROPOSED ENSEMBLE MODEL EVALUATION

Matrix for Prediction

Evaluation score	Valaditation Score	Change from Baseline Model	Test Dataset score
Accuracy	0.81	9.70	0.72
F1	0.81	10.72	0.72

VI. CONCLUSION

This research work presents a novel method to grade the orange fruits according to their defined grades. Firstly, the fruit is detected using computer vision. The camera sensor clicks the picture of the input fruit, which is then predicted. The orange fruits overall prediction came out to have an accuracy of 95%.The final system increased the validation accuracy by 9.72% and F1 score by 10.72%,

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Machine Learning Based IoT Device for Pest Detection in Precision Agriculture

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ABSTRACT

Apples are the topmost fruit crops of the world, and are widely expanding in many regions and countries.
The most common problem for these crops is the attack of the codling moth, which is a dangerous parasite for apples. IoT sensing devices can nowadays run near sensor machine learning algorithms, thus giving not only the possibility of collecting data over wide coverage but even featuring immediate data analysis and anomaly detection. Near sensor neural network algorithms can automatically detect the codling moth: the system takes a picture of the trap, preprocesses it, crops each insect for classification, and eventually sends a notification to the farmer if any codling moth is detected.
The application is developed on a low-energy platform powered by a solar panel of a few hundred square centimeters, realizing an energy autonomous system capable of operating unattended continuosly over low power wide area networks. The hardware is based on the Raspberry Pi3 board and the Intel Movidius Neural Compute Stick, responsible for the preprocessing technique and the neural network implementation, respectively. The network model has been analyzed in detail, showing parameter settings and the limitations for the specific hardware constraints.

I. INTRODUCTION

Nowadays, machine learning (ML) algorithms are widely used in many fields and are particularly innovative in agriculture to compute tasks such as species recognition [6], water management, crop quality [7], disease detection, and weed detection.
This article focuses on an automatic method for monitoring parasite insects from images taken in pest traps. The codling moth is a particular insect that looks like a butterfly, and it is a dangerous parasite for apple fruit crops. An energy-efficient IoT solution shows how the feasibility of classifying parasites from other general insects autonomously, using low power consumption hardware directly infield. Recent technological advances have paved the way for remote agricultural sensing and automation. current wireless sensing platforms and communication systems are designed for bare remote monitoring without making any immediate decision after the damage has already been done [4].

Moreover, the large-scale deployment of sensors would result in a tremendous increase in the number of connections and the amount of data to be transmitted, which could over- whelm current communication systems. Adding intelligence to the nodes, shifting the detection of anomalies near the sensor to permit decisions and actions as soon as possible, is the key to reduce the communication costs and latencies, and to permit high scalability of IoT solutions in agricultural environments.

It runs ML on the sensor board, and if the insect captured by the camera is classified as a codling moth, a report is sent for an immediate counteraction. Current methods to monitor pests consist of capturing insects using commercial pheromone-based glue traps, as shown in Fig. 1a, that attract insects even if present at very low densities. Periodic in-field inspections or simple wireless cameras permit the farmer to watch each insect and determine if it is a codling Moth.

IoT System: The proposed system, as shown in Fig. 1b, processes the picture in situ near the sensor (preprocessing algorithm), returns a classification of the insects (ML algorithm) in the trap, and eventually sends a notification to the farmer if it recognizes a codling moth.

II. IMAGE PROCESSING

The dataset used to start the DNN training contained approximately 1300 pictures and was incremented when more insects were trapped during the earliest experiments. The dataset represents two classes: codling moth and general insects. These figures are used to feed and train the DNN with a TensorFlow model.

The dataset was created with the same camera and trap. The camera captures the bottom side of the insect glue trap; thus, as shown in Fig. 4, pictures may contain a high number of trapped insects to classify. Thus, the images are processed in situ to separate each insect in sub-tiles from the original picture. This step is essential since it filters the raw pictures, as shown in Fig. 4, and produces tiles that contain only one insect. This algorithm is used in two different cases:

- To build a large and comprehensive dataset of pictures for training the DNN model. We started with 100 raw pictures that generated more than 1300 tiles containing only one insect.
- At each application startup, a picture of the trap is taken first, and then, thanks to the preprocessing algorithm, each new trapped insect is cropped for the classification step. The task efficiently exploits features such as color (dark subjects on a white background) and the shape of the insects with a Blob Extraction algorithm. The process for image crop consists of:
- Conversion of the frame from RGB to gray scale
- Smoothing (or blurring) of the frame with a Gaussian filter
- Edge extraction through a Canny operator
- Some dilation and erosion of the picture

III. TRAINING, VALIDATION, AND TEST

For the training stage, we used the rapid development of neural networks for image classification provided by the Tensor-Flow library [13]. In an ML approach, an initial training step is required. The training consists of an

offline process that optimizes the neural network using a large dataset of labeled images. In this way, the system learns the classes assigned to the images.

The basic unit of a DNN is the neuron (or node) that multiplies by weight values the input signals. The training phase adjusts the weight values, while some parameters, such as the number of epochs and the image size, can improve the accuracy of a DNN. Epochs represent the number of times all of the training vectors are used once to update the weights. Each epoch finish es with a validation step that evaluates the ongoing training process. A good trade-off between the number of epochs and image size is necessary for a correct training stage and to meet the hardware constraints. The training stage of this application has been assessed with three different configurations:

- 75 epochs, image size 224 □ 224
- 10 epochs, image size 112 □ 112
- 10 epochs, image size 52 □ 52

The results of the training tests are presented in Fig.

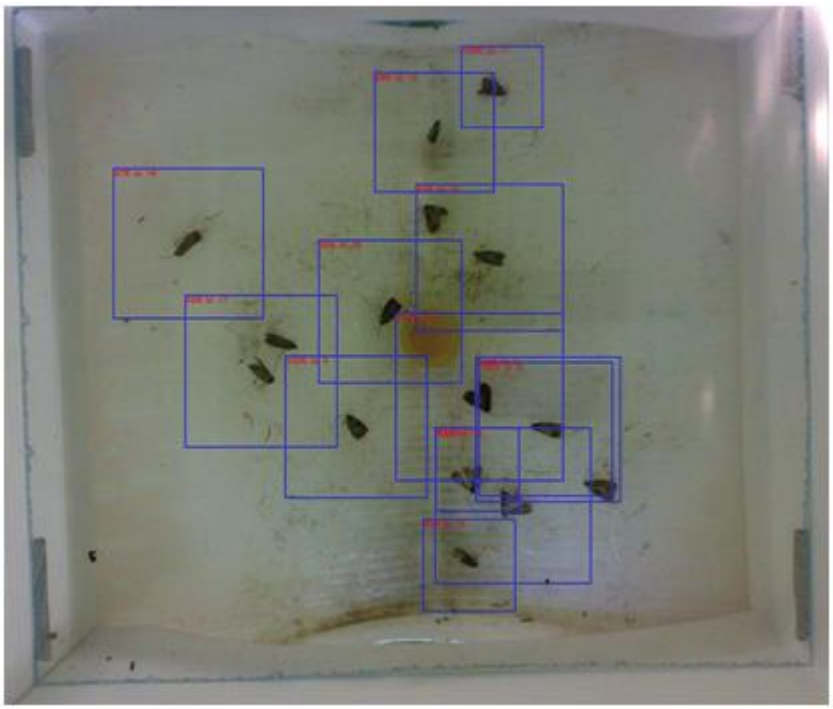

Figure 6. Example of moth detection from the system.

IV. POWER ASSESMENT

In apple orchards, codling moth checking is usually executed twice every day. We evaluated the power consumption of the overall system's classification, as shown in Fig. 3, which is divided into five general tasks with different execution time and current consumption:

- Task 0: Boot of the Raspberry (Time 43.68 s, Average Current 345 mA)
- Task 1: Image capture (Time 3.45 s, Average Current 394 mA)
- Task 2: Preprocessing (Time 4.07 s, Average Current 501 mA)

- Task 3: Classification (Time 10.19 s, Average Current 525 mA)
- Task 4: Report/Alarm generation (Time 0.34 s, Average Current 525 mA)

When the system finishes Task 4, it shuts down, and zeroes its power consumption, while a nanowatt real-time clock (RTC) is activated to trigger and boot the application when planned. As expected, it is possible to observe that T3 is the most power hungry task because it combines the usage of the Raspberry and the Intel Movidius. Figure 7 shows the power consumption of the overall system from T0 to T4, and the total energy necessary is 124.1 J; thus, a 9000 mAh battery is sufficient to sustain the system for more than one year. Moreover, when combining the system with a 0.5 W solar panel of a few hundred square centimeters, as presented in [14], the energy intake will be enough to permit the smart camera to operate unattended indefinitely.

V. CONCLUSION

Even though the proposed system does not use ultra-low-power microprocessors or microcontrollers, its average power consumption is minimal because of its low duty cycle. Due to the low cost of the hardware, this type of system can scale to several installations in the farmer's apple orchard, and save time and money for human intervention in trap checking every day. This type of application is straightforward and innovative, and gives an additional value to agriculture. In this way, it is possible to use treatments for codling moth only when the system detects threats for crops, optimizing the use of chemicals and mitigating their impact on the environment.

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Alert and Accident Tracking System for Drowsy Driver

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ABSTRACT

Due to tight schedules, it is impossible to be active all of the time in modern times. Consider the following scenario a person is traveling home from work, exhausted from the day's problems. His hands are on the wheel and his foot is on the pedal when he begins to feel tired, his eyes begin to close and his vision blurs, and before he realizes it, he's sleeping. Falling asleep behind the wheel may have terrible implications; accidents can occur, and individuals can lose their lives. This condition is far more prevalent than we realize, and as a result, it is critical to address it. So, in order to overcome this issue, we developed a Alert and Accident Tracking System for Drowsy Driver. This system detects eye activity and alerts the user to avoid avoidable mishaps and safely perform their job. This initiative seeks to give trustworthy indications for drivers, industrial workers, security personnel, and students who are performing critical job at night and frequently fall asleep by mistake Eye blink sensor. So, in this project, we considered creating a Alert and Accident Tracking System for Drowsy Driver utilizing an Arduino Nano, an eye blink sensor, and an RF Transceiver module. The primary goal of this system is to detect the driver's eye movements using an eye blink sensor, and if the driver becomes sleepy, the system will provide a warning message through a loud buzzer alert.

Keywords—vision blurs, Eye blink sensor, Arduino nano, Piezo Buzzer.

I. INTRODUCTION

The Tackling these issues can be difficult when our lifestyle does not align with avoiding drowsy driving. In a 24/7 society, with an emphasis on work, longer commutes, and exponential advancement of technology, many people do not get the sleep they need. Effectively dealing with the drowsy-driving problem requires fundamental changes to societal norms and especially attitudes about drowsy driving.The terms drowsy, sleepy, and fatigue are used interchangeably although there are differences in the way these terms are used and understood. Fatigue has costly effects on the safety, health, and quality of life of the people . Whether fatigue is caused by sleep restriction due to a late or long shift at work, hanging out late with friends, or a long and monotonous drive for the holidays the negative outcomes can be the same. These include impaired cognition and performance, motor vehicle crashes, workplace accidents So, in order to overcome this issue, we developed

a Alert and Accident Tracking System for Drowsy Driver. This system detects eye activity and alerts the user to avoid avoidable mishaps and safely perform their job.This initiative seeks to give trustworthy indications for drivers, industrial workers, security personnel, and students who are performing critical job at night and frequently fall asleep by mistake Eye blink sensor. So, in this project, we considered creating a Alert and Accident Tracking System for Drowsy Driver utilizing an Arduino Nano, an eye blink sensor,The primary goal of this system is to detect the driver's eye movements using an eye blink sensor detect the eye is closed or open when eye is closed and driver goed to sleep and it's detect the system and start the buzzer.

II. METHODOLOGY

The eye blink sensor is used to detect eye blinks by managing the driver's eye blink. If the human eye is closed, the output of the infrared receiver is high; otherwise, the output of the infrared receiver is low.
The buzzer serves as an alarm or alert device. If the receiver's eye blink sensor output is high, the buzzer will activate; otherwise, the buzzer will be switched off.

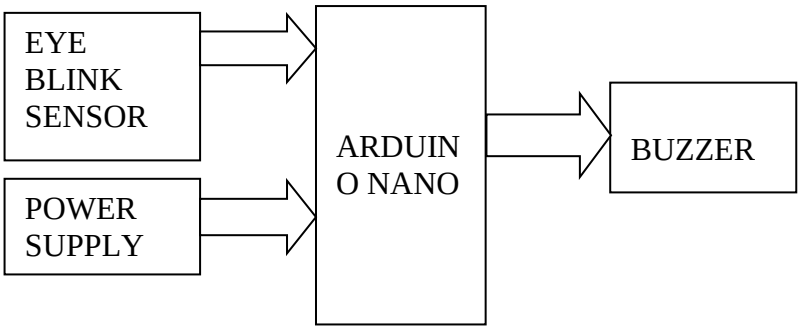

Figure 1: block Diagram

III. HARDWARE COMPONENTS

The hardware and components used in this project

1. Arduino Nano
2. Eye blink sensor
3. Buzzer
4. Push Button Switch
5. Battery

1. Arduino Nano

The Arduino Nano is a small, complete, and breadboard friendly board based on the ATmega328it has more or less the same functionality of the Arduino Duemilanove but in a different package. It lacks only a DC power jack and works with a mini -B USB cable instead of a standard one.

Specifications

Processor of microcontroller	:ATmega328
Architecture of the board	:AVR
Operating Voltage	:5 V
Memory for Flash	:32 KB
Static RAM	:2 KB
Speed of clock	:16 MHz
INPUT Pins of Analog	:8
EEPROM	:1 KB
Direct Current for one I/O Pins	:40 mA (In/Out Pins)
Applying Voltage	:7 to12 V
Input/Output Pins for Digital	:22 (6-PWM)
Output of PWM	:6
Consumption of Power	:19 mA
Size of PCB	:18 x 45 mm
Weight of the board	:7 g

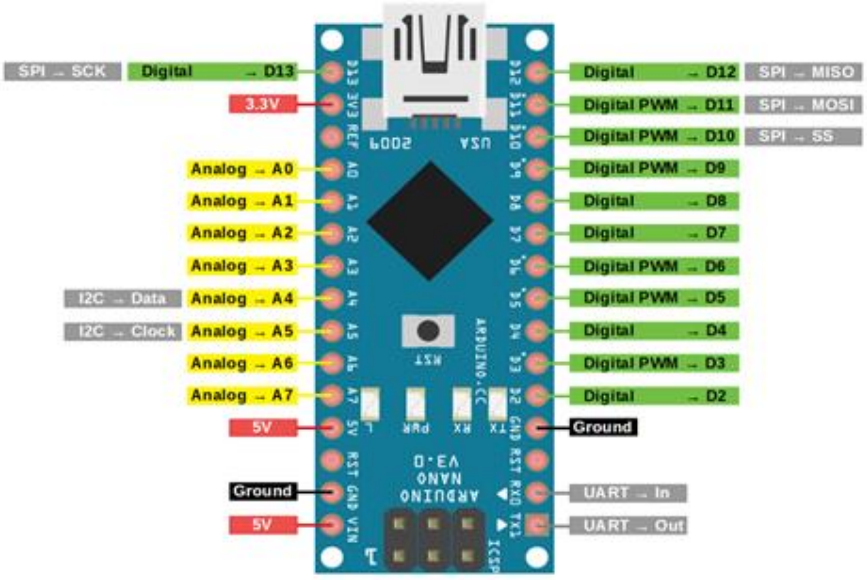

Figure 2: Pin Diagram of Arduino Nano

Figure 3: Arduino Nano Board

2. Eye Blink Sensor

The eye blink sensor is a sensor that operates by lighting infrared rays in the eyelid area. The phototransistor and differentiator are the two major circuits in this sensor that are used to examine any changes in returning reflected infrared light. The accurate and overall function is heavily dependent on the targeting and placement of the detector and emitter parts in relation to the human eye..

The eye blink sensor is used to monitor or detect the eye blink of the driver to detect whether they are in a drowsy state or not. If the human eyes are closed, the output of Infrared receiver is in high state otherwise the Infrared receiver output is in low state.

Figure 4: Eye blink sensor

Working

Eye Blink Sensor has two main parts. One is Infrared Transmitter and other is Infrared Receiver. IR transmitter role is to Transmits the Infrared rays to the driver's eyes and an IR receiver role is to receive the reflected rays which was initially transmitted; when the eyes are in the closed manner. If the eyes are closed, it is nothing but the output of IR receiver is high and if the eyes are open, it means the output is low for the IR receiver. The Buzzer automatically turns on when there is a high output and if there is a low output then the buzzer turns off automatically.

(5V) High → LED On; Eye closed condition. (0V) Low → LED Off; Eye opened condition

Table 1: Pin Configuration of Eye blink sensor

Pin Name	Description
VCC	Input Power Supply
GND	Ground
OUT	Output

Features and Specifications

- Eye blink indication by LED
- Quick signal or digital output ar directly connecting to the microcontroller

- Size is Compact
- Working voltage is +5V DC

3. Buzzer

A buzzer is an aural signalling device. It might be mechanical, electromechanical, or piezoelectric. The piezo buzzer is employed in this application. A piezo buzzer is a small speaker that may be attached straight to an Arduino Nano board. Piezo buzzers are devices that can provide the necessary beeps and tones for the signalling device. It operates using a piezo crystal, a particular material that changes form when a voltage is given to it. If the crystal presses against a diaphragm, such as a tiny speaker cone, it can create a pressure wave, which the human ear perceives as sound.

Figure 5: buzzer

Features and Specifications

- Voltage Rated: 6V DC
- Working Voltage: 4-8V DC
- Current Rated: <30mA
- Type of Sound: Continuous Beep
- Frequency Resonance: ~2300 Hz
- Tiny and perfectly sealed packing
- Bread board friendly

4. Push Button Switch 4 pin

This switch has four connections A, B, C, and D. A and D are connected together and B and C are also connected together. When the switch is pushed, all connections A,B,C,D are connected together and use as a on and off switch for the system.

Figure 6:Push Button Switch 4 pin

Features and Specifications

- It is a small size witch (6mm – 6mm)
- It can be used as a reset switch
- It can be handle minimum 1 V to maximum 12 V
- Operation temperature is: -25 C to +70 C
- Number of Pin: 4

5. Battery

The battery is used for the power supply purpose.

Figure 7: Battery

Software used

The software which utilized in our project is nothing but the Arduino Integrated Development Environment (IDE). For the programming purpose of the Arduino Nano board, the Arduino Integrated are coded in Java language which is self-installable. Here in this software, coding languages such as C and C++ are used. This IDE software makes the way for a strengthen environment and it is easy for the user to work. Here we are going to compile and upload the programs to the Arduino Nano board via connection with USB.

IV. CONCLUSION

During the night, sleepiness is one of the most common causes of accidents. This project is intended to be a portable prototype model for detecting tiredness using an eye blink sensor. Using an eye blink sensor, the suggested system can assist to avoid car accidents caused by driver drowsiness. In this research, we construct

and test a system for detecting driver weariness. If the driver becomes tired, the eye blink sensor linked to the glasses will detect it, and the buzzer will notify the driver with a beep to avert road accidents.

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IoT Base Smart Courier Box for Home

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ABSTRACT

The Internet of Things (IoT) refers to a situation in which objects, animals, or people are given unique IDs and the capacity to send data over a network without the need for human-to-human or human-to-computer contact. Internet of Things (IoT) developed as a result of the confluence of wireless systems and the Internet IoT devices often collect and stream data .It is transmitted through the Internet to a central location where it is evaluated and processed. As stated by the As the capabilities of Internet-connected devices develop, they will become by integrating data into more valuable information, more intelligent In today's hectic world, We frequently do not have enough time to reply to our normal activities because of our hectic lifestyles. For the fast growing online purchasing industry, the final stage is for delivery men to bring package posts toclients. Far too often, if the clients are not there, the deliverymen must deliver again the next day. The Node Mcu smart box for accepting package posts is presented in this study. It may accept a large number of parcels from customers and send a message to the customer's mobile phone via the Line application once the parcels are placed in a box. In an abnormal condition, a buzzer is utilized to provide a warning. The smart box has a waterproofand shockproof construction. Furthermore, it has been developed to use a passcode to unlock the box's door.

Keywords— IOT (Internet of Things), Node Mcu, buzzer

I. INTRODUCTION

The expansion of e-commerce and online purchasing, as well as the greater efficiency of distribution and delivery systems, have resulted in an increase in parcel deliveries. Parcels can be difficult to deliver, particularly to residential addresses, for a variety of reasons, including the recipient being absent or unavailable to receive the parcel, parcels left unattended being vulnerable to theft or environmental damage, parcel re-delivery being time consuming and costly, parcel return being costly, and returned or undelivered parcels frequently leading to dissatisfied customers. As a result, automating parcel/product reception will almost likely result in a simple and secure fulfilment of an online transaction. Smart boxes are expressly designed to make parcel delivery and collecting easier. The primary benefit ofthis system is the presence of the IoT enables the device to communicate with the receiver no matter wherever he was present on the globe.

Digital marketing is the important tool and has been impacted to human behaviour. It is a very diverse marketing platform used by most business for marketing all types . So ,the trend of products and services for all the companies will become to the digital marketing. Besides on mobile or desktop for online shopping, they are now firmly entrenched component of modern lifestyles, easy and convenience to find everything such as electronics, fashion and beauty, baby or children's cloths, books (hard copy), et al. The customers can order what they want by one click and they will get a rapid delivery that is why the e-commerce and m-commerce markets are very popular.

The easy-to-shop step-by-step When clients want to buy everything from online shopping, they shop through a store, load an online shopping basket, and then pay before waiting for the deliverymen to bring the parcel postal. Customers got parcels by signing on the deliveryman's cell phone for identification. In rare circumstances, clients are unable to receive parcels on the same day because they are absent. This paper presents a novel Node Mcu-based smart box for receiving parcel posts. When the client is absent, the smart box may receive several package postings from the customer and send a message to the customer's smartphone via the Line application.

In paper IoT based Smart Delivery Box, secured delivery Box which generates OTP for every active session and notifying the customer about the systematic process flow till the session is terminated. The system performs as a secured Box with minimum operational delay. Time based One Time Password increases the authenticity of the delivery vault. Global system for mobile communication module is used to send text message since GSM network has an advantage of covering wider area of operation even during mobility of the customer. Using MQTT Broker Android application, the box can be locked/unlocked from remote location. In paper smart system letter box, in which the hardware kit is used to notify user that letter is arrived. The mobile application is used to receive the notification. Here the obstacle sensor is used to detect the object (letter). The RTC clock is used to store the time the delivery of the letter. GSM module is used to send the notification through message and the GPS detects the location at which address the letter has been received. We have used Android operating system in this system which has lot of features integrated in it. database is used to store the records. This database is easy to maintained records. In paper SFB is a courier/parcel collecting box which is to be installed in our home like A/C in a place where the outsiders and insiders can be able to access it for placing and collecting the parcel respectively. It consists of barcode sensor, weight sensor loading cell and doors on both sides of the box for placing and collecting the parcel as when the customer is available. It will also contain a shifting belt where the parcel will be placed initially. After verification of the parcel it will be shifted inner ward so that the parcel will reside in a place safely until the customer is able to collect it.

II. RELATED WORKS

Node MCU For Application

A barcode sticker is placed inside a package, which the delivery driver is required to scan as evidence of delivery. Because these current boxes do not provide actual proof of delivery, delivery drivers may frequently refuse to place items in them. The author has introduced the smart box, which is an intelligent parcel delivery box with a relatively sophisticated design with interfaces for GSM, Wi-Fi, and Bluetooth. Smart Parcel

Receiving System Design and Implementation This article introduces the Smart Package Receiving System by bringing technology into the everyday lives of ordinary people by using developments in GSM technology to alleviate the problem of missed deliveries by creating a smart and secure parcel delivery solution that we can watch and control. from our Smartphone. The idea is to introduce a Smart Parcel Receiving System which will be able to verify and accept the ordered parcel as well as acknowledging the customer and the e-retailers of parcel In our modern busy lifestyles we are often not having enough time to respond to our routine activities like – answering a person at the door or for collecting a door delivery. To handle such situations we propose a solution by automating the parcel collection unit. This paper discusses about the part of IoT in home sophistication, the proposed approach for automating the parcel delivery collection, the working and design of the system.

III. WORKING

Nodemcu is wifi based controller which connect to internet. When delivery person came he call us and by using IoT we open the door of the box i.e. by pressing button nodemcu trigger relay that will turn ON the solenoid lock When the parcel put inside the box the door will close and automatically it will lock IR sensor use to detect the parcel inside the box and we can see the status online if the parcel is available there

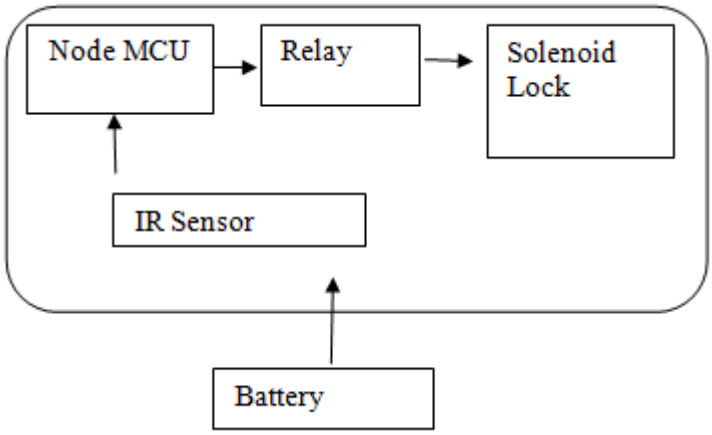
Motivation

In our daily life, ordering things online has greatly reduced the time and effort rather purchasing it personally. But in such cases, the availability of the customer at the time of product delivery is always essential. The requirement of this constraint minimizes the easiness of ordering the product online. Hence automation of parcel/product receiving will certainly lead to an easy and safe fulfillment for an online ordering. This is the motive behind the proposal of an approach for automation of parcel receiving.

Advantages

Smart Parcel Box with UV Based Sanitization makes delivery of the parcel easier and safe even in the absence of the customer. Each and every mechanism is handled by customer it self through app, so parcel is fully protected. Parcel Boxes secure your deliveries better than deterrents like security cameras and alarms. Boxes are also more convenient than delaying deliveries or having them sent to alternative locations for pickup. It will be useful for industrial purpose also to keep their products and important letters securely. These systems can be sold to people who live in bungalow, rent, industries, and high security societies. The important use of this product which user can get sanitized product. People will less disinfected by using this system. This system also having battery backup.

Block Diagram



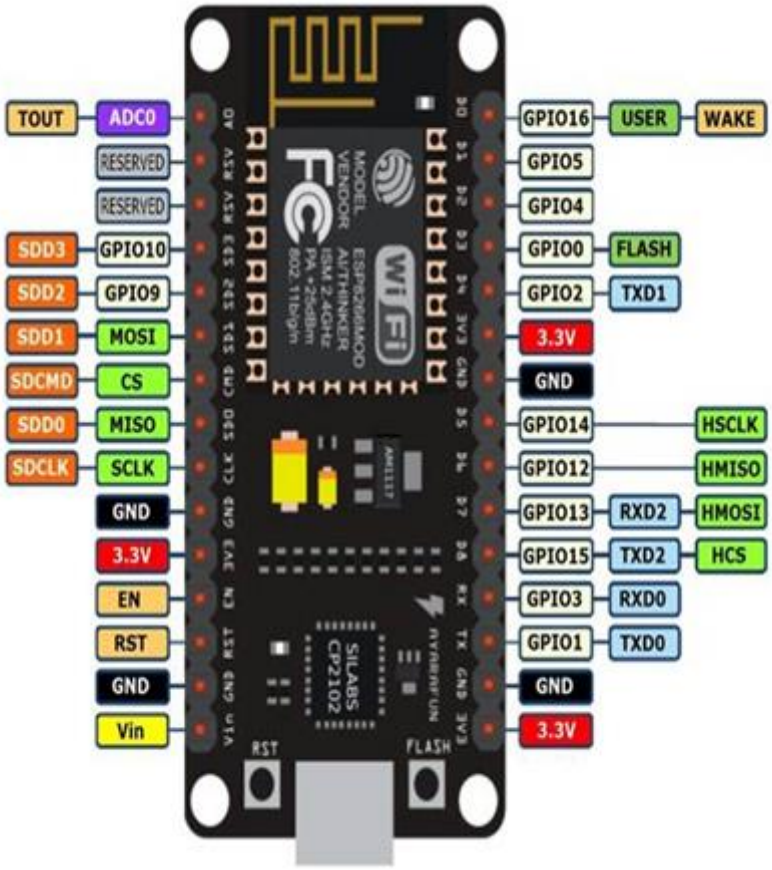
Hardware use

- Nodemcu
- Relay
- Solenoid door lock
- IR sensor
- Battery

NODE-MCU

Node MCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espress if Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added.

Specification	Node MCU v1.0
MCU	32 bit Tensilica L106
Frequency	80/160 MHz
Input-Output	17xDIO
ADC Pin	1x10 bit (IV)
Operating Voltage	3.0 ~ 3.6 v
Program Memory	4 MB
Wifi	IEEE 802.11 b/g/n



Relay

- SPDT
- 5V DC
- 230V / 7A - AC support switching
- 28V / 10A - DC support switching

IR sensor

When the module detects obstacles in front of the signal, the circuit board green indicator light level, while the OUT port continuous output low-level signals, the module detects a distance of 2 5cm, detection angle 35 °, the detection distance can be potential adjusted with adjustment potentiometer clockwise, the detection distance increases; counterclockwise adjustment potentiometer, the detection distance decreases..

Door Lock

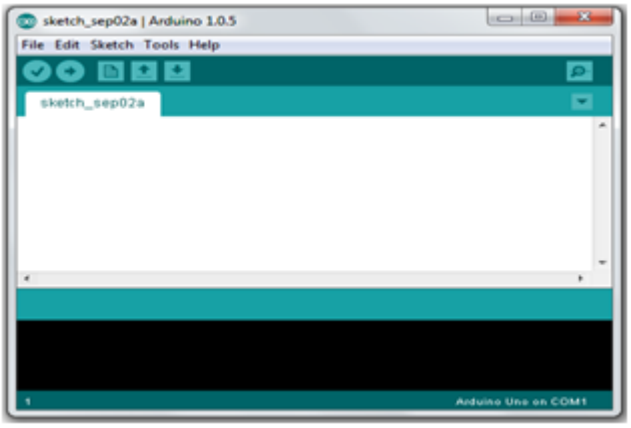
This DC 12V Cabinet Door Lock Electric Lock Assembly Solenoid can be used for locking sell-machine, storage shelf, file cabinet and etc. The hidden way of unlocking can be used for an emergency. Rated Operating Voltage (VDC) 12Rated Current (mA) 0.80A.

Battery

3.7V 2000mAh with Charge Protection
Maximum charging voltage 4.2V
Maximum charging current: 1000mA

Software Use

Arduino Compiler
Language: Embedded C for Arduino
Cloud server for IoT



IV. CONCLUSION

We offer a solution based on Smart Parcel Box with UV Based Sanitization is an IoT-based parcel collecting unit that safely receives parcels from couriers and also offers acknowledgement. This sophisticated approach will save time by avoiding shipment delivery rescheduling. Customers may safely click and get our shipment using our own app with live streaming. The most essential application of this product is that the consumer may obtain a sterilised product. Using this technique, people will be less disinfected.

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Redefining Indian Agriculture through Farming 4.0- An IoT Approach

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ABSTRACT

Agriculture is the heart of Indian economy generating employment for approximately 60% of the total workforce and feeding a population of about 1300 million. India generates about 250 million tons of agriculture produce every year. Despite of having a significant contribution in the economy this sector is yet to be technologically developed in India. With the growing population, meeting the expected demand for food and allied agriculture product is bit challenging for which revolution in the field is need of an hour. Significant number of efforts have been taken by government to bring the Indian agriculture a new turn focusing towards uplifting agriculture sector. Agriculture 4.0 mark the digitalization of agriculture and entire food system using IoT, AI automation and other technologies for optimizing both production and consumption for demand supply chain management. This paper represent the application of Internet of Things approach in Indian farming, tool and techniques adopted and the possible challenges could be faced by Indian farmers as well as government in applying the same.

Keywords—Indian Agriculture, farming 4.0, Internet of Things, smart farming, Information and Communication Technology (ICT)

I. INTRODUCTION

When it comes to life of a well being the first question come to everybody's instinct is food. Day by day world's population getting increasing and if we look at the food-scarcity equation, demand side is increasing and lagging behind value chain or supply side. Agriculture 4.0 is a revolution in agriculture industry which can be a proving solution addressing the need of this food chain and improve the farming process. The global agriculture in future may be affected by limited resources, climate change, and food waste and government policies [4]. As population is continue to grow, the government need to manage the available arable land for maximum utilization and high yield production. As per one of the article published in Economictimes by 2050 huge shifting of rural population to urban areas is estimated which add about 2.4 billion people to urban cities which trigger the increased demand of about 70% for food and allied stuff which is directly or indirectly related to

farming. To meet this future challenge revolution in agriculture field is the first and foremost requirement. Agriculture 4.0 with the essence of advanced technologies of information and communication tool may become a proven solution for this.

Farming 4.0 is a method of rejuvenating the traditional farming approach by applying some modern techniques and advanced agriculture operations including application of sensor technologies, devices, machines and information technologies.

Future Indian agriculture may use sophisticated ICT tools and techniques like drone, GPS technologies, Sensors for checking different parameters like temperature, moisture, humidity etc. These advancement in the agriculture sector will let the businesses be more efficient, cost effective, highly yield and profitable. The coming revolution through Farming 4.0 will hopefully meet both the demand side and the value chain or supply side of the food scarcity equation.

Through Farming 4.0 the farmer need not to be depend on the farm routine activity management like applying water, spreading right amount of fertilizer across the field, pesticides over the crop plants etc. Instead the smart technologies and related tools will manage the entire process automatically and help farmers to take decisions on some activities. The activities like real time soil monitoring, plant health monitoring, weather monitoring and prediction, sustainable weed control may be done automatically, gathering data of all parameters from the field, forming the datasets, analyze each data set may be done smartly by applying Farming 4.0 which cover all the management need of the farmers. More specifically right from farm planning to inventory management to equipment optimization and keeping things controlled is the basic agenda of farming 4.0.

II. FARMING 4.0 IN INDIAN CONTEXT

In the last two decades Indian agriculture is witnessing the drastic change, going through the huge transformation phase becoming a competitive industry to give cut throat competition to other sectors. Number of concept right from green revolution to organic and precision farming have been leveraging into the system. These concepts give a huge breakthrough to the Indian agriculture sector and new wave of technological advancement is coming for revolutionising the agriculture field.

Present statistics shows 17-18% contribution of agriculture and related industries in country's GDP. Forecast shows India's population reach 1.6 billion by 2050 and this is the time where Indian agriculture industry showcase its positive points and boost the production to meet the demand of this huge population figure.Fig.1. Shows the real statistics of the Indian economy which shows majority of the population is directly or indirectly have concern with the agriculture sector.

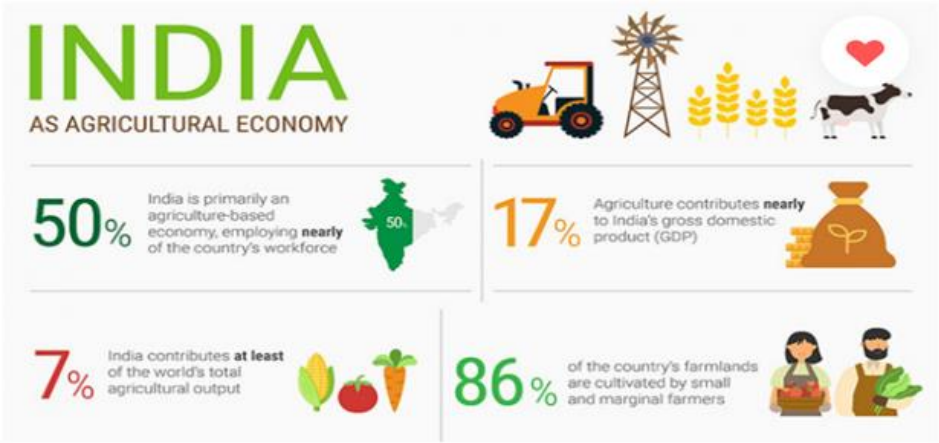

Fig. 1. Statistics of Indian Economy from Agriculture Perspective

Need of new technological advancement which is a perfect combination of Artificial Intelligence, Internet of Things, Mobile applications and smart apps is generated which help to effectively utilize all the available resources. These technologies are now accessible more than ever and giving agriculture industry to new technological height which. This new array provide cost efficient, enhanced production, highly productive and reduced waste well organized farming which is the need of an hour.

III. CONCEPT OF SMART FARMING

Smart farming is basically leveraging advanced technologies like Internet of Things, cloud, big data and other tools in managing all the agricultural activities. [1]It is well known as precision farming or precision agriculture which is completely sensor monitored and software managed. This concept is gaining popularity day by day with the ever increasing demand of growing population for food and related stuff and limited resources for meeting the same. Smart farming give a new technological height to the agriculture industry with the use of new information and communication technologies. The smart technology enabled intelligent farm include so many IoT tools which are described below:

A. Sensors

Sensors like humidity sensor, water sensor, light sensor, temperature sensors are used for scanning the parameters in light for monitoring and controlling its quality and management.

B. Telecommunication

Advance networking tools like GPS or Wi-Fi are basically used as a communication medium for facilitating interaction between the components of the system.

C. Data Analytics

For smart farming, so many parameters like soil-mapping, fertilizer quantity and application, machinery and animal health need to be monitor and controlled. For this huge amount of onsite data need to be collected from the crop yield and analysed using decision making and prediction tools.

D. Satellites & Drones

For remote monitoring of data around the field.

The proper mix of all these technologies facilitate Machine-to-Machine derived data. The acquired data is then feed into a decision support system which help the farmers to get clear picture of the things happening to their crop. Number of factors can be effectively utilize all the available resources. Example, by precision measuring technique the farmer can easily find out the amount of fertilizer and pesticide he must use to get higher yield with accurate paste control. Everything right from providing proper nutrition to animals to weed management can be effectively done by this smart farming concept.

IV. TOOLS AND TECHNOLOGIES ADOPTED FOR REDEFINING INDIAN AGRICULTURE THROUGH IOT

For the farm to be IoT enabled i.e smart farm, we need to be focussed on some of the important parameters which should be control smartly. As discussed in the previous section of the paper the basic agenda of Farming 4.0 is to manage all the farm related activities smartly and automatically. Some of these important activities are:

1. Soil Monitoring
2. Field management
3. Routine monitoring
4. Waste management

These operating parameters can be managed by one of the following ways in IoT enabled smart farm which are discussed below:

A. Agriculture Sensors for Soil Monitoring

Sensors are those devices in IoT which enable the data acquisition. For smart farming a farmer need sensors for detail analysis of all the available resources and topography. The smart sensors gather real time data from the farm field related to quality of soil, ammonia concentration in it, temperature, moisture content, Ph value of soil, organic matter contents and other related parameters which have to be monitor and control for effective farming. Fig 2. Shows the pictorial view of soil monitoring through sensors.

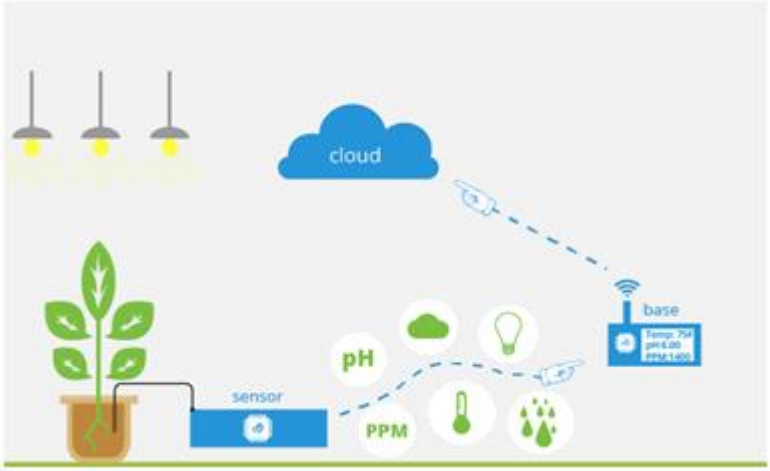

Fig. 2. Monitoring temperature, Ph, ppm organic matter contents through Sensors in IoT [3]

B. Field Management through AI & Mobile App

For the farm field to be smartly manage one need an intelligent system which analyse the data gathered from the sensors and take smart actions against it. AI based precision agriculture include all the parameters right from quick diagnosis of any kind of plant disease to automated farm management which include weed control, pest prevention, improvement of farm efficiency through predictive analysis and expert systems. Similarly it also help in quicker diagnosis of livestock issues in animal husbandry.

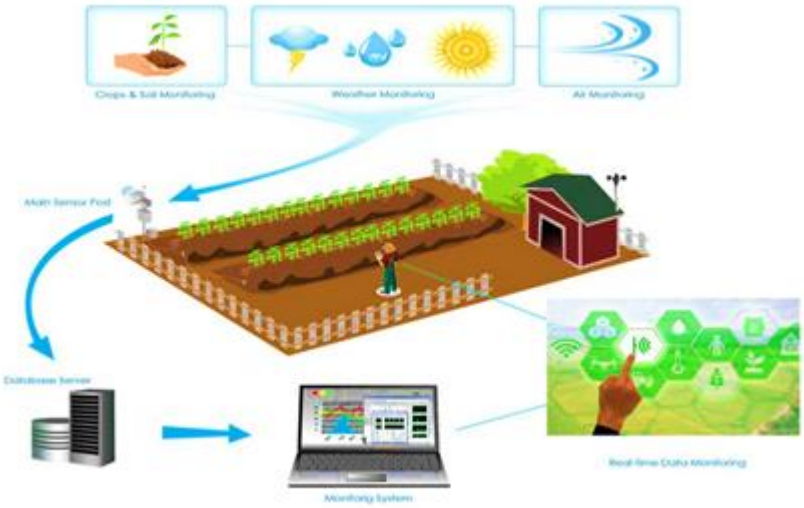

Fig. 3. Field Management through AI and Mobile Applications [5]

C. Smart Greenhouses for Routine Monitoring

IoT enabled smart greenhouses monitor and adjust different parameters like temperature, humidity, irrigation etc automatically which are related to all the routine activities of farming. This will be done by eliminating the human intervention from the farming process and whole monitoring and controlling of all the activities done automatically through IoT and connected devices.

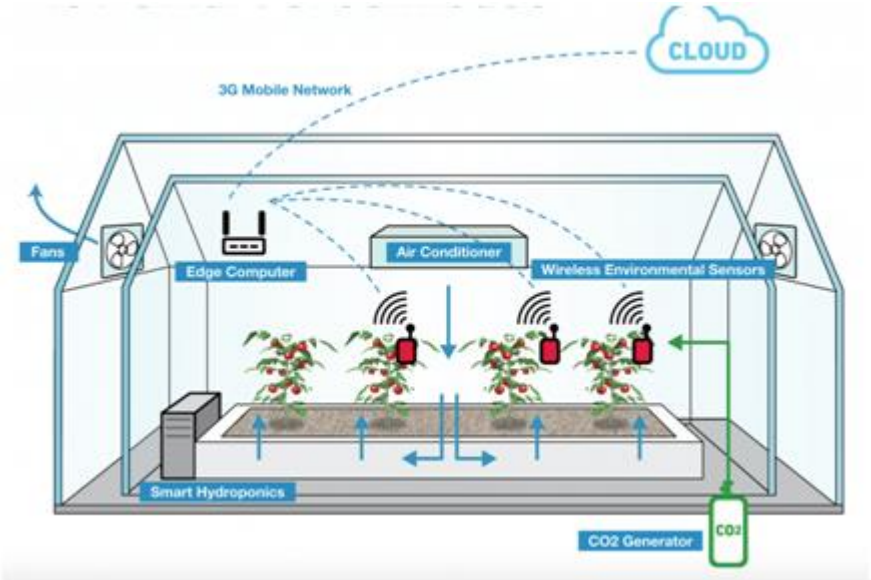

Fig. 4. Routine monitoring through smart greenhouses [6]

D. Waste Management and Reduction through Smart Sensors

Farmers are continually searching for ways to decrease waste, with limited resources available for growing crops or raising livestock [2]. soil embedded smart sensors measure the moisture content and ph value of soil to ensure optimum condition for the crop growth which in turn interconnected to smart irrigation and fertilizer system to deliver right amount of both at right time to give good crop yield with reduced chances of waste generation. Similarly the new advancement in the field with the advent of mobile application which provide farmers the accurate weather prediction and changing weather patterns. These mobile application give real time insight of the data related to crop and livestock and help them to take corrective action to avoid generation of waste.

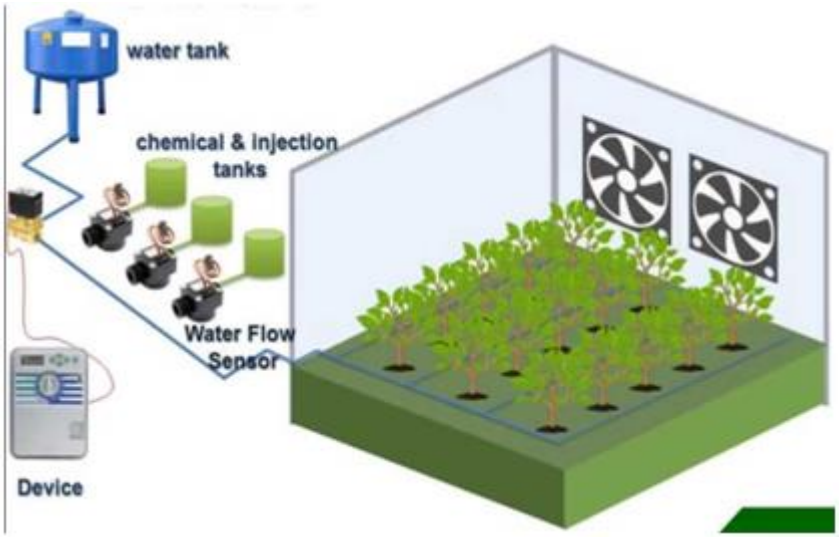

Fig.5. waste management through smart water sensors

V. CHALLENGES BEFORE INDIAN AGRICULTURE SYSTEM TO ADOPT FARMING 4.0

Significant number of initiative and efforts have been taken by Indian government to bring typical indian farming a new technological height but the number of factors are directly or indirectly become a reason of slow growth of same. these are discussed below:

A. Cost of Technology

Marority of Indian farmers are not that financially strong to adopt related technologies as cost associated with IoT based tools and techniques is quite high and unbearable by the farmers.

B. Function Illiteracy

Implementation of these advance technological concept in your typical farm is quit challenging task if you are not knowledgeable about it. Majority of Indian farmers are not that literate to understand the concept of IoT tools which is the biggest failure at this point of time. If government need to bring the newrevolution in Indian agriculture they first have to make the farmer technology ready so that they would be able to perform and implement all the ICT technology in farm to optimize the ovrall farm activity for high production yeild.

C. Government Policies

small fragmented landholdings and distortionary subsidy practices by the government burdening Indian farmers with promising liabilities can definitely be one of the challenge which is decelerating the momentum of Agriculture 4.0.

D. Technical Issues

Technical problems like professional agriculture sensors for aquiring perticular parameter, wireless power transfer which need high bandwidth internet service which could be almost impossible to make available and accesableto rular areas of India, cross media and cross technology communication, robust wireless networks etc.

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Teaching Tool Implemented With OpenCV

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ABSTRACT

The aim of a computer-based virtual vision tool is to determine and recognize the entity of numerous gestures like size, position, and shapes. To make smooth online detection of entities we produce a tool that allows system users to track the movements of entities. To build this tool, we have used OpenCV, for object tracker and python. By running this tool, a camera is activated which enables you to draw in the air by just waving your finger to the camera, it tracks the coordinates and easily helps to draw words, pictures on the screen. Here users can see this on a white window screen. Users can be able to clear the screen whenever it is needed and can use several colors of their choice to draw on the screen.
Index Terms - python3, OpenCV, Web-Cam

Keywords : Teaching tool, Air Canvas Tool, Effective way of teaching.

I. INTRODUCTION

Several educational institutes in developing countries are presently based only on a traditional routine of learning. Because of that, they go around with the traditional setup of face-to-face presentation of lectures in a classroom. Several Educational Institutes started upskilling learning by providing online classes, however, many of them operate using old and conventional methods of learning. The sudden wave of a fatal disease, i.e., Covid-19 caused by infection of coronavirus shiver the entire world. This COVID-19 pandemic situation challenged institutions and enforced educators to shift to an online mode of teaching overnight. So, everything is wonderful in online teaching, but we miss the boards which teachers used to draw pictures, symbols, formulas on it for deep learning. This idea comes from there, so we have made this teaching tool.
We have used the computer vision techniques of OpenCV to build this project. The preferred language is python because of its exhaustive libraries and easy-to-use syntax, but understanding the basics can be implemented in any OpenCV technology-supported language. Here, Color Detection and tracking are used to achieve the aim. The color marker is detected, and it created a mark on the board. The viewer can easily interact with the tool, and it makes the teaching experience realistic.

Problem statement

To find an effective way of teaching by analyzing and recognizing an object to draw on the surface by calculating the coordinates. Fingertip is used as a marker.

II. METHODOLOGY

The frame is read and convert the captured frames To HSV color space (Easy for color detection) Make the canvas frame and put the respective link buttons on it.

Now Set track bar values for finding the mask of the colored marker Preprocessing of the mask is done with morphological Operations (Eroding & Dilation).

The next step goes on like this by, Detecting the contours, finding the center coordinates of large contours, and keeping storing them in the array for the next frames (Array for drawing points on the canvass). Finally, draw the point stores in an array on the frames and canvas.

Hardware/software Requirements

Hardware:

- Webcam
- LED Screen

Software:

Mentioned libraries and framework installed

- Python 3 or above
- PyCam Module
- Open CV
- Mediapipe

III. IMPLEMENTATION

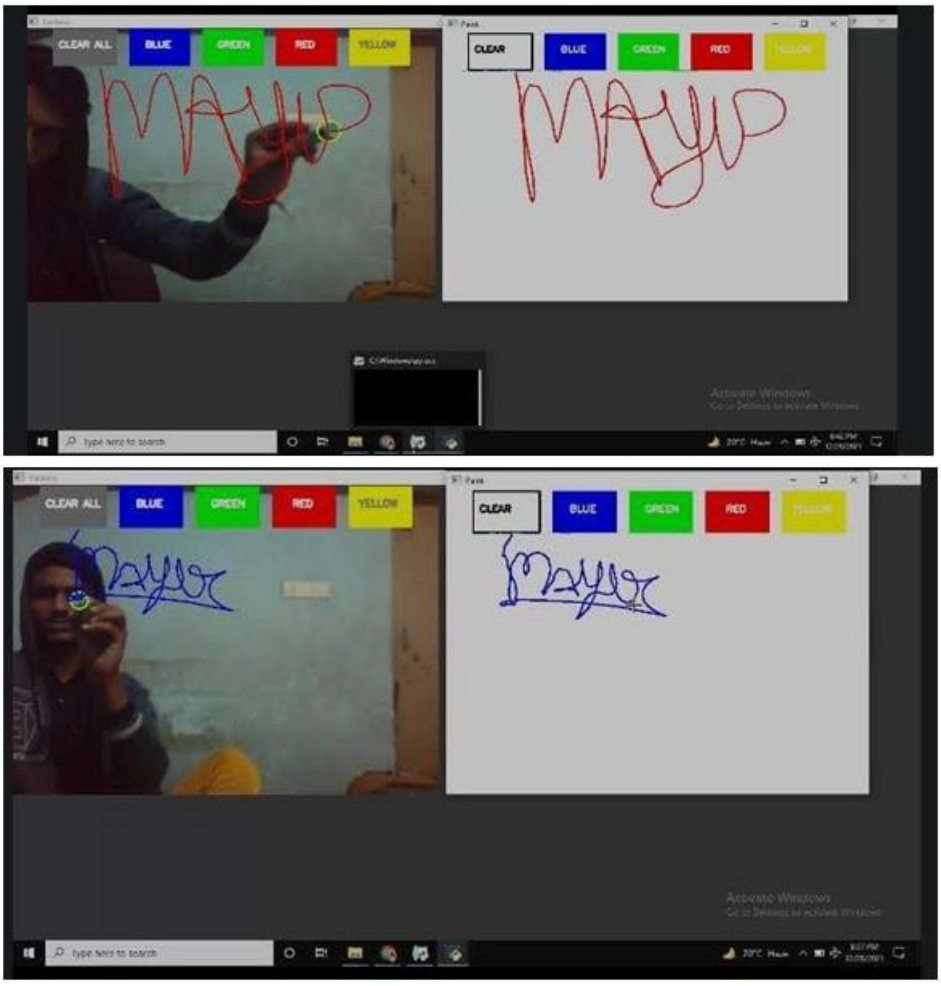
Algorithm

1. Create and set a track bar that will send a notification message to show a change on a slider.
2. HSV threshold will be used to determine the low/up color ranges using track for any image on the disk.
3. To store these distinct colors we will allocate memory for the NumPy array.
4. We will loop over the colors which have the points which help to draw on the surface of the canvas.
5. They are then used to draw on the canvas.
6. Over the entity, it will scan the kernel to compute the maximum pixel value to determine the pointers for initializing indexes.
7. We will enable a webcam that starts scanning frames.
8. We will start the loop.

9. To have the same side that the user will use to draw to look easy to read and feel we will flip the camera.
10. We will set HSV values to update and detect color in the range.
11. For enabling users to choose their choice of color, we add color buttons on the top so whenever the track bar moves from one position to another position, it will change the color.
12. We will end the loop after identifying the extreme point set along with the contour.
13. If the pointers are formed, we will sort the contours.
14. Then find the max contour.
15. By calculating the radius which is around the contour, draw the circle.
16. Then move the contour whenever a user wants to.
17. It will show all the windows including a white track bar, mask.
18. When a user wants to stop the tool, he will just have to press the q. It will release the camera and other resources.

IV. RESULT

Finally, we have developed an interface between human hands and the system using OpenCV technique and python language to pick the color and draw using the fingertip on the surface.



V. CONCLUSION

This project makes the user have an interactive environment where the user can draw whatever he wants by choosing his required colors from the displayed ones. It feels like we are just drawing in the air, by representing our imagination on the screen. So, we conclude that this visual teaching tool was developed using NumPy library and OpenCV where there are many libraries and built- in algorithms that make workspaces more efficient while in use.

VI. FUTURE WORK

This project can be further enhanced by installing the manual detector, as well as the multicore module. Hand development to track touch, we will need to take a closer look at OpenCV. Moreover, we can try different ways to optimize.

Translation methods such as PyGame include a line drawing method (pygame.draw.line ()),pygame.display.flip() that may be useful. In producing smooth and clean lines. At the same time, use different types of brushes. we will try to make this application fast and smoother.

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Design and Development of Sign Language Detection System Using Machine Learning and Deep Learning Techniques

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ABSTRACT

Communication is the process human beings understand what is said to them and the way they say or express their mind, desires and feelings to other human beings and that is frequently thru speech. Although, in terms of human beings with listening to impairment, signal language is inevitable. Thus, signal language is the most natural and powerful way for communicating among deaf and other human beings. One need to examine signal language to engage with them. Learning typically takes region in peer organizations. There are only a few take a look at substances to be had for signal studying. Because of this, the procedure of getting to know signal language gaining knowledge of is a very tough undertaking. The preliminary degree of sign studying is Finger spelled sign mastering and moreover, are used when no corresponding signal exists or signer isn't always aware of it. In this take a look at, we seize pics of the hand gesture using web digital camera and the system shall expect and show the call of the captured photograph. We use the HSV shade set of rules to stumble on the hand gesture and set the history to black. The images undergo a chain of processing steps which include diverse Computer vision strategies which includes the conversion to grayscale, dilation and masks operation. And the place of interest which, in our case is the hand gesture is segmented. The capabilities extracted are the binary pixels of the photographs. We employ Convolutional Neutral Network (CNN) for training and to classify the photos

Keywords— Sign Language, Computer Vision, Convolutional Neural Network, etc.

I. INTRODUCTION

Language is a medium to speak with someone or with a collection. The spoken language is communique media for folks that can speak and listen. Sign Language (SL) is a method of communique for the people who face problems in speak me and listening to. The sign language is used broadly with the aid of folks who are deaf-dumb those are used as a medium for verbal exchange. A sign language is nothing however composed of numerous gestures formed by special shapes of hand, its actions, orientations in addition to the facial expressions. There are around 466 million human beings international with hearing loss and 34 million of those

are kids. `Deaf' humans have little or no or no listening to capacity. Those people can communicate with every different or with the organization through one-of-a-kind signs and symptoms and gestures.

Fig.1.1. American Sign Language

II. MOTIVATION

Communication is one of the primary requirements for survival in society. Deaf and dumb people talk among themselves the usage of signal language but normal human beings discover it hard to recognize their language. Extensive work has been achieved on American sign language recognition but Indian sign language differs significantly from American sign language. ISL makes use of two fingers for speaking whereas ASL uses single hand for speaking. Using both hands frequently cause protection of features duet overlapping of arms. In addition to this, loss of datasets at the side of variance in sign language with locality has led to rest rained efforts in ISL gesture detection. Our project intention attacking the fundamental step in bridging the communication gap among ordinary human beings and deaf and dumb people the usage of Indian signal language.

III. LITERATURE SURVEY

3.1. Real-time two-way sign language communication system built using image processing, deep learning and computer vision:

According to analyze magazine “Real-time -way sign language conversation device built the usage of picture processing, deep learning and pc vision” (T. Bohra, 2019). In this journal, Techniques such as hand detection, skin colour segmentation, median blur and contour detection are finished on pix within the dataset for higher results. CNN version skilled with a large dataset for forty lessons and became capable of predict 17600 test pics in 14 seconds with an accuracy of 99%.

3.2. American Sign Language Recognition using Deep Learning and Computer Vision:

The 1/3 studies journal “American Sign Language Recognition the usage of Deep Learning and Computer Vision” (K. Bantupalli and Y. Xie, 2018) worked on american sign language reputation machine which works

on video sequences primarily based on CNN, LSTM and RNN. A CNN version named Inception become used to extract spatial functions from frames, LSTM for longer time dependencies and RNN to extract temporal capabilities. Various experiments had been carried out with various pattern sizes and dataset includes one hundred one-of-a-kind symptoms performed by means of 5 signers and maximum accuracy of 93% was received. Sequence is then fed to a LSTM for longer time dependencies. Outputs of softmax layer and maxpooling layer are fed to RNN structure to extract temporal capabilities from softmax layer.

3.3. Sign Language Recognition Using Modified Convolutional Neural Network Model:

This is fourth journal "Sign Language Recognition Using Modified Convolutional Neural Network Model" (Suharto, 2018). Public dataset LSA64 [15] turned into used for 10 vocabularies with 500 motion pictures. For education the dataset is sent to 6:2:2 ratio, three hundred videos for training, 100 for validation and one hundred for trying out set. The version has appropriate training accuracy however very low validation accuracy.

3.4. Recognition of Indian Sign Language in Live Video:

In this fifth magazine "Recognition of Indian Sign Language in Live Video" (Singha, Joyeeta & Das, Karen,2013) proposed a system for indian sign language recognition from a live video. The gadget contains of 3 ranges. Preprocessing stage consists of pores and skin filtering and histogram matching.

Eigen values and eigen vectors are being taken into consideration for characteristic extraction stage and Eigen price weighted Euclidean distance for type. Dataset consisted 480 pics of 24 signs and symptoms of ISL signed via 20 human beings. System was tested on 20 videos and achieved an accuracy of 96.25%.

IV. ALGORITHMS USED

For this project, various classification algorithms are used:

1. Support Vector Machine (SVM)
2. k-Nearest Neighbors (k-NN) and
3. Convolution Neural Network (CNN)

4.1. Support Vector Machine (SVM):

It is a set of Supervised getting to know methods used for classification, regression and outliers' detection. There are unique styles of SVMs you can use for precise ML troubles like Support Vector Regression (SVR) which is an extension of Support Vector Classification (SVC). In SVM, each information factor is plotted in an n-dimensional space (n is the wide variety of capabilities) with the value of a specific coordinate. The classification is performed via finding hyper plane that differentiates the training pleasant.

The goal of the SVM set of rules is to create the pleasant line or selection boundary that could segregate n-dimension space into instructions in order that we can effortlessly put the brand new information factor in the right category in the destiny. This quality decision boundary called a hyperplane. SVM chooses the acute points/vectors that assist in developing the hyperplane. These excessive cases are referred to as as aid vectors,

and as a result set of rules is termed as Support Vector Machine. Consider the below diagram in which there are two special categories which are labeled the use of a choice boundary or hyperplane.

WHY Support Vector Machine (SVM)?

SVM are used in numerous packages like handwriting reputation, face detection classification and plenty of more. This is one of the motives we use SVMs in Machine Learning. It handles both Classification & Regression on linear & non-linear data. It finds extra correct effects when in comparison with other algorithms because of their potential to deal with small and complex datasets.

4.2. k-Nearest Neighbors (k-NN):

K Nearest Neighbor algorithm falls below the Supervised Learning category and is used for classification (maximum commonly) and regression. It is a flexible algorithm extensively utilized for imputing missing values and resampling datasets. As the name (K Nearest Neighbor) suggests it considers K Nearest Neighbors (Data factors) to predict the elegance or continuous fee for the new Datapoint.

4.3. DEEP LEARNING ARCHITECTURE

There are primary considerations even as working with the deep getting to know:

- Processing is multilayer non-linear and studying shape may be supervised or unsupervised. The famous architectures used to create deep mastering models are Convolution Neural Network.
- For preferred type problems, Deep Belief Network is extensively used. Convolution Neural Network is one of the most popular deep gaining knowledge of architectures used for classification of image, text and sound. Moreover, Recurrent Neural Network is used while statistics is extra in the shape of Sequential.

4.3.1. Convolution Neural Network (CNN):

Convolution Neural Network (CNN), are deep neural networks used to method information that have a grid-like topology e.g., pictures that may be represented as a 2-D array of pixel. A CNN model includes four important operations:

Convolution: The purpose of convolution is to extract features from the input image. It preserves the spatial relationship between pixels by learning images features using small squares of input data.

Relu: It is an element-wise operation that replaces all negative pixel values in the feature map by zero. Its purpose is to introduce non-linearity in a convolution network.

Pooling: Also called ad down sampling reduces the dimensionality of each feature map but retains important data.

Fully-connected layer: It is multi-layer perception that uses softmax function in the output layer. Its purpose is to use features from previous layers for classifying the input image into various classes based on training data.

V. METHODOLOGY

On gathered dataset, we divided our technique to address the category hassle into three ranges. The first stage is to segment the skin element from the photograph, because the ultimate component can be appeared as noise

w.r.t the man or woman classification hassle. The second degree is to extract relevant capabilities from the skin segmented pix that may show massive for the following degree i.e., learning and classification. The 1/3 stage as cited above is to use the extracted functions as enter into numerous supervised getting to know fashions for education after which ultimately use the trained models for class.

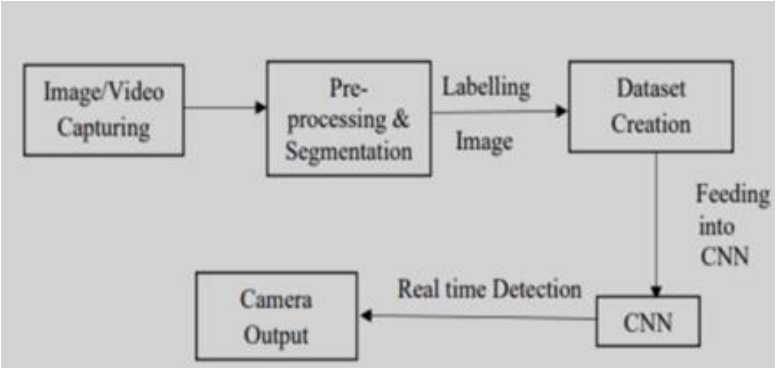

Fig. 5.1. Architecture of Sign Language Detection System

This is step one in sign popularity. Camera interfacing is a very crucial component. Web digicam is used to seize the video/ pics /hand gesture. Now internet camera is likewise in built in laptops &you can still use external camera for interfacing. But captured snap shots want to be in high definition. So, selection of properly webcam & its interfacing is a critical project of this approach.

5.1. Preprocessing:

After amassing the database from the user, we need to preprocess that photograph. For putting off low-frequency historical past noise, normalizing the intensity of the man or woman particle images we use the preprocessing approach, by means of the usage of MATLAB Firstly, we convert RGB photos into grey scale photographs (rgb to grey converter). This will convert RGB pix to excessive depth Grey scale pix. In this step we will carry out noise removal and segmentation operation. The essential aim of preprocessing is to lessen undesirable distortion and an improvement in input facts (signal language pictures). The Image preprocessing technique makes use of the giant redundancy in pics. Neighboring pixel corresponding to one item in actual picture has adjusted a few or similar brightness fee. For preprocessing median filter out is used for lessen salt and pepper noise in pics. By the usage of median filter out smoothing, sprucing and side enhancement operation are completed. The foremost use of median filter out is that it can run via sign entry by means of access or it could replace every access with median of neighboring entries. Each output pixel includes the median value within the 3-via-3 community around the corresponding pixel inside the input image.

5.2. Segmentation:

Training on skin segmentation dataset. We used the pores and skin segmentation dataset from UCI containing approximately 2,00000 points for training the usage of gaining knowledge of algorithms like SVM. The trained models are then used to phase out the non-skin labeled pixels.

5.3. Feature Extraction:

Feature extraction is a set of methods that map input features to new output features. It is a system of

dimensionality reduction via which an initial set of raw information is reduced to extra achievable agencies for processing. A feature of those large facts units is a huge quantity of variables that require quite a few computing sources to method. Feature selection is for filtering inappropriate or redundant features from your dataset. Feature extraction describes the applicable form records contained in a sample so that the task projected of classifying the pattern is made smooth by using a formal manner. In pattern popularity and in photo processing, function extraction is a unique shape of dimensionality reduction.

5.4. Classification:

It refers to a predictive modeling problem in which a category label is expected for a given example of input data. Classification is a project that requires the use of gadget learning algorithms that discover ways to assign a class label to examples from the problem area.

VI. RESULTS

Fig.6.1. Input Image of Letter E

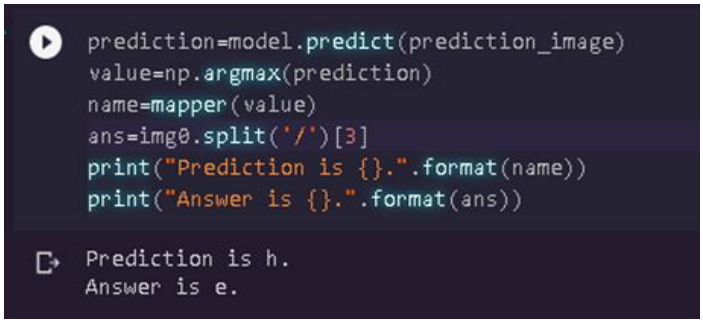

Fig.6.2. Output Of Predicted Image

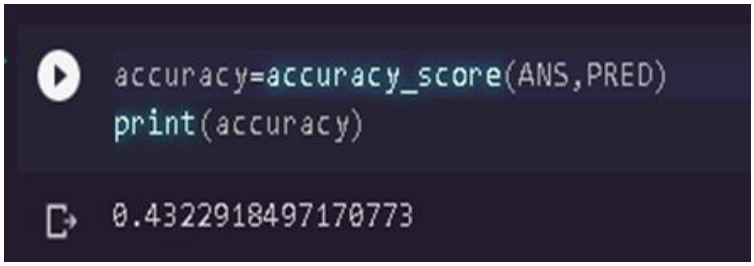

Fig.6.3. Accuracy of Model

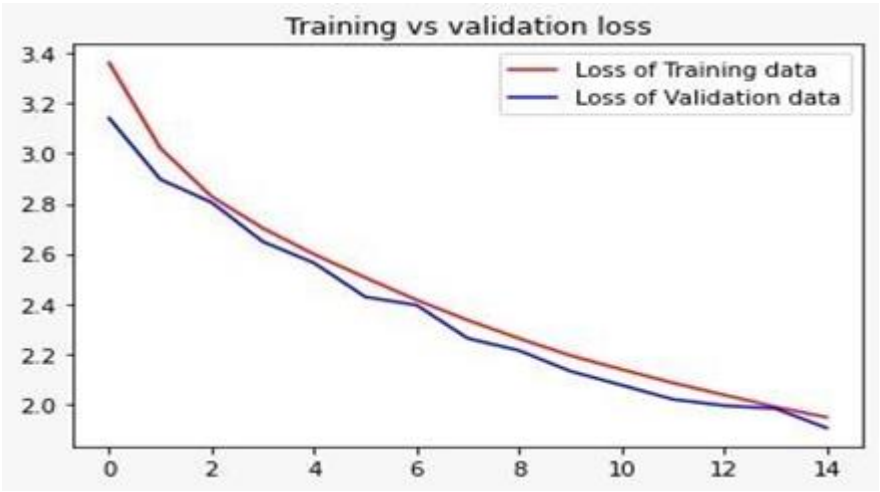

Fig.6.4. Graph of Training vs Validation Accuracy

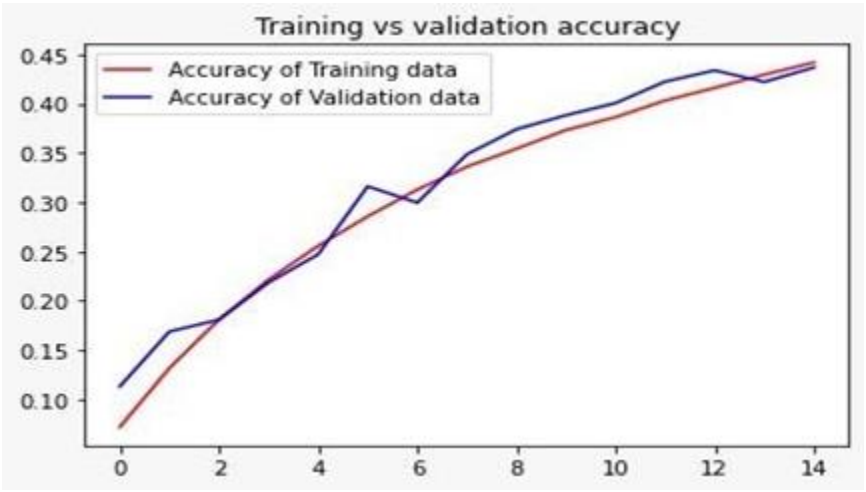

Fig.6.5. Graph of Training vs Validation Loss

VII. DISCUSSIONS

The records set divided into two corporations, one used for schooling and different for trying out. The training set consists of 70% of the aggregate records and remaining 30% are used as checking out. We also perform experiments on equal (30% or 70%) dataset that is training in addition to testing for KNN classifier.

VIII. FUTURE WORK

The proposed signal language recognition gadget used to understand signal language letters may be further prolonged to recognize gestures facial expressions. Instead of displaying letter labels it will be more appropriate to display sentences as extra appropriate translation of language. This also will increase readability. The scope of various sign languages can be expanded. More education statistics can be delivered to stumble on the letter with greater accuracy. This task can in addition be extended to convert the signs to speech.

IX. CONCLUSION

In this work, we've long gone thru an automatic sign language gesture recognition device in actual-time, the use of distinctive equipment. Although our proposed work predicted to identified the signal language and convert it into the textual content, there's nonetheless a variety of scope for possible destiny work.

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Use of Modified Luceana Glauca Pod for Scavenging Copper Ions from Industrial Waste Waters

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ABSTRACT

Use of Luceana glauca pod substrate (subabul) for the removal and recovery of copper ions from industrial waste water is discussed here. The dried and powdered pods are contacted with acidified formaldehyde and the resin product so obtained is found to be highly efficient in removing Cu2+ ions from the solutions. The metal ion uptake increased with increasing pH values. It is also observed that more than 99% of Cu2+ ions is removed by substrate from solutions instantaneously. By using packed columns of the substrate, the metal ion concentration from waste waters can be reduced to very low levels conforming to the acceptable water quality standards.

Keywords: Luceana glauca pod, copper ion, industrial waste waters.

I. INTRODUCTION

Any substance in considerable excess will upset the balance of nature. The natural bodies of water are polluted by different contaminants like organics, refractories, heavy metal ions, etc, from domestic sewage, agricultural and industrial wastewater discharges. In view of toxicity of heavy metal ions, stringent limits have been imposed by the Public Health Authorities regarding their effluent concentrations. Excessive amount of heavy metal ion like copper can induce toxic effect like liver damage. Several workers described the use of various tree barks, agricultural waste products, pods for selective removal of toxic heavy metals cations from industrial wastes (particularly for small industrial units which cannot afford conventional wastewater treatment systems). The metals were possibly bound to the pod substrates by ion exchange with hydrogen, presumably the phenolic groups in tanning compounds. The author has used the pod {dry flattered elongated fruits (phali)} of commonly available Indian tree, Luceana glauca (subabul) for the removal and recovery of copper ions from waste waters and the results are reported in the present work.

II. EXPERIMENT

The Luceana glauca pods are dried and finely powdered in an electric grinder. 2gm of the powder were added to a mixture of 20 gm of 0.2 NH_2SO_4 and 5 gm of 39% HCHO and the whole mixture was stirred for 6 hours at 50°C and then filtered. The residue was washed with demineralised water till pH of filtrate was 4 to 5 and the same was then dried at 50°C in an electric oven. The data below shows the sorption of Cu^{2+} ions on the treated Luceana glauca pod substrate with respect to parameters such as effect of pH, temperature, contact time, anions effect, concentration and effect of light metals ions along with Cu^{2+} ions if present.

III. RESULT AND DISCUSSION

pH Effect-

It was found that the Cu^{2+} ion uptake increases with increasing pH of the solution. The maximum Cu^{2+} ion recovery occurs at pH-9 which is 95.38%.

Temperature Effect-

It is observed that the percentage removal of Cu^{2+} ions from the solution on the substrate decreased with increase in temperature. The maximum recovery of Cu^{2+} ions occurs at 30°C.

Contact time Effect-

It was found that 57% of the Cu^{2+} ion removal from the solution occurred within 5 minutes, showing a very fast metal ion uptake on the substrate. The Cu^{2+} ions removal from solutions recorded a value of 57% even after a contact time of 2 hours and the value remained same after a contact time of 24 hours.

Anions Effect-

It is observed that from copper acetate solution removal of Cu^{2+} was found to be 89% from copper nitrate solution it is 74% from copper sulphate solution it is 57% and from copper chloride solution it is 43%.

Light Metal Ions Effect-

It was found that upto 1000 ppm of the respective light metal ions (like Na^{+} Mg^{2+} Ca^{2+} etc) co-existing with Cu^{2+} ion in the solution, there is no appreciable change (10% less) in the sorption of Cu^{2+} ion by the substrate.

Concentration Effect-

The effect of initial metal ion concentration on the uptake of Cu^{2+} by the substrate was studied and the results are shown as an isotherm in the Figure 1 and 2. The absolute metal ion removal from the solution increases with increasing initial metal ion concentration although the percentage of metal ion recovery naturally decreased.

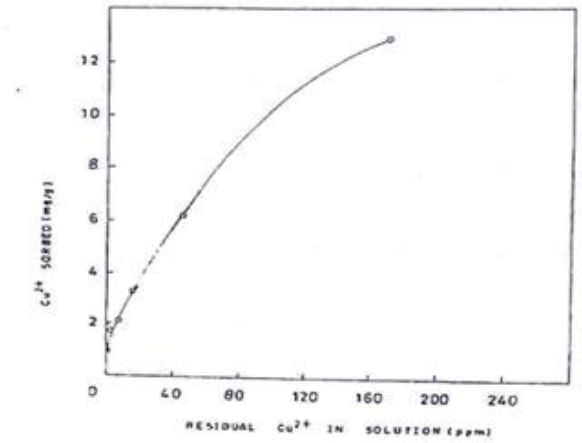

Fig 1: Adsorption isotherm: Effect of concentration on the uptake of Cu^{2+} ions form $CuSO_4$ solution using luceana glauca pod substrate

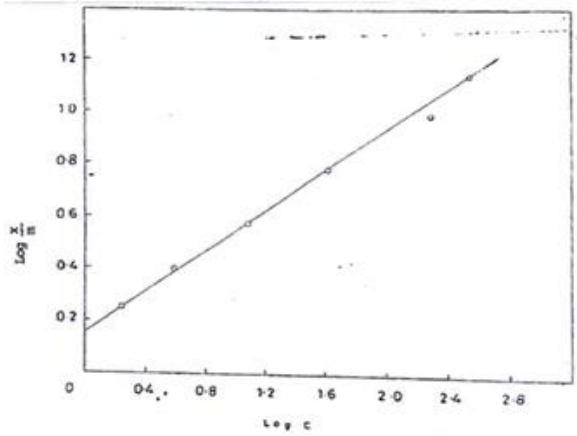

Fig 2: Freundlich Adsorption: Adsorption of Cu^{2+} ions form $CuSO_4$ solution using luceana glauca pod substrate

Column Experiment-

A continuous process employing a packed column of the Luceana glauca pod substrate is expected to be more efficient and economical to operate than t˜e batch experiment. Several column experiments have been conducted and result is as follows: -

When the initial concentration of Cu^{2+} ion is 00 ppm, the final concentration of 9.5 ppm.

For column experiment 1 ltr of Cu^{2+} solutions were passed down the column of 20 mn internal diameter packed with 1 0gm substrate at the rate of 5ml per minute. It was found that the capacity of the substrate for the Cu^{2+} ions is 0.8 meq per gram of the substrate.

Recovery of the Sorbed Metal Ions- The sorbed heavy metal ions could be leached out from the substrate using dilute $HN0_3$. The washed substrate can be reused.

IV. CONCLUSION

The Luceana glauca pod substrate seems to be very efficient and economical for removing Cu^{2+} ions from industrial waste waters. By employing adequate column of the substrate the residual Cu^{2+} ion concentration in the effluents can be reduced to a very low level which are within their acceptable discharge limits. The raw

materials used for the preparation of the substrate are widely available and inexpensive. Hence Luceana glauca pod substrate seems to offer a very cheap and useful product for effective removal and recovery of Cu^{2+} ion form industrial water effluents.

By using such substrate, it is possible to use waste cellulosic material for preparing a very efficient cation exchanger which is cheaper than the cation exchanger resins available in the market, which in its tum removes heavy metals cations (toxic and nontoxic) from their respective effluents. These metals ions can be removed and can be reused thereby solving the problems of toxic effects in waste water on living organisms. This also to helps to solve the water pollution problem.

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Studies On Mechanical Behaviour of Jute Fiber, Banana Fiber and Human Hair Hybrid Sandwich Composites

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ABSTRACT

The composite materials are replacing the traditional materials, because of its superior property such as high tensile strength. They are renewable, cheap and recyclable. This composites material having low density and low cost. Moderate mechanical properties hence they are having attention due to easy availability and renewability of raw materials. Natural fiber has been alternative to synthetic fibers and find its application transportations such as automobiles, railway coaches and aerospace.

Also, hair is a discarded material for our society and easily available in municipal waste, homes, etc. and available in bulk amount of volume is found in dump/ waste streams due to slow degradation. So, it is better to develop the approach for utilization this waste as resources or raw material. Hence, this paper presents a review on mechanical properties of Jute-Banana-Human Hairs fiber reinforce polymer composite.

Key words: Jute fiber, Banana fiber, Human hair, epoxy resin, Composite.

I. INTRODUCTION

Composites are one of the most widely used materials because of their adaptability to different situation and the relative ease of combination with other materials. They can serve specific purposes and exhibit desirable properties. This is very important issue in many engineering works. Recently there has been a greater inclination towards natural fiber reinforced composites. Additionally, Natural Fibers have a lot of advantages over traditional fibers in terms of low cost, low density, biodegradable and easily processed. The conventional materials such as glass, carbon and boron fibers are quite expensive and the use of fiber like carbon or boron is justify only in aerospace application. Therefore, it is meaningful to explore the possibility of using cheaper materials such as natural fibers as reinforcement.

1.1. Jute Fiber :

Jute Fiber is also known as the Golden Fiber. It grows well on alluvial soil and requires high temperature, heavy rainfall and humid climate. Its leading producers are India and Bangladesh Jute is the plant of the genus Corchorus of the iliciae family. The jute fiber possesses moderately high specific strength and stiffness. Therefore, it is suitable as reinforcement in a polymeric resin matrix. However, it exhibits considerable variation in diameter along with the length of individual filaments. The properties of the fiber depend on factors such as size, maturity and processing methods adopted for the extraction of the fiber. Properties such as density, electrical resistivity, ultimate tensile strength and initial modulus are related to the internal structure and chemical composition of fiber. Jute fiber having length 1 to 4 meter and diameter from 17 to 20 microns.

Fig 1. Raw Jute Fiber

Table 1: Chemical Composition of Moisture Content of Jute Fiber

Cellulose	Hemi- Cellulose	Lignin	Moisture Content
64.4%	12%	11.8%	12.1% - 13.4%

1.2. Banana fiber:

Banana fiber extracting industry is a large and growing industry. It is eco-friendly like jute fiber. The technology of Banana fiber extraction has been developed in south-India where in a good number of Banana fiber extraction units have been running successfully. Some firms are exporting Banana fiber products because of the greater demand. The natural fiber is renewable, non-abrasive, of banana in the biodegradable entity. Hardness value increases with increase in fiber length and it is maximum at 2 – 5 m fiber length.

Banana fiber, ligno-cellulosic, obtained from the pseudo stem of banana plant, is a bast fiber with relatively good mechanical properties. Banana fiber is similar to that of Bamboo fiber and ramie fiber, but its fineness and spinnability is better than the two. it is highly strong and light weight fiber.

Fig 2. Raw Banana Fiber

Table 2: Chemical Composition of Moisture Content of Banana Fiber

Cellulose	Hemi-Cellulose	Lignin	Moisture Content
63 - 64%	10 – 19%	5%	10 – 11%

Table 3 : Comparative mechanical properties of Jute and Banana fiber with other natural fibers:

Fiber	Density (g/cm^2)	Elongation (%)	Tensile strength(MPa)
Jute fiber	1.3 – 1.46	1.5 – 1.8	393 – 800
Banana fiber	1.35	6.54	550
Sisal fiber	1.33 – 1.5	2.00 – 14	400 – 700
Bamboo	0.6 – 1.1	-	140 – 800
Oil palm	0.7 – 1.55	25	248
Coir	1.2	15 – 30.0	175 – 220
Vakka	0.00081	3.46	549

Table 4 : Comparative mechanical properties of pure thermoset composites and respective jute and banana reinforced composites:

Properties	Epoxy	Jute/banana/epoxy	PE	Jute/banana/PE
TS(MPa)	32.91	84.86	30.6	64.5
TM(GPa)	0.78	1.6	0.6	1.8
FS(MPa)	117.74	253.39	54.07	98.5
FM(GPa)	5.78	11.64	1.435	2.46
IS(kJ/m^2)	5.63	2.21	-	-

Abbreviations :

TS : Tensile Strength

TM : Tensile Modulus

FS : Flexural Strength

FM : Flexural Modulus

IS : Impact Strength

1.3. Human Hair :

Hair is a protein filament that grows from follicles found in the dermis or skin. It is one of the defining characteristics of mammals. The human hair keratins have 65-95% proteins depending on the humidity and up to 32% of water. It has long chains (polymers) of amino acids in terms of raw elements, on an average hair is composed of 50.65% carbon, 20.85% oxygen, 17.14% nitrogen, 6.36% hydrogen, and 5.0% Sulphur. Amino acid present in hair contain cytosine, serine, glutamine, threonine, glycine, leucine, valine and arginine.

Hair exhibits a high tensile strength, 150–270Mpa, which is significantly dependent on strain rate and humidity. The strain rate sensitivity approx. 0.06-0.1, is comparable to that of other keratinous material s and common synthetic polymers.

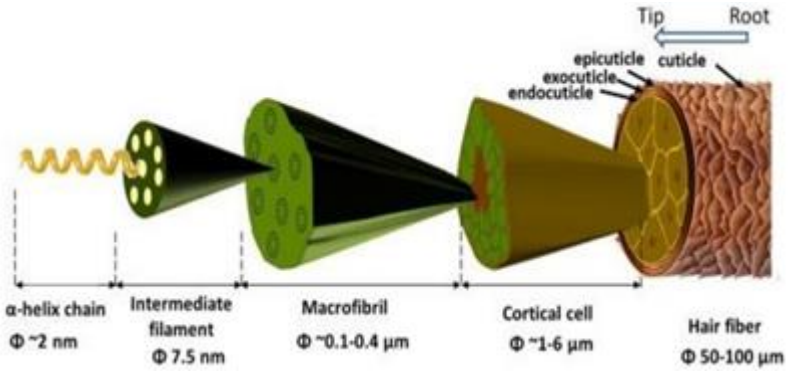

Fig.3 Schematic representation of hierarchical structure in human hair starting α-helix chains and progressing to the entire section

1.4. Epoxy resin :

The epoxy resin (LY556) and hardener (HY951) were taken in the ratio of 10:1 (i.e., 100ml for 1 liter of resin) for the reinforcing the composite material.

II. METHODOLOGY

2.1. FOR WATER TREATMENT:

We took both the nature fiber approx. 250g of hair and fibers immersed into the distilled water for 24hr in about 5lit of tub in measured quantity . After 24hr taking both fibers and human hair out and then putting for drying naturally in the sun so that all the moisture content present in it should be completely removed or evaporated.

2.2. FOR NaOH TREATMENT:

Same for NaOH treatment , taking 5lit. of water and adding 50gm of NaOH in it in measured quantity .then dipping both fibers and hairs in different tubs and keeping for 24hrs.After 24hr taking both fiber and hair outside of tub and for washing this with distilled water 3-5 times with the acetic acid (CH3COOH) to neutralize the NaOH content present in fibers and human hair. For this to check we used phenolphthalein indicator so that we get NaOH content free fibers . Finally, again washing it with fresh water and putting it again for drying naturally till its moisture get removed.

III. PROCEDURE

After human hair and fibers ger treated with water and NaOH jute fiber and banana fiber are cut in 180mm and human hair are cut randomly in very fine length about 10mm. Then fibers and human hair are arranged in 185mm×185mm cavity alternately . Firstly, we arrange fibers and after human hair layer we arranged alternate five layers (i.e., 1 layer of human and 2-2 layers of Jute and banana fibers)of it and after every layer we use resin as a binder. After layers are arranged in cavity, we apply pressure on it by using C- clamp and after 24 hr. we remove the pressure from the cavity and we get the 50mm thick layer of composite material . finally, we cut it into strips by using grinding machine.

Fig.4 Final product cutted into strips

IV. RESULT AND DISCUSSION

4.1. Tensile test:

The tensile strength of the composite material was measured by using universal testing machine. The strip of material is of dimension 175mm×25mm×5mm. after testing the material average value is reported.

4.2. Flexural test:

The flexural strength of the composite material was measured by using universal testing machine.

Table 5 : With Epoxy Resin:

Sr. No.	Sample Identification	Ultimate tensile strength(N/mm^2)	Flexural load (kg)
1	A1	18.44	48.20
2	B1	17.20	39.2
3	C1	20.42	32.89
4	D1	34.95	62.54
5	E1	26.08	16.78
6	F1	25.45	40.77

Where,
A1: Parallel matrix with NaOH
B1: perpendicular matrix with NaOH
C1: inclined matrix with NaOH
D1: Parallel matrix with water
E1: perpendicular matrix with water
F1: inclined matrix with water

4.3. Water absorption test :

In this test, the strips of product are dipped in distilled water for 24Hr. and water absorption capacity calculated.
% Of water absorption = [(W2-W1/W1)]*100

Table 6 : With Epoxy Resin

Sr.no.	Sample identification	Weight before dipped into water (W1 in gm)	Weight after 24hr. (W2 in gm)	Water absorption capacity (%)
1	A1	46	47	2.127
2	B1	39	40	2.564
3	C1	33	34	3.030
4	D1	34	35	2.941
5	E1	32	33	3.125
6	F1	35	36	2.857

Where,
A1: Parallel matrix with NaOH
B1: perpendicular matrix with NaOH
C1: inclined matrix with NaOH
D1: Parallel matrix with water
E1: perpendicular matrix with water
F1: inclined matrix with water

V. CONCLUSIONS

- Mechanical properties such as tensile and flexural are found to be increasing with different patterns of sandwich structure pattern.
- The average values of Epoxy Resin (NaOH) for tensile and flexural test is 23.75N/mm^2 and 40.06 kg.
- Natural fiber composites have good mechanical properties and are slowly replacing synthetic fibers and are helping to reduce environmental impact caused by synthetic fibers.
- Mechanical properties can be attained by using treated fibers and correct method of fabrication.

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Raw Mango Cutting Machines : A Review

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ABSTRACT

Mango is known as King of fruit and cultivated worldwide. Many value added product prepared from mango fruit like jam, mango nectar, mango juice, squash and mango concentrate. Mango pickle is one of the important products prepared from the raw mango. Raw mango cutting is the important unit operation in the in the pickle preparation. Traditionally raw mango cut by tools which is time consuming and labor intensive. There are limited developed manually and automatically operated machine for the raw mango cutting. This paper tries to review developed raw mango cutting machine and highlight the result obtain from machines. Compare to traditional cutting methods automatically operated machines are more efficient in cutting of raw mango which maintain more hygiene and uniformity of cut pieces of mangoes.

Keywords— Raw mango, cutting, slicing, cubing, cutting efficiency, mango cutter, traditional mango cutting, automatically mango cutter

I. INTRODUCTION

Mango (Mangifera indica L.) is recognised as a king of fruit and consumed and cultivated worldwide more than 100 countries. Specially in Asia cultivation carried out at tropical and subtropical countries. The major mango-growing states in India are Uttar Pradesh, Andhra Pradesh, Tamil Nadu, Gujarat, Karnataka and Bihar. Uttar Pradesh achieve first rank in mango production with a share of 23.47 % and highest productivity. India also major exporter of mangoes in world, during year 2020-21 country exported 21,033.58 MT of fresh mangoes of worth of Rs. 271.84 crores/ 36.23 USD Millions [1].

Mango is a good source of Vitamin C and A and rich in minerals potassium, carbohydrates and phosphorus [2]. Due to the perishable nature of the mango fruit, it is difficult to store for the long period consequently most of the crop losses occur annually. Therefore, mango is processed into various product like jam, mango nectar, mango juice, squash and mango concentrate [3].

Raw mango is generally green in colour and mostly uses for the preparation of pickle, chutney and powder. In the processing of raw mangoes for pickle production 9.5 %, mango slices in brine 3.6 % and mango chutney 3.2 % mangoes used [4]. Mango pickle is important cuisine food in India. There are different types of pickles differs in its flavour, texture and ingredients. Many types of pickle are prepared commercially nowadays in India and other countries.

Most of the raw mango used for pickle is cut by traditional cutters, which is time and labour consuming, not precise and made up of mild steel. This process leads to blackening of slices, wastage, uneven slices and causing human drudgery. The shelf life of pickles made up of manually cut slices or cubes is reported 180 to 210 days, whereas that of mechanically cut slices or cubes 300 to 365 days [5].

Handling of mango is done manually and in unhygienic ways. Most of the raw mango pickle industries perform basic operations like peeling, cutting, slicing, grating, and dicing. All these operations are tedious and labour intensive, as it involves manual work. Hence, it is essential to mechanize these operations by developing efficient machine which can reduce the processing time as well as cost of operation and make the process more hygienic [5]. Mechanical operation of slicing and cube cutting of raw mango is advantageous as it involves more precise slicing and cube cutting than the manual cutting. It reduces fruit damage and improves the efficiency and accuracy.

As very limited work has done on the raw mango cutting machines therefore the objective of this paper is to review the existing raw mango slicing and cubing machines. The paper tries to focus the methods, working principle and mechanism of developed machine and highlight the obtain result in terms of slicing and cubing capacity, cutting efficiency, damaged percentage compared with traditional or manual slicing and cube cutting.

II. RAW MANGO CUTTINGS METHODS

A. Traditional raw mango cutting

Many types of traditional raw mango cutting tools are observed to be used having different mechanisms. [6] reported a raw mango cutter to be used for the household raw mango cutting. It consisted of sharp blade with handle. The tool is operated by one hand and the mango to be hold with the other hand as shown in Fig. 1.

B. Manually Operated Machine

[7] developed manually operated raw mango cutting machine operated by both hand and pedal as shown in Fig. 2.

Fig. 1. Traditional raw mango cutting blade

Fig. 2. Hand cum pedal operated raw mango cutter

The machine consists of cutting unit, cutting blades, cutter guide, tray handle and pedal lever and spout and main frame. It is operated by two persons with the help of hand and pedal lever. One person cut the whole mango into two halves and another person cut half cut mango into further pieces.

Multipurpose punching and cutting machines developed by [6] shown in Fig. 3. The developed cutting machine also used for the raw mango cutting. A rectangular wedge-shaped tool of 110 mm × 40 mm size with 6 mm thickness with sharp edge as shown in Fig. 4 used for cutting. A 125 mm long and 12 mm diameter round rod with one end threaded was welded to the blade at center. A threaded end can be fixed in holder to hold it in position securely. A wooden plank was used to achieve cutting of mango. In case of standing model, it was fixed in the frame just below the tool holding rod with help of locking strips. In case of sitting model, it was a separate arrangement consisting of a square frame with 4 legs of 200 mm height and is bolted to the main base frame.

(a) (b)

Fig 3. (a) Standing and (b) Sitting model of multipurpose punching and cutting machine

Fig. 4. Raw mango cutting tool

C. Automatically Operated Machine

[8] designed raw mango cutting machine with low cost and high production capacity with low manpower for household and small-scale industry. Working mechanism of machine is based on a pneumatic cylinder that turns compressed gas power into reciprocating linear motion to chop raw mango. The machine consists of 6 blocks cutting blade, air compressor, hose pipes, muffler, frame, push buttons, 5/2 solenoid valve, nipples, head block, filter and double acting pneumatic cylinder. Raw mangos need to place over the cutting blade by the operator, after which the compressor should be started to compress air, and then air should be stored in tank. That stored air will be used in cylinder to forward stroke to cut that raw mango which is placed in cutting blade (6 blocks) by applying hammering effect on the mango by using push button which is operated by 5/2 solenoid valve. After the forward stroke, release the push button to return the cylinder to the backward stroke for further operation.

[9] designed and developed a raw mango cutting machine based on automatic air compression system shown in Fig. 5. The component of the machine is feeding hopper made by M.S. sheet of 155 mm ×75 mm for easy discharge. The cutting blades are fixed which are made from hardened stainless steel with sharp 1 mm cutting edge, 80 mm length and 80 mm width as shown in Fig. 6. Thickness of the blade 3 mm to bear the cutting pressure of mango slices. The collecting unit used to collect cubes discharged from inclined hopper provided below the cutting unit. Cube cutter frame height and width are decided based on the length of mango slide. Frame provides the strength to the cube cutter. Mechanical actuator is a device which here provides linear forward and backward motion to the mangoes. It is operated on 12V DC supply. Air Compressor it is device which converts low pressure air into high pressure air. It pressurizes the air. There are two types of air compression used. Pneumatic cylinder it is device in which piston has its movement by the application of air. It has reciprocating linear motion. Solenoid valve is used to control the flow of air. The valve is operated by an electric current through solenoid.

Slicing and cubing machine for raw mango developed by [10], the two-machine developed which carried out slicing and cubing operation differently. A slicer based on the principle of manually feeding of mangoes (one by one) fabricated shown Fig. 7. The whole machine consists of feeding hopper, cutting unit, collecting unit, power transmission system and frame. The mango was feed through the feeding hopper. The slicing blade cut the mango in to the small slices.

Fig. 5. Automatic raw mango cutting machine

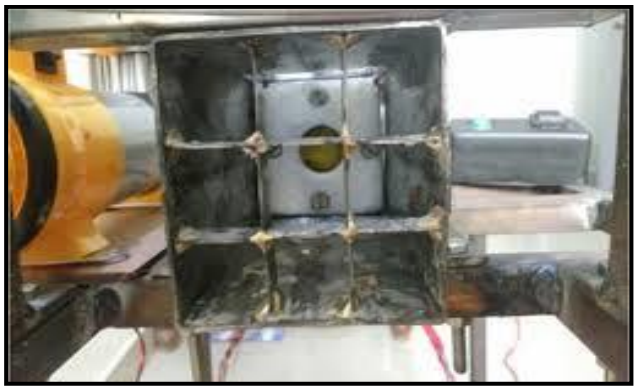

Fig. 6. Cutting blade of automatic raw mango cutting machine

The cut slices come from the collecting unit. The cube cutter fabricated with manual feeding of mango slices as shown in Fig. 8. The whole machine consists of feeding hopper, rotor, cutting blades, power transmission system, outlet and frame. The cut slices of mango were feed through the feeding hopper. The rotor cut slices of mango into the small cubes. The cubes collect from the collecting unit.

Fig. 7. Raw mango slicing machine

Fig. 8. Raw mango cubing machine

Raw mango slicer and cube cutter developed by [11]. In the slicer machine the mangoes are cut into 4, 6 or 8 slices according to size. The obtain width of the slicer is 20 mm and thickness depend upon the thickness of the pulp. The feeding of the mangoes carried out under the gravity with the help of chute provided. The feeding chute provided such way that the orientation of the mangoes facilitates desired size of cutting slice. The cut pieces of pulp and kernel separated under impact after falling on nylon mesh. The slices obtain from the slicer passed through the cube cutter and cut into cubes of size 2.5 cm × 2.0 cm × 1.6/ 1.8 cm. slices fed manually under the gravity to the cutting blade assembly.

III. PERFORMANCE EVALUATION OF RAW MANGO CUTTING MACHINES

A. Traditional and Manually Operated Machines

Handle cum pedal operated raw mango cutting developed by [7] evaluate performance of machine for the raw mango variety of Phule Abhiruchi. The average cutting size of cut pieces for length, width, thickness and weight observed 91.45mm, 67.80mm, 62.51mm and 224.50g, respectively. The output capacity of machine observed 55.01 kg/h and 400 kg/day with 54 per cent labour saving over traditional method. The blackening of pieces due to traditional cutter blade is avoided due to stainless steel blade of machine.

The performance of multipurpose punching and cutting machine evaluated for raw mango cutting by [6] as shown in Fig. 9. It observed that cutting rate of multipurpose machine of standing model for raw mango was 8.26 per cent and 40.15 per cent more than sitting model and traditional cutting blade. The highest cutting rate observed with standing model as it is available with more comfortable position than the sitting model for cutting. The traditional cutting blade also required sitting position by holding frame with leg during cutting which cause more stress on legs alternatively affect the less cutting rate.

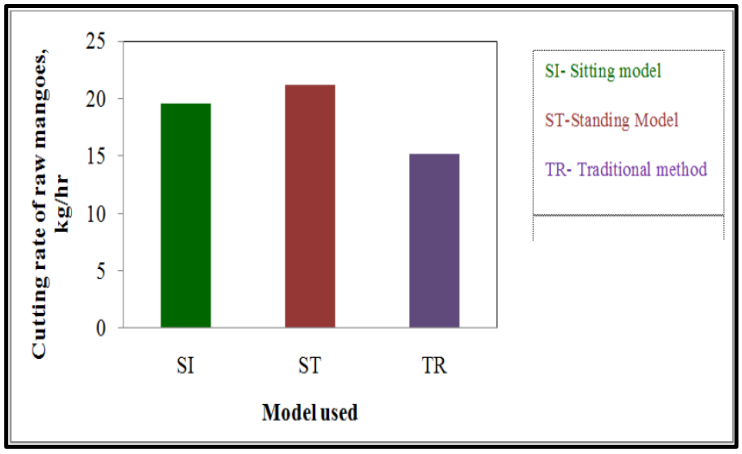

Fig. 9. Cutting rate of raw mangoes recorded with different models

B. Automatically Operated Machines

[8] conclude that considering the existing problems of raw mango cutting machine it is needed to design a machine which should acquire less space, compact, inexpensive, portable, and versatile so the small-scale industrialist can afford it. It should comprise with high rate of cutting maintaining hygiene and safety to worker.

Performance evaluation for slicing and cubing machine of raw mango performed by [10]. The capacity of slicing machine and cubing machine of about 500 kg/h and 200 kg/h respectively. The overall efficiency of slicing machine highest about 90.39 per cent at 600 rpm and minimum damaged percentage with 9.60 per cent. Cost requires for slicing machine estimated about Rs. 9.66 / tonne compared to Rs. 840 / tonne by manual method. The overall efficiency of cubing machine highest about 82.75 per cent at 160 rpm and minimum damage percentage 17.19 per cent. Cost requires for cubing machine estimate about Rs. 91.74/ tonne compared to manual method Rs. 1075.20/ tonne.

Raw mango slicer and cube cutter machine performance evaluated by [11] and observed that capacity of slicer found to be 0.7 tonnes/h based on required size of slices it was around 90 per cent. The labour require for slicing machine is only 18.7 per cent as compared to manual slicing. The capacity of cube cutter which feed by slices obtain by slicer machine observed about 0.4 tonnes/h. The labour required for cube cutting machine is 13.3 per cent as compared to manual cube cutting. The cost require for cube cutting was estimated about Rs. 194/ tonne in compared to Rs. 352/ tonne for manual cube cutting.

IV. CONCLUSION

Raw mango cutting operation is necessary for the pickle production industry as it is tedious, time consuming and labour-intensive mechanisation development is necessary for the industrial level for small scale as well as commercial level. Traditional method of raw mango cutting is done by manually with less efficient tools in which difficult to maintain hygiene, uniformity and quality of cut pieces. It also requires more time, cost and labour to perform operation. There are some manually operated machine developed which is use for cutting of raw mango. The developed machines are also efficient for cutting operation. Manually operated machines has higher capacity than the traditional cutting methods with less drudgery of labour. Automatically operated raw

mango cutting machines are observed highest cutting capacity and cutting efficiency with less labour requirement and minimum drudgery to operator. As the less handling of fruit by the labour the hygiene is maintained. Also, uniformity of cut pieces maintained and damaged due to cutting blades reduced in automatic operation.

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Artificial Intelligence Based Banking Chatbot

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ABSTRACT

The project's goal is to create a chatbot for the banking industry. The application's major goal is to assist unaided clients while also reducing staff disruption. Customers can use this project to fill out bank application forms such as account opening, loan claiming, and so on. The customer receives textual, audio, and visual responses from the chatbot. Natural Language Processing is used to do this (NLP). The most prevalent way for constructing Chabot applications is natural language processing (NLP), and we're using it to create a user-specific Chabot for banking customers. By analyzing the user input against three separate engines, NLP detects the intent of the user entity with a high degree of accuracy. Understanding the user's genuine voice and facilitating smooth contact is critical. This unit assists the customers in the bank with their personal needs. Furthermore, the goal of this study is to develop a high-potential application-specific knowledge system in the banking sector.

Keywords— Natural Language Processing, Unibet, Artificial Intelligence, Knowledge base.

I. INTRODUCTION

NLP is a type of artificial intelligence that is used to communicate with intelligent systems. A wide range of studies on chatbots utilizing Natural Language Processing exists in Artificial Intelligence. Chatbots provide answers to any inquiries that the user has, regardless of the domain in which they are used. Chatbots are being employed in a variety of areas, including universities, healthcare, and entertainment. Siri, Cortana, Alexa, and other prominent chatbots are just a few examples. Many websites employ chatbots to respond to user inquiries. AI-powered chatbot A chatbot is a piece of artificial intelligence software that can interact with humans and respond in real-time. These chatbots can answer in a variety of ways, including text, speech, and visual representation. AI bots are created in such a way that they can understand and respond to human needs; to do so, a set of principles is applied to AI bots. A set of queries that the user might ask is sometimes mapped with relevant responses. Limited chatbots are what they're called. This is one way in which AI bots function. The

other aspect is that these chatbots analyze what the user is looking for and respond to them in real-time. The answers will be depending on the preferences and actions of the user. Intelligent Chatbots are what they're called.

In the banking industry, chatbots are becoming increasingly popular. The following are the reasons for the necessity for an "interactive banking sector." [1] Because people with reading and writing disabilities may find it difficult to complete the application, customers may be hesitant to seek assistance from bank employees.

[2] Bank employees are frequently hesitant to assist consumers. The answer to all of these issues necessitates the use of this program. The system summarizes the user's requests and offers the desired outcome. The following are some of the characteristics of an interactive bot: Clients are guided through the cash deposit, account opening, and lending process. Interactive bots are user-friendly, low-cost, simple to set up, and operate on little power. The bot analyses the user's questions and responds appropriately. The interactive bot uses AI and NLP algorithms. The objective of this application is to implement a user-friendly bot to guide the customers in the bank. To save investing much on hiring different language resources. To provide an answer to users' queries effectively. To save the time of the client since he/she doesn't have to approach the bank staff.

II. RELATED WORK

[1] Conversation to Automation in Banking Through Chatbot.

This paper proposes ontology-based solutions for addressing conversation in the banking and financial industry. Although this study has not yet been thoroughly evaluated, the existing results are promising. The framework will be completed, and a chatbot will be developed in the future.

[2] Bank Bot: Contactless Machine Learning Chatbot for Communication during COVID-19 in Bank

This paper describes the creation of a Contactless Chatbot that can be used in banks to answer/guide general questions from consumers who visit the bank regularly, hence enforcing the concept of "social distancing" between clients and providing relief to bank employees. Contactless Chatbots are intelligent systems that interpret and answer users' natural language queries in a discussion.

[3] Banking Bot

As a result, when this project banking bot is put into practice, it will be more efficient, allowing consumers to quickly accomplish the user's action of conducting numerous banking activities. It lets users with several bank accounts link their accounts into a single interface, where they can enter their account information into the bot account and complete banking activities in seconds. The user will almost certainly have accounts with several banks. It will be inconvenient for the user to log into numerous internet banking sites every time, thus this bot will come in handy in this circumstance, plus it is also interactive.

[4] Artificial Intelligence Powered Banking Chatbot

The system would be a first step toward putting in place an intelligent question-answering program that could, in later stages, not only respond but also self-learn to improve itself, improving not only the quality of user service but also reducing human workload, increasing productivity, and, of course, increasing the number of satisfied users.

III. PROBLEM STATEMENT AND OBJECTIVE

A. Problem Statement

When it comes to the banking industry, technology has provided numerous unique opportunities for the industry to achieve maximum client happiness. One clever technique is to introduce chatbots to the company's clients. Chatbots created with AI are one of the most promising banking business techniques that can help the bank gain the loyalty vote of its devoted clients. Although User Care centers are provided, there are often long wait times and redirection, leaving the user with little choice but to wait a long time for a simple informational inquiry to be answered. Many people have concerns regarding bank practices, ATMs, and fixed deposit accounts. As a result, there is an unnecessarily large crowd in bank for inquiries.

B. Objectives

The major goal of this paper is to offer a solution to banks that will allow for contactless communication between bank workers and customers, which will be especially useful during pandemic times. The Chatbot presented in this paper has the potential to replace the "May I Help You?" desk found at the entrance of every bank. It will also be a huge help in the current Covid-19 situation, fostering little or no human-to-human connection.

IV. PROPOSED WORK

This system includes a chatbot named Jarvis, which is a banking chatbot that answers all bank-related questions. Backend, ML model, and Frontend are the three parts of the chatbot's model. Rasa Framework is in charge of the chatbot's major functions.

The system will be accessed by the end-user using a web application. He will type his inquiry into the text field on the web application's front end. This request will be processed by bot controller logic whenever he presses Enter or submits the doubt. The bot controller logic contains the Flask framework implementation, which is used to handle user requests and then provide responses to those queries as a reply.

The query will then be forwarded to the business logic and machine learning logic that have been implemented. Natural Language Processing (NLTK library) and its vectorization method are used in business logic to perform simple and advanced pre-processing techniques on the user input query. The query will be tokenized, with extraneous spaces and stop-words removed, and lemmas extracted for each token. Then, using vectorization, this text format query will be translated to vectorized format. The classification method will now be applied to this reformed query using Machine Learning logic to determine which class it belongs to. Based on the previously saved model that was run on train data, a classification algorithm will be used. All requests from user input data with a class equal to the retrieved class will be fetched, and the cosine similarity will be applied to these classes. The most comparable answer will be supplied to the user as a response to the query based on the respected similarity values we get. We've started compiling our data collection of queries and answers that banking customers used to ask bank employees at customer service centers or information desks. As our data, we referred to several banking websites and collected FAQs. For this work, we used a variety of

web scraping programs. The Distribution of questions in the Data-set format is depicted in the diagram below. Beautiful Soup is a library. The get requests method can be used to download web pages using this library. After that, the soup method received the downloaded page. The elements of the webpage can be accessed using the soup element. Web scraping gathers data from websites in an easy-to-understand format, allowing you to make decisions quickly. By utilizing the NLTK library, which was created for Natural Language Processing. We must allow the machine to understand the query language that we used for Natural Language Processing because the user input will be in English.

V. MODULES

We'll be employing NLP (Natural Language Processing) and DNN ideas (Deep Neural Network). To create a chatbot, As a result, the chatbot can provide accurate responses to requests. The computer may occasionally misunderstand the meaning of a sentence, resulting in ambiguous results. Machine learning algorithms such as DNN and NLP can help solve these issues. We communicate with chatbots in a nonlinear, irregular, and context-rich manner. Chatbots equipped with natural language processing (NLP) can analyze, process, and communicate with users in a language they understand in industries where customer service is a top priority, such as banking. NLP approaches classify consumer information by tagging sections of speech, correcting spelling, and reformatting data so that it can be read by a machine.

An artificial neural network with numerous layers between the input and output levels is known as a deep neural network. It resembles a human brain's intricate neuronal organization. The DNN determines the proper mathematical transformation to convert the input into the output depending on the probability of each node being true or false. The input layer collects data from the user and sends it to the first hidden layer. To set their probabilities, the hidden layers perform mathematical computations on our inputs. Calculating the number of hidden layers, as well as the number of neurons for each hidden layer, is one of the most difficult aspects of developing deep neural networks.

TRAINING DATA

A JSON file containing key-value pairs of patterns and responses is used. We generate several messages that the user is likely to type in and map them to a set of relevant responses in the JSON file. Each dictionary in the file has a tag key that indicates which group each message belongs to. We'll use this information to train a neural network to classify a phrase of words into one of the sub dictionaries associated with the tag in our file. The user is then presented with an answer picked at random from that group. The chatbot will become smarter and more complicated as additional tags, responses, and patterns are provided.

EXTRACTING DATA

We must now extract the information we require from our JSON file. All of the patterns and tags that the user query belongs to are required. To save these values, we make a list of all the unique words in our patterns. We can then extract the data we require by iterating through the JSON file.

WORD STEMMING

The process of determining the root of a word is known as stemming. To put it another way, to remove all punctuation, plural forms, tenses, and other such components from a word [3]. The resulting word is the word's

root. For example, the stem of the word "that" maybe "that," and the stem of the word "happening" could be "happen". The stemming process is used to reduce our model's vocabulary and attempt to determine the general meaning or context of the sentences. The stemmed words are saved as a separate list to be used in the following step of our data pre-processing.

BAG OF WORDS

A chatbot mostly gets text or string type input, but neural networks and machine learning algorithms require numerical data. As a result, we employ the concept of a bag of words to represent our sentences or string-type input as numerical data. Each phrase will be represented by a list of the length that corresponds to the number of terms in our model's vocabulary. Each word in our vocabulary will be represented by a position on the list. If the position in the list is a 1, the word appears in our statement; if the position is a 0, the word does not appear. Because the sequence in which the words occur is not maintained, we call this a bag of words. Instead, the presence or absence of a word is the only thing that matters.

DEVELOPING A MODEL

We're ready to start building and training a model now that we've pre-processed all of our data. We utilized a Deep neural network with three hidden layers and ten neurons in each layer for this project. Our network will be nourished by a smorgasbord of words. As a result of our DNN's additional processing, a class to which the BOW belongs (one of the tags from the JSON file) is returned. Soft-max is a type of classifier and function that is employed. The data can be classified using Soft-max and a direct classifier [5]. The total number of epochs used is five hundred. A cycle across the entire training dataset is referred to as an epoch.

A. Details of hardware and software

Hardware Requirements:

- Hard disk – 500 GB
- System – *I5* Processor
- RAM-4 GB

Software Requirements:

- LANGUAGE - Python
- FRONT END: HTML, CSS
- Backend – Flask
- Database – MySQL
- Algorithm - CNN, Xboot

VI. OUTPUT

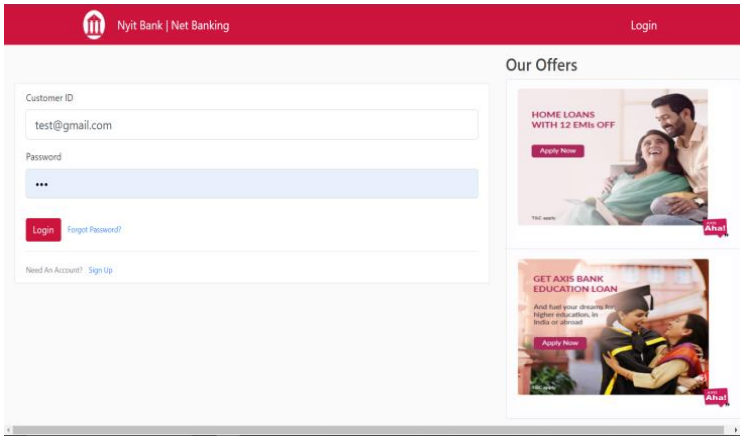

Fig: Login Module

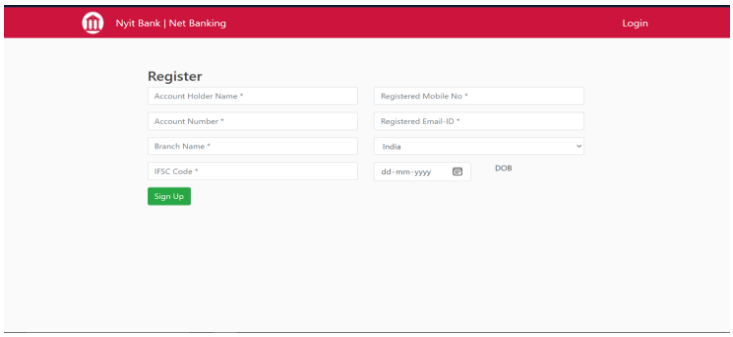

Fig: Registration Module

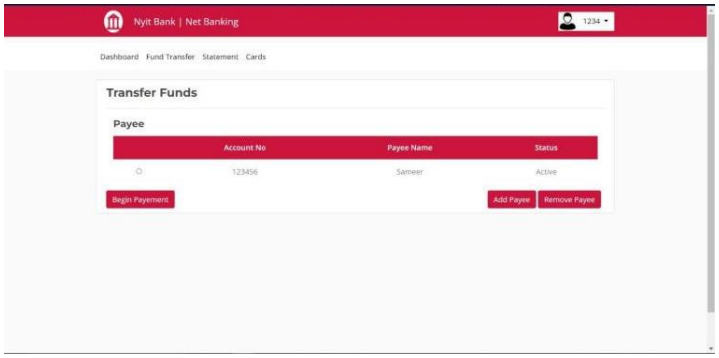

Fig: Transfer fund

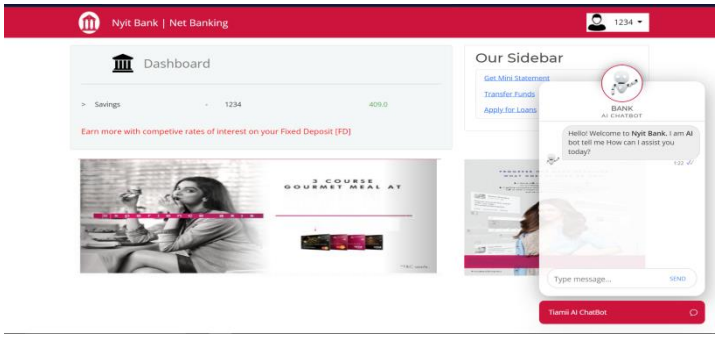

Fig: Home Screen

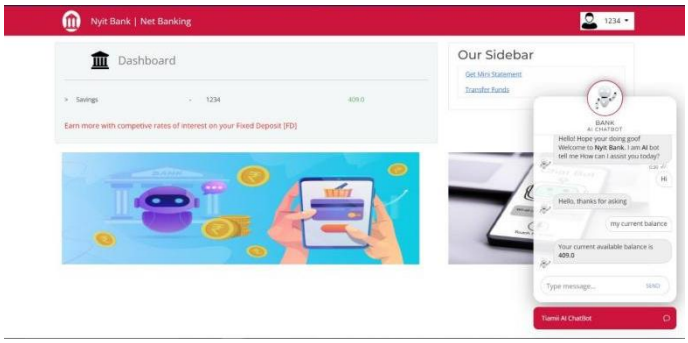

Fig: Dashboard with a chatbot

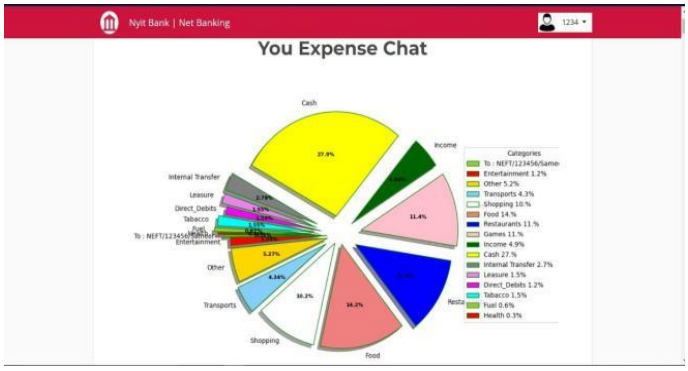

Fig: Expense chart

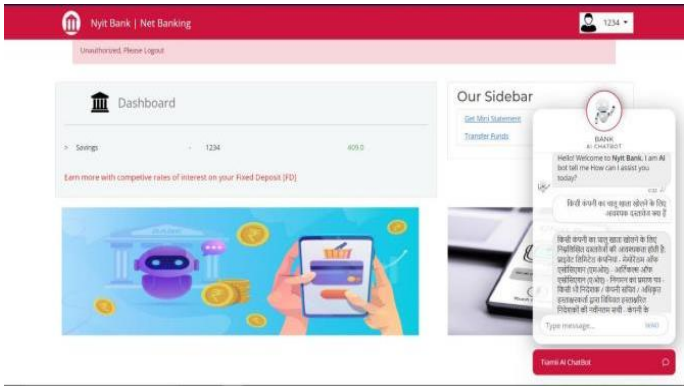

Fig: Hindi bot

VII. CONCLUSION

The proposed system would be a first step toward implementing an intelligent query handling program that could, in subsequent phases, not only respond but also self-learn to improve itself, thereby improving not only customer service quality but also reducing human workload, increasing productivity, and, of course, increasing the number of satisfied customers.

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Smart Irrigation System with Controlling the Flow of Water Using Arduino

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ABSTRACT

India is an agricultural country, wherein about 70% of the population depends on agriculture. Farmers have wide range of diversity to select suitable fruits and vegetables crops. However, the cultivation of these crops for optimum yield. It can be improved by the aid of technological support. The management of irrigation can be improved using automatic watering system. So here we design a smart irrigation technology in low cost which is usable by farmers. The aim of the paper is to detect the moisture content in soil to control the water motor automatically. Smart irrigation system to control flow of water for efficient management and intruder detection system has been proposed. Soil parameters like soil moisture, Humidity are measured and sensed values displayed in LCD. The GSM module has been used to establish a communication link between the user and the field. The current field status will be initiated to the farmer through the SMS. The actual irrigation is done through Arduino by its sensed value of a soil. The electricity generation for this system is done by solar panel.

Keywords: Arduino, LCD, GSM Module, Soil moisture sensor, DHT11, Relay.

I. INTRODUCTION

Indian economy is basically depends on agriculture. Agriculture uses most of available fresh water resources. But now a day's Increased labor costs, stricter Environmental regulations and increased competition for water resources from urban areas provide strong motivation for efficient Irrigation system. The automated irrigation system is feasible and cost effective for optimizing water resources for agricultural production. Using the automated irrigation system we can prove that the use of water can be reduced for different agricultural production. The irrigation system provide only required amount of water to crop.

There is a need of many automated systems that are capable of replacing or reducing human effort in their daily activities and jobs. Here, we are introducing one such system named as smart irrigation system with controlling the flow of water, which is actually a model of controlling irrigation facilities that uses sensor technology to sense soil moisture, temperature with the microcontroller (ATmega328) in order to make a smart switching device to help millions of people. The system has a distributed wireless network of soil moisture and

temperature sensors placed in the root zone of the plants. We can automatically water our garden plants without bothering our neighbors, when we are going on vacation or somewhere else for a long period.

II. SYSTEM DEVELOPMENT

In this Section, we introduce the details of Automatic irrigation system. The block diagram is followed by the introduction of the Arduino kit. The proposed system consists of various modules such as Arduino UNO, DHT11 sensor, Global System for Communication (GSM), Liquid Crystal Display (LCD). LCD display is provided to get the display of the Humidity and temperature. Then it consists of different system component, their interfacing with Arduino board.

2.1 Block diagram

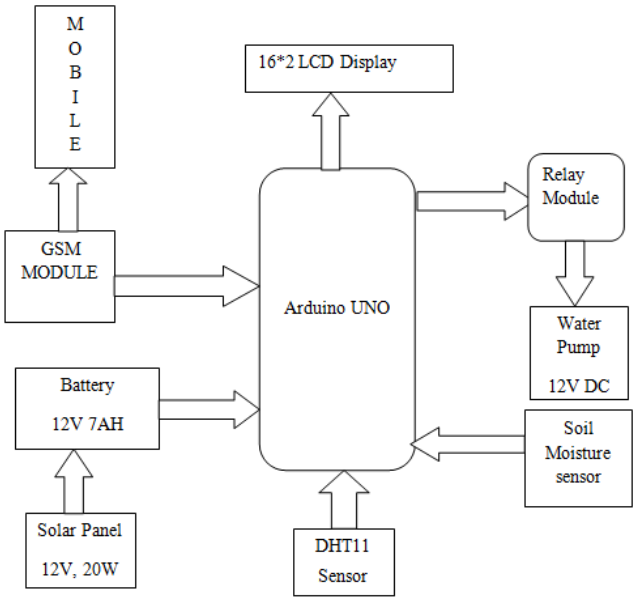

Fig.2.1 Block Diagram

2.2 Arduino Board

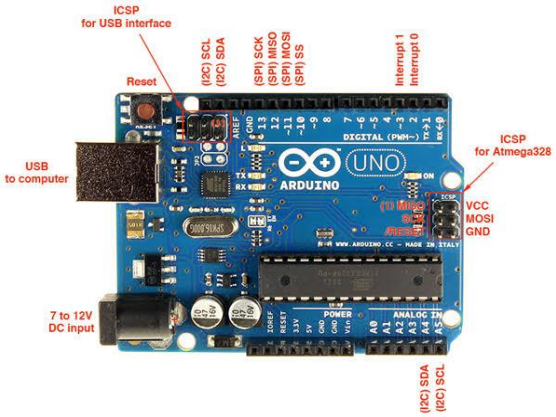

Fig.2.2 Arduino Board

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. We can operate board by sending a set of instructions to the microcontroller on the board. To do so we use the Arduino programming language (based on writing), and the Arduino Software (IDE),

Arduino board consists of 8-bit ATmega328 microcontroller. This microcontroller belongs to 8-bit family microcontroller. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino board has 14 digital input/output pins (of which 6 can be used as PWM outputs).It consists of power jack, 6 analog inputs pins, 16 MHz ceramic resonator, a USB connection, and a reset button.

2.3 DHT11 Sensor

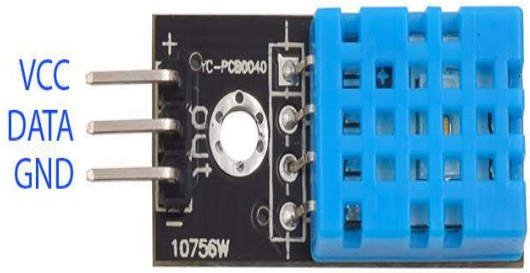

Fig.2.3 DHT11 Sensor

DHT11 is digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity, application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. DHT11 has 3 pins which are VCC pin, Data input pin, and the Ground pin. Input data is in the form of humidity and temperature input to the Arduino. Sensor includes a resistive sense of wet components and NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller. DHT11 uses a simplified single-bus communication. Single bus that only one data line, the system of data exchange, control by a single bus to complete.

2.4 Soil Moisture Sensor

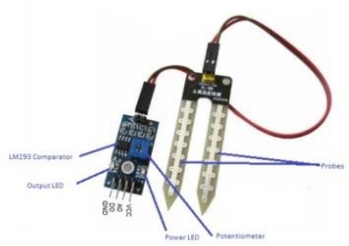

Fig 2.4 soil moisture sensor

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

2.5 GSM (Global System for Communication System)

Fig.2.5GSM Module

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). This is an ultra-compact and reliable wireless module. The SIM900 is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates. GSM was intended to be a secure wireless system. GSM uses General packet Radio service (GPRS) for data transmissions like browsing the web.

2.6 Solar panel

Fig.2.6 Solar Panel

A solar panel is a collection of solar *cells*. The more light that hits a cell, the more electricity it produces. The solar panel can make electricity by using a small device called Solar cell right from sunlight. This solar panel converts electricity up to (20W-12V) in 8 hours in summer season specially.

The photovoltaic cell is a specialized semiconductor diode that converts visible light into direct current. Some photovoltaic cell can convert infrared or ultraviolet radiation into DC electricity. The photovoltaic cell are made up of silicon combined, or doped, with other element to affect the behavior of electrons and holes.

2.7 LCD Display

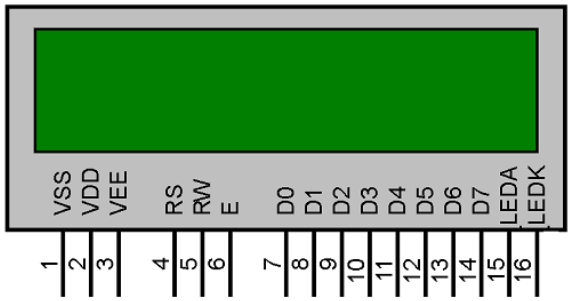

Fig. 2.7 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits.

A 16x2LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

2.8 Motor Pump

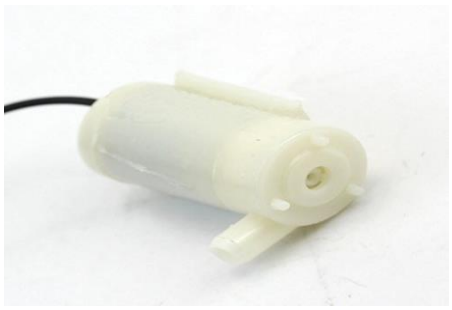

Fig.2.8 Motor

A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid. Mechanical pumps serve in a wide range of applications such as pumping water from wells, aquarium filtering, pond filtering

and aeration, in the car industry for water-cooling and fuel injection, in the energy industry for pumping oil and natural gas or for operating cooling towers.

2.9 Sprinkler

Fig.2.9 Sprinkler

The irrigation sprinkler (water sprinkler or simply a sprinkler) is a device used to irrigate agricultural crops, lawns landscapes, golf courses and other areas. They are used for cooling and for the control of airborne dust. Sprinkler irrigation is the method of applying water to a controlled manner in that is similar to rainfall. The water is distributed through a network that may consist of pumps, valve, pipes and sprinklers. Irrigation sprinklers can be used for residential, industrial, and agricultural usage.

III. SYSTEM IMPLEMENTATION

Sensor based "Smart Irrigation System with controlling the flow of water using Arduino" is based on Soil Moisture Sensor that will measure the moisture level of soil and it will send the signal to the "Arduino UNO" board. According to the moisture level of soil the sprinkler irrigate the crops. The Arduino plays a role of Micro-controller. This Arduino board will compare the values received from moisture sensor with the predefined level stored in the system. Based on the values received from the sensors, the Arduino will turn on the irrigation system ON/OFF. In this system DHT11 sensor is used to measure the temperature and humidity of atmosphere. The "Liquid Crystal Display" (LCD) is used to display the atmospheric temperature and moisture level of soil. The user gets a message on his mobile phone via GSM. The message includes the atmospheric temperature, moisture level of soil and the status of motor whether it will ON or OFF. This is a smart irrigation system and controlling the flow of water, where the irrigation pump is operated from solar energy. This all working notification displayed on LCD display. Relay is used to operate motor electrically. Sprinkler device used to irrigate agricultural crops to distribute water through a network that may consist of pumps.

IV. RESULT

After successful hardware implementation of the circuit output will be obtained. In this system value of moisture and temperature can be detected and also message of these values send on user's mobile. When the

value of soil moisture sensor goes below the threshold value Arduino send the high signal to relay and with the help of relay automatically motor turns “ON”. When the value of soil moisture sensor goes above the threshold value, Arduino send the low signal to relay and with the help of relay automatically motor turns “OFF”.

V. CONCLUSION

The main objective of smart irrigation system is more innovative, user friendly, time saving and more efficient than the existing system. This system measures two parameters soil moisture and temperature. This system is very economical in terms of hardware component and power consumption. Due to server updates farmer can know status about moisture and temperature at anytime, anywhere, automatically controlled it will help the farmers to properly irrigate their fields. This system always ensures the sufficient level of water in the paddy field avoiding the under-irrigation and over-irrigation. Farmers can remotely ON/OFF the motor by using cell phone even from away.

Solar power provides sufficient amount of power to drive the system. To overcome the necessity of electricity and ease the irrigation system for our farmers, the propose model can be a suitable alternative. The system provides with several benefits and can be operated with less manpower. The system supplies water only when the humidity in the soil goes below the reference. Due to the direct transfer of water to the roots water conservation takes place. Thus the system is efficient and compatible to changing environment.

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Real Time Face Mask Wearing Detection System with Deep Learning

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ABSTRACT

The corona virus disease 2019 (COVID-19) pandemic is currently perceived as one of the greatest global threats, not only to public health and well-being, but also to global economic and social stability. Mask-wearing during this pandemic has become a divisive topic in our community. Wearing face masks is recommended as part of personal protective equipment and as a public health measure to prevent the spread of coronavirus disease 2019 (COVID-19) pandemic. The goal is to prevent the droplets produced from talking, coughing, sneezing, etc., from leaving one person and infecting another, something mask wearing disrupts significantly. Wearing a mask is about protecting your neighbors, friends, relatives, co-workers, and other members of your community, especially those at high-risk. If we are in public and cannot maintain six feet of social distance between ourselves and others, then it is important that we wear a mask to slow the spread of corona virus.But most of the people are not wearing face masks in public places which increases the spread of viruses. This may result in a serious problem of increased spreading. Hence to avoid such situations we have to scrutinize and make people aware of wearing face masks. Humans cannot be involved in this process, due to the chance of getting affected by corona.Hence here comes the need for an automated system, which is the main theme of our project. Our project involves the identification of persons wearing face masks and not wearing them in public places by using image processing and deep learning techniques. We are going to use python and deep learning to develop this system. The object detection algorithms are used for identifying persons with and without wearing face masks, which helps to reduce the human interaction at entry point to check whether the incoming people are wearing masks or not and depending upon initial warning further actions will take place.

Keywords— COVID19, pandemic, global threats, infection, mask, automated system, deep learning, object detection, human interaction.

I. INTRODUCTION

The world is struggling with the Covid-19 pandemic and so much essential equipment is needed to fight against Coronavirus. One of such essentials is Face Mask and the mask was not mandatory for everyone but as the day

surpassed scientist and Doctors have recommended everyone to wear the mask. Therefore, to detect whether a person is wearing a Face Mask or not, there is a detection technique. Face Mask Detection Platform utilizes Artificial Network to identify if a person does/doesn't wear a mask. The application can be associated with any current or new cameras to identify individuals with/without a mask.

In this project, we have developed a deep learning model for face mask detection using Python, Keras, and OpenCV. We developed the face mask detector model for detecting whether a person is wearing a mask or not. We have trained the model using Keras with network architecture. Training the model is the first part of this project and testing using a webcam using OpenCV is the second part.

The main task of our project is to identify if the person is wearing face masks and not wearing them in public places by using image processing and deep learning techniques. We are going to use python and deep learning to develop this system. The object detection algorithms are used for identifying persons with and without wearing face masks, which helps to reduce the human interaction at entry point to check whether the incoming peoples are wearing masks or not and depending upon initial warning further actions will take place.

Our Facemask Detection system is built with OpenCV, Keras, TensorFlow using Deep Learning and Computer Vision concepts. We can detect face masks in Static Images as well as in Real-time Video streams. Our project is going to be developed mainly into 2 modules, first is training the facemask detector and second phase is to apply the detector to detect whether the person is wearing a facemask or not. In order to train a custom face mask detector, the two distinct phases with each of its own respective sub-steps are shown in Figure 1.1.

II. LITERATURE SURVEY

A. "Facial Recognition System for People with and without Face Mask in Times of the COVID-19 Pandemic", Jonathan S. Talahua, Jorge Buele,

This research describes the development of a system for recognizing people, even when they are using a face mask, from images. A classification model based on the MobileNetV2 architecture and the OpenCv's face detector is used. Thus, using these stages, it can be identified where the face is and it can be determined whether or not it is wearing a face mask. The FaceNet model is used as a feature extractor and a feed forward multilayer perceptions to perform facial recognition. For training the facial recognition models, a set of observations made up of 13,359 images is generated; 52.9% images with a face mask and 47.1% images without a face mask. The experimental results show that there is an accuracy of 99.65% in determining whether a person is wearing a mask or not.

B. *"Face mask detection using deep learning: An approach to reduce risk of Coronavirus spread"*, *Shilpa Sethi,Mamta Kathuria and Trilok Kaushik,*

This paper aims to devise a highly accurate and real-time technique that can efficiently detect non-mask faces in public and thus, enforce the wear mask. The proposed technique is an ensemble of one-stage and two-stage detectors to achieve low inference time and high accuracy. they started with ResNet50 as a baseline and applied the concept of transfer learning to fuse high-level semantic information in multiple feature maps. In addition, we also propose a bounding box transformation to improve localization performance during mask detection. The experiment is conducted with three popular baseline models viz. ResNet50, AlexNet and MobileNet. They

explored the possibility of these models to plug-in with the proposed model so that highly accurate results can be achieved in less inference time. It is observed that the proposed technique achieves high accuracy (98.2%) when implemented with ResNet50. Besides, the proposed model generates 11.07% and 6.44% higher precision and recall in mask detection when compared to the recent public baseline model published as Retina FaceMask detector.

C. ***"The Face Mask Detection Ffr Preventing the Spread of COVID-19 at Politeknik Negeri Batam"****, Susanto Susanto; Febri Alwan Putra; Riska Analia; Ika Karlina Laila Nur Suciningtyas,*

This paper aims to develop the face mask detector which is able to detect any kind of face mask. In order to detect the face mask, a YOLO V4 deep learning has been chosen as the mask detection algorithm. The experimental results have been done in real-time application and the device has been installed at Politeknik Negeri Batam. From the experimental results, this device is able to detect the people who wear or do not wear the face mask accurately even if they are moving to various positions.

D. ***"Face Mask Wearing Detection Algorithm Based on Improved YOLO-v4",*** *Jimin Yu, Wei Zhang,*

In this paper, an improved algorithm based on YOLO-v4 is proposed to solve the problem of mask wearing recognition. However, in the present work, there are still some problems in insufficient feature extraction for difficult detection samples or even missing and false detection cases. In addition, the case of wearing a mask when the light is insufficient is also not considered. Therefore, the next step should be expanding the data set based on the standard mask wearing criteria and obtaining further improvements for the model in the present work, and so extending it to more object detection tasks.

III. PROPOSED SYSTEM AND METHODOLOGY

The proposed system is designed for automating face mask recognition and reducing the flaws of the existing manual system.

Our Face Mask Detection system is built with **OpenCV, Keras/TensorFlow** using Deep Learning and Computer Vision concepts. We can detect face masks in Static Images as well as in Real-time Video streams. A data set is a collection of data. In Deep Learning projects, we need a training data set. It is the actual data set used to train the model for performing various actions. A collection of instances is a dataset and when working with machine learning methods we typically need two datasets for different purposes.

- **Training Dataset:** A dataset that we feed into our Deep learning algorithm to train our model.
- **Testing Dataset:** A dataset that we use to validate the accuracy of our model but is not used to train the model. It may be called the validation dataset.

To create this dataset, we follow these two steps:

- Taking normal images of faces.
- Then creating a custom computer vision Python script to add face masks to them, thereby creating an artificial (but still real-world applicable) dataset. Facial landmarks allow us to automatically infer the location of facial structures, including Eyes, Eyebrows, Nose, Mouth, Jawline.

In order to train a custom face mask detector, we need to break our project into two distinct phases, which is,

- **Training:** Here we focus on loading our face mask detection dataset from disk, training a model (using Keras/TensorFlow) on this dataset, and then serializing the face mask detector to disk
- **Deployment:** Once the face mask detector is trained, we can then move on to loading the mask detector, performing face detection, and then classifying each face as with mask or without mask.

3.1 modules

Our system development has been mainly done in 2 modules, that are as follows:

A) Training the face mask detector

B) Applying the detector

A) Training the face mask detector

With the help of OpenCV the image is preprocessed and the face and presence of the face mask on that is recognized and given as output with the help of a trained CNN model. When tested it was observed that training speed is fast and the accuracy is high. This project uses TensorFlow and Keras to train a CNN model for detecting face masks. The trained models can be run on any system for predicting results.

B) Applying the detector

The "Real-World-Masked-Face-Dataset" database available on Git-Hub is used. Unzipping the files makes available a large number of images of people of Asian origin wearing a mask. From this database, the training of the classifier of the first stage is carried out. Later the well-trained facemask detector has to be loaded in the system to work with webcam to detect the face mask in the real time image which is going to be captured with the help of webcam. We have achieved 99.49% accuracy on detecting the mask in real time as shown in figure 1.1.

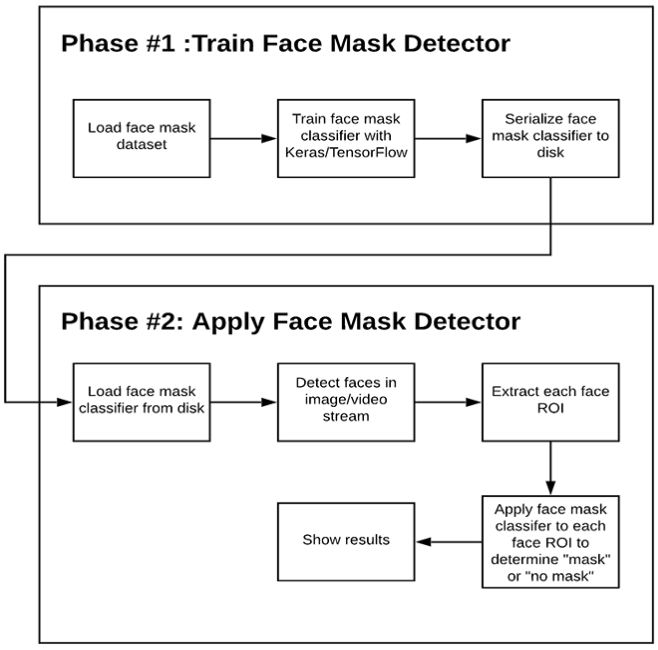

Figure 1.1: System Flow

3.2 related methodologies

- **OpenCV**

OpenCV means Open-Source Computer Vision Library. It is a library of programming functions mainly aimed at real-time computer vision. This library was originally developed by Intel. OpenCV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. All of the new developments and algorithms appear in the C++ interface. There are bindings in Python, Java, and MATLAB.

- **TensorFlow**

TensorFlow is an end-to-end open-source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML and developers easily build and deploy ML-powered applications. Easy model building Build and train ML models easily using intuitive high-level APIs like Keras with eager execution, which makes for immediate model iteration and easy debugging. Robust ML production anywhere easily trains and deploys models in the cloud, on-prem, in the browser, or on-device no matter what language you use. Powerful experimentation for research A simple and flexible architecture to take new ideas from concept to code, to state-of-the-art models, and to publication faster.

- **Keras**

Keras is the most used deep learning framework. Because Keras makes it easier to run new experiments. Take advantage of the full deployment capabilities of the TensorFlow platform. Keras is used by CERN, NASA, NIH, and many more scientific organizations around the world. Keras has the low-level flexibility to implement arbitrary research ideas while offering optional high-level convenience features to speed up experimentation cycles.

- **Numpy**

NumPy is short for "Numerical Python". It is a Python library. NumPy is used for working with arrays. It also has functions for working in the domain of linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open source project and you can use it freely. NumPy aims to provide an array object that is up to 50x faster than traditional Python lists.

IV. FUTURE SCOPE

The technology is continuously involving and getting updated day by day with new trends, so being a part of it we have to be updated.

So as the part of future plans, we may come with many new features like providing mask to those who doesn't have one, providing sanitization to everyone, and also with some customization alert at the time of ‘no mask’ person is detected, like light blink, alert sound, alert sound with light blink, blocking entry, sending the alert to somewhere(like head office, control room, etc.).

Our primary aim is satisfied, but we are looking forward to continuing our work on it with the improvements as mentioned above so that we can help the society in fighting with COVID and other similar diseases and flues.

V. CONCLUSION

As the technology is booming with emerging trends therefore the novel face mask detector can possibly contribute to public healthcare. In this project, we have developed a deep learning model for face mask detection using Python, Keras, and OpenCV. We developed the face mask detector model for detecting whether a person is wearing a mask or not. We have trained the model using Keras with network architecture. Training the model is the first part of this project and testing using a webcam using OpenCV is the second part.
The model is trained on an authentic dataset. We used OpenCV, tensor flow, Keras and CNN to detect whether people were wearing face masks or not. The models were tested with images and real-time video. The accuracy of the model is achieved and the optimization of the model is a continuous process and we are building an accurate solution by tuning the hyperparameters.
The accuracy of the model will be achieved and the optimization of the model is a continuous process and So we are building a highly accurate solution. We can prevent people from Virus Transmission through this System. This specific model could be used as a use case for edge analytics. By developing this system, we can detect if the person is wearing a face mask and allow their entry would be of great help to society.

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Customer Relationship Management System

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ABSTRACT

We are developing a CRM (Customer Relationship Management) System software. During this project we aim to create different modules to help customers to keep them up-to-date with the assistance of feedback survey with business authorities and it'll help business to grow. CRM are generally standardized to make sure that they need reliability and validity. Customer Relationship Management (CRM) System is the process that monitor, administer and control the feedback within the variety of survey. CRM includes data capturing and review/correction, collects and analyzes your results automatically. Companies are already pouring billions of dollars into CRM solutions—software and services designed to assist businesses more effectively, manage customer relationships through any direct or indirect channel a customer might use. That's why, the marketplace for CRM technology is exploding.

I. INTRODUCTION

Customer relationship management (CRM) System is an approach to manage a company's interaction with current and potential customers. It uses data analysis about customers' history with an organization to boost business relationships with customers, specifically that specialize in customer retention and ultimately driving sales growth. Through the CRM approach and therefore the systems accustomed facilitate it, businesses learn more about their target audiences and the way to best cater to their needs.[1]

Customer relationship management (CRM) System is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle, with the goal of improving customer service relationships and assisting in customer retention and driving sales growth. CRM systems compile customer data across different channels, or points of contact between the customer and also the company, which could include the company's website, telephone, live chat, junk mail, marketing materials and social media. CRM systems also can give customer-facing staff detailed information on customers' personal information, purchase history, buying preferences and concerns. CRM may be divided not only into different areas, but also into four components, each employed by each department proreta. These

components are analytical CRM. This helps to spot trends and may verify whether certain measures are successful while also reporting on whether there have been any side effects. Other is Operational CRM the task of operational CRM is to translate the findings of analytical CRM into concrete measures. The third one is Communicational CRM, that manages various communication channels so a coordinated contact with the customer is maintained.

The last one is Collaborative CRM, rather like communicational CRM, collaborative CRM serves to coordinate.

II. RELATED WORK

Reference Brink, A. & Berndt, A. (2009) "Relationship Marketing and Customer Relationship Management" Jute Publications discussed a dramatic change within the view of the meaning of selling. the normal '4 Ps' of promoting need to be reconsidered from a customer-oriented perspective and therefore the transactional marketing approach should target customer retention.

Also, market segmentation not appears to be operating effectively. A paradigm shift is clearly necessary, from marketing to anonymous masses of shoppers to developing and managing relationships with more or less well-known, or a minimum of somehow identifiable, customers.

CRM in Real Time: Empowering Customer Relationships in-built 2008 by Goldenberg, B.J for the knowledge technology personnel gain a perspective that the method and folks are important while executives understand the importance of their support and ownership. The book is written for the common man who truly has to understand the problems related to CRM, customer service, and strategic integration of consumers into the business concern.

Peppers, D. & Rogers, M. (2011) "Managing Customer Relationships: A Strategic Framework" John Miley & Sons. This study examines the fundamental components of Customer Relationship Management and its influence on the expansion of Micro, Small and Medium Enterprises (SMEs) in South-West Nigeria. the information obtained were analysed using appropriate descriptive and inferential statistics. The results of the study show a statistically significant relationship between customer care strategies and customer retention, public image maintenance and customer care ($r = 0.430$, $p < 0.05$), ($r = -0.438$, $p < 0.05$) respectively. The analysis also revealed a big relationship between human resource factor and business revenue, development also as product market development ($r = 0.209$, $p < 0.05$), ($r = 0.259$, $p < 0.05$), ($r = 0.472$, $p < 0.05$) respectively. The analysis further showed a statistically significant relationship between analytics and business revenue, development, and customer retention ($r = 0.416$, $p < 0.05$); ($r = 0.313$, $p < 0.05$), and ($r=0.291$) $p=0.003$) respectively. The study concludes that the components of Customer Relationship Management examined as an omnibus concept had influence on the expansion of MSMEs within the study area.

Customer relationship management: by Islamic bank in 2008 .This explores the implementation of customer relationship management (CRM) in Islamic banks through two components of organizational and technological factors. The CRM is one among the solutions to resolve the 2 common issues that are low level of public awareness toward the Islamic banks' products and low level of Islamic financial literacy. a combination method that's employed in this chapter consists of quantitative method using descriptive analysis and qualitative method using content analysis supported a review of literature. A proportional sampling technique is employed

to gather questionnaires from a complete of twenty-two respondents. The findings reveal that a majority of respondents agreed to any or all statements associated with organizational and technological factors, which affect the CRM implementation. the data during this chapter are often useful, or as a reference, for stakeholders, particularly the financial service authority and also the bank of Indonesia in developing the Islamic banks.

III. METHODOLOGY

Following are the modules that we are developing.

A. USERS

Customers are the foremost valuable assets for your business. Here, the lead module keeps data of all the shoppers organized. your marketing channels, the software stores all their data in one place.

Furthermore, this CRM module offers smart views to gauge the current status of the leads. When all of this data is accumulated in one place, any sales manager can quickly analyse sales operations currently occurring and the way it will be modified further.

Additionally, there are different options to manage leads, activities, task, and lists, that empowers every salesperson to form the foremost out of their efforts.

B. MARKETING

Marketing module stages conclusive details of all of your email marketing campaigns and more. It displays the names of the marketing campaigns with this status.

In addition thereto, the marketing module also displays the results of your email marketing campaigns with respective click-through rates and more. This helps you to induce a gist of how fruitful your email marketing campaigns are. and the way you'll be able to improve it further. Also, the marketing module allows you to make new email campaigns after analysing the response of the previous. Additionally, this CRM module showcases the small print of landing pages that you simply have created. It puts together all data regarding views, conversion rate, present status, and more.

Last but not least, the Marketing Module of CRM creates and furnishes the main points of all website widgets, their types, and their status. Additionally, it also provides you the way to test the conversion rate of those widgets by generating individual reports for each one amongst them.

C. WORKFLOW

The workflow module helps you to automate your sales process. for instance, when a brand-new lead flows into the system. you'll be able to set-up automation to assign it to a salesman that may cater to your lead's interest.

Following that, you'll create an if/else condition. Suppose, if the lead doesn't devour your follow up call, you'll set a task to call after three days. Conversely, if they obtain and show interest in your product, you'll be able to engage them with email, highlighting the small print of the merchandise.

The workflow module of CRM helps you to collect all the workflows in one place and analyse the quantity of triggers, etc.

Moving on, the CRM module also delivers a process designer. It allows you to make process after identifying relevant triggers.

D. CONTENT REPOSITORY

The content repository module of the CRM software gathers all images and documents. It makes them easily accessible whenever you would like them.

Through content repository, all of your creatives and pictures will be accessed by your team members. When in need, it saves time by eliminating the confusion of trying to find data stored in several silos.

E. REPORTS

Report's module of the CRM software gathers reports of various categories and presents them in one place. These reports include administrative reports, field sales reports, customer analytics, and lots of more.

Based on your usage pattern, this CRM module collects frequently used reports in one section. It enables you to access them effortlessly. Also, the module allows users to make customized reports in no time.

Reports Module of CRM provides the convenience of analysing all data associated with sales and marketing. With this, it helps you to optimize your process to grow in your industry.

IV. RESULTS

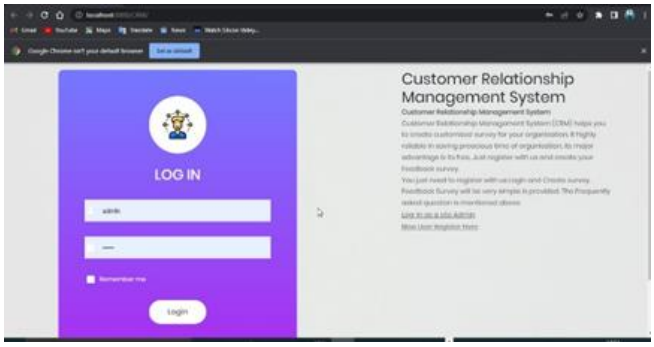

Fig (1): Home Page

This is home page, it consist short description about CRM System with the login ID and Password to go to further pages.

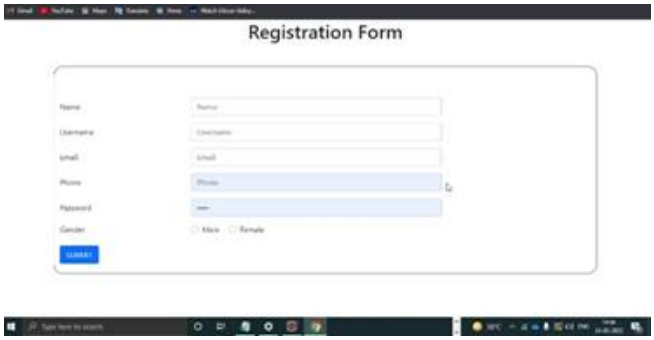

Fig (2): Registration Page.

This is Registration page if any one is not registered they can registered themselves here.

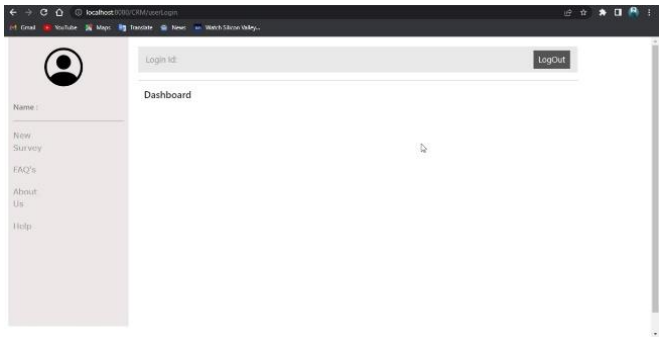

Fig (3): User portal.

This is user portal, here in left side there are tag for starting survey, FAQ page, about us page and help page

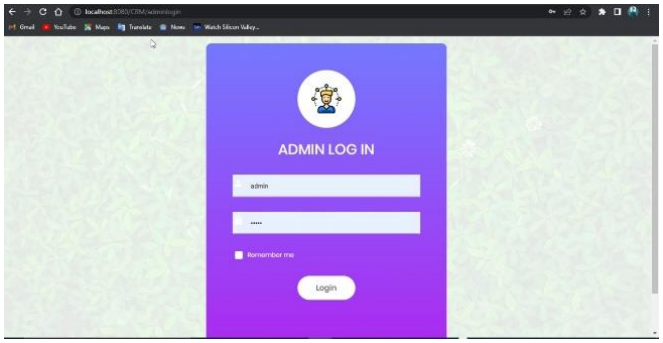

Fig (4): Admin Login.

This is login page for admin.

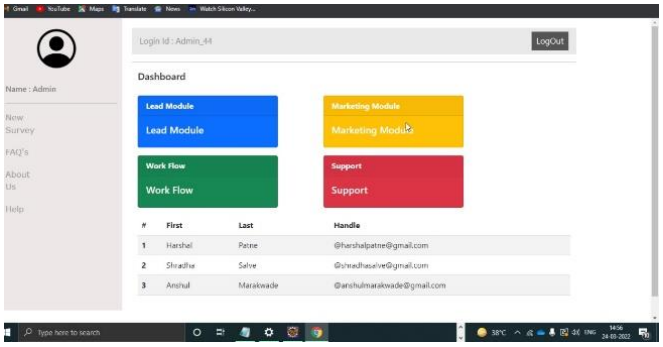

Fig (5): Admin Portal.

This is admin portal, the admin can view the responses or the clients information.

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IOT Based Farm Irrigation and Fertilizer Ecommendation System

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ABSTRACT

India is mainly an agricultural country. agriculture is the most important occupation for the most of the indian families. it plays vital role in the development of agricultural country. water is main resource for Agriculture. Irrigation is one method to supply water but in some cases there will be lot of water wastage. So, in this regard to save water and time we have proposed project titled automatic irrigation & fertilizer recommendation system using IoT. In this proposed system we are using various sensors like temperature, humidity, soil moisture sensors which senses the various parameters of the soil and based on soil moisture value land gets automatically irrigated by ON/OFF of the motor. also, picking the proper fertilizer for the land and yield is an important and basic part of agriculture so this project helps the farmers for picking the reasonable fertilizer for the land and yield in an efficient manner with automated fertilizer recommendation system based on soil moisture and humidity.

Keywords— Internet of things, Arduino processing unit, Soil moister and temperature sensor, etc.

I. INTRODUCTION

Agriculture is the major source of income for the largest population in India and is major contributor to Indian economy. However, agriculture requires irrigation and with every year we have more water consumption than rainfall, it becomes critical for growers to find ways to conserve water while still achieving the highest yield. The Internet of Things (IoT) is a technology where in a mobile device can be used to monitor the function of a device. This project helps the farmers to irrigate the farmland in an efficient manner with automated irrigation system based on soil moisture. The proposed system has been designed to overcome the unnecessary water flow into the agricultural lands. Temperature, moisture and humidity readings are continuously monitored by using temperature, moisture and humidity sensor and send these values to the assigned IP address. Android application continuously collects the data from that assigned IP address. Once the soil moisture values are exceeded the particular limit then the relay, which is connected to the arduino microcontroller controls the motor. The android application is a simple menu driven application, with 4 options. This includes motor status, moisture, temperature and humidity values. The motor status indicates the current status of the pump. Also,

picking the reasonable fertilizer for the land and yield is an important and basic part of agriculture so this project helps the farmers for picking the reasonable fertilizer for the land and yield in an efficient manner with automated fertilizer recommendation system.

II. LITERATURE SURVEY

This paper [4] has genius represented a framework that is extremely essential and doesn't convey anything new to the table. It utilizes a framework that has sensors for moisture, temperature, and humidity, and utilizations Arduino to execute its capacities. It is halfway automated as the client needs to keep a mind the water dimension of the framework. This framework utilizes a GSM module for correspondence

This paper [5] proposes a strategy that utilizes various sensors i.e Temperature, moisture, humidity and light to make a savvy irrigation framework. The information is sent to a web server for information dissecting and preparing, it is put away in JSON design. The light sensor detects the light, to expand the working of the plant, light is conveyed too. They intend to utilize keen calculations to improve the framework. It publicizes that it has 92% productivity than the rest.

This paper [6] IoT is utilized for irrigation in this task as the moisture sensor identifies the substance of water inside the dirt and in like manner educates the client through the PC it is associated with by means of warnings. The framework contrasts the moisture and the limit esteem and begins the water siphon in agreement and stops the siphon in like manner. The framework has constrained range as it is utilizing a PC to associate with the Arduino board through USB link since it isn't plausible to use for a homestead. The framework makes utilization of an Arduino board, moisture sensors, and a water siphon.

MEASUREMENT

For this project, various measurement are used:

A. Moisture Measurement.
B. Temperature Measurement.
C. Humidity Measurement.

A. Moisture Measurement

Soil is comprised of blend of segments including mineral and natural particles, with water and air making up the spaces in the middle. It is encouraged to break down soil to reason its classification. Every classification has distinctive properties henceforth their water holding limit changes from one sort to the next. As water invades soil, it begins to fill the hole between the void spaces in the middle of soil particles when every one of the spaces are totally immersed with the water, the state is known as immersion point. This state goes on for brief time. With time overabundance water permeates descending through water profile because of gravitational power. At same time narrow activity give inverse power to gravity and give adjusted condition so descending development of water is ruined.

B. Temperature Measurement

Temperature monitoring is key in numerous modern situations. It likewise assumes imperative part in plant development subsequently monitoring temperature is basic for good farming practice. Numerous standard methods exist which relies on estimation of physical properties of the working material that differs with temperature. Thermocouple, thermistor, RTD, pyrometer, Langmuir tests, infrared, and so forth are a portion of the cases.

C. Humidity Measurement

There are three approaches to speak to Humidity. It is the measure of water vapour (water that has abandoned a fluid to an undetectable gas) noticeable all around. Outright humidity is the genuine measure of water vapour in a predetermined volume of air. Relative humidity is the proportion of moisture noticeable all around when contrasted with the most extreme measure of moisture the air can hold, which changes relying upon the air temperature. More sizzling air, for instance, can hold more moisture

III. METHODOLOGY

A preset value of soil moisture sensor is fixed in microcontroller and also for fencing.when it goes beyond the particular threshold value water is automatically irrigated to the crops and once the required amount of water is fulfilled it stops,the Microcontroller transmits that information on the internet through a network of IoT in the form of wifi module ESP8266 that is attached to it. this enhances automated irrigation as the water pump can be switched on or off through information given to the controller.

A. Proposed System

Nowadays agricultural field is facing lot of problems due to lack of water resources. In order to help the farmers to overcome the difficulties, smart irrigation system has been used. In this system, various sensors such as pH, soil moisture and DHT11 are connected to the input pins of Arduino microcontroller. The sensed values from the sensors are displayed in LCD. If the sensed value goes beyond the threshold values set in the program, the pump will be automatically switched ON/OFF by the relay circuit and it is connected to the driver circuit which helps to switch.

B. Arduino Processing Unit

Arduino is a microcontroller board providing a platform for controlling the signal/input from various sensors and other modules. It provides an open source platform independent IDE that allows the programmer to process the electronic signals from attached components and control them. One of the most popular Arduino is Arduino Uno which is an 8 bit Atmel AVR Microcontroller with a clock speed of 16 MHz. Last but not the least, these boards are not expensive and have a very active developer's community.

C. Soil Moisture sensore

Soil Moisture sensore is used to measure the moisture content present in the soil. When the soil moisture value read by the sensor is above the threshold value, low level (0V) will be the digital output and if it is below the threshold level, high level (5V) will be the digital output. The digital pin is used to directly read current soil moisture value to see if it is above threshold or not. The threshold voltage can be regulated with help of potentiometer

IV. CONCLUSION

In light of all above talk it can be reason that programmed irrigation framework utilizing remote innovation can give effective framework equipped for moderating assets and human exertion. The framework likewise encourages ongoing remote monitoring of the current ecological state of field. Present day innovation can be consolidated to let down the cost. These electronic frameworks are control proficient thus devours less power and depend on auxiliary sources such sunlight based vitality for finish independence. By using Internet of Things, majority of Farmers were aware about the monitoring and warning detection method in agriculture.

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Food Calorie Estimation using Machine Learning

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ABSTRACT

Now-a-days people are more concerned about their fitness and to maintain that fitness they are more conscious about their diet. With the growing technology, it gets high attention from the researchers in the field of Machine Learning to enable people to manage their diet in a better way. People care about the type of food they are eating and the nutrients it contains. In this paper we introduced an automatic way to detect and recognize the food in an image in order to enable keeping track of daily intake automatically using images taken by the user. For recognizing the images we have used Convolution neural network which is widely used for a variety of classification problems and achieve promising results. Our trained model has achieved an accuracy of 80% in the task of recognizing 15 different types of food images.

Keywords: Calorie counter; Deep Learning, Convolutional neural network and calorie estimation, Food Detection, Food Recognition.

I. INTRODUCTION

Food is an essential need of the human body. So people must follow a diet plan in order to maintain a fit and healthy life. But in most cases people face difficulties in estimating the amount of food intake. Which contains a manual process such as going through a web browser and searching for that food item, the nutritional values it contains and the amount of calories it contains. It will be very useful if there is a system to keep track and maintain the calorie intake. From the past few years the usage of smartphones has been drastically grown. With the help of which we can get a large amount of data generated by smartphone users to predict the behaviour of the people.

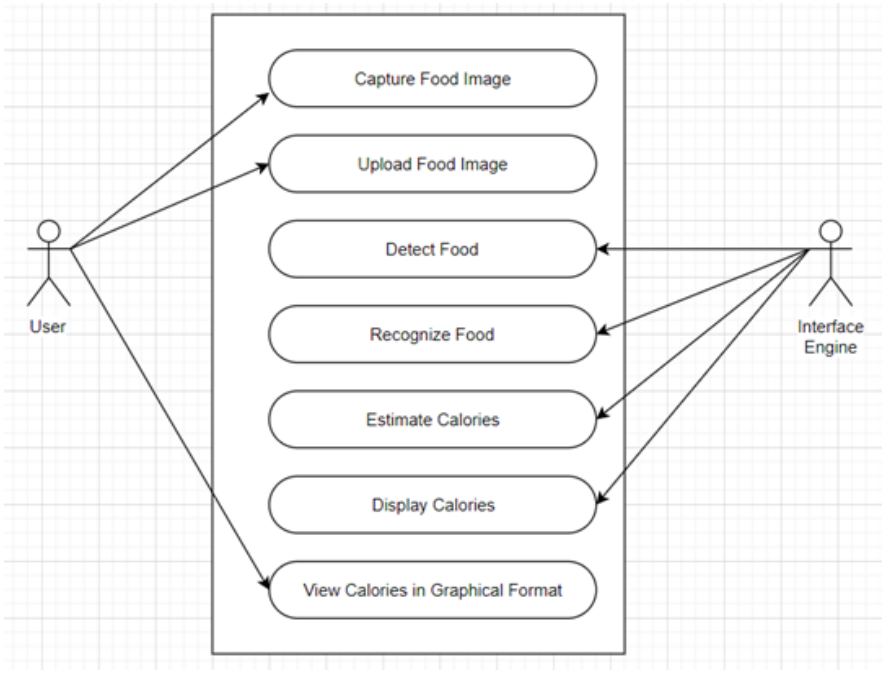
We can use this data to track the eating habits of an individual and the number of calories they are consuming daily. The first step in this approach is to develop an automated recognition system. Which can detect the type of food in the image and retrieve the number of calories it contains. An automatic food recognition system

could serve as a calorie counter for people who are trying to lose weight. People simply have to take a picture of the food item that they are eating and see the number of calories it contains.
The features used for training fruit recognition systems are colour, size, shape, and texture. Most of the current systems use these features or a combination of them. The convolutional neural network model learns what type of features result in a higher accuracy and therefore uses them in the classification process.

II. PROPOSED SYSTEM

Food Calorie Detection is a simple application which is used to recognize and detect food items based on input image through which it will estimate the amount of calories present in it. The idea is to estimate the calories of food items which are being recognized. The convolutional Neural Network (CNN) is used to recognize the food item. Further to estimate the calories we have given the standard calorie value for one gram of each food item. The weight of the food item is given as an input and based on the standard calorie value the accurate calorie value of the food item is calculated.

2.1. Use-Case Diagram



Use-Case Diagram

III. METHODOLOGY

The project consists of two steps, identifying food from an image and converting the food identified into a calorie estimation. We performed food image classification using CNN (convolutional Neural Network). Our application involves getting input images from the user and After that, the image will go through a pre-processing step to match the needed input of the next process. The pre-processed input image will be fed to the

prediction CNN model for classification of the food image. The resulting food type or name will then be compared to the list of food. The food type and its calorie will be presented to the user.

WorkFlow diagram of Proposed Application

3.1. DataSet

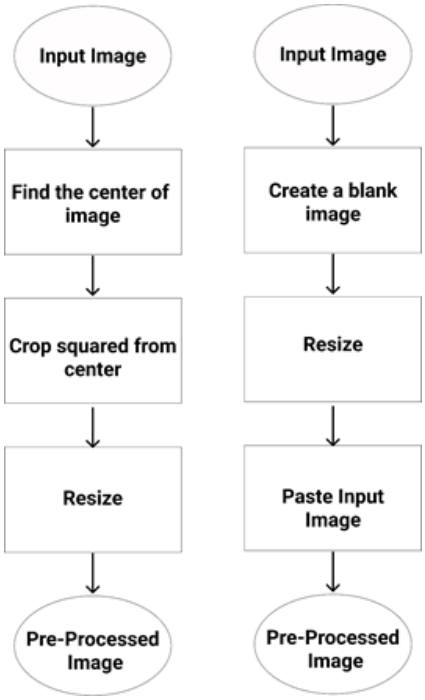
A Deep learning Algorithm requires a large dataset to build an accurate model which will help us to recognize the images. For this application we have created a model of 15 classes each consisting of 150 images. Most of the image has a food as the focus in that image, but some of the images has other objects in the image that may affect the prediction result. For these files to be a suitable input for the NN model, it must undergo a pre-processing step.

3.2. Pre-Processing

Some basic pre-processing has been performed to clean the dataset where the irrelevant and noisy images of 15 categories have been removed.

Also, data augmentation has been performed –

- Pixel values re-scaled in the range of [0,1].
- Random rotations max 40 degrees.
- Random zoom applied.
- Shear angle in counter-clockwise direction in degrees



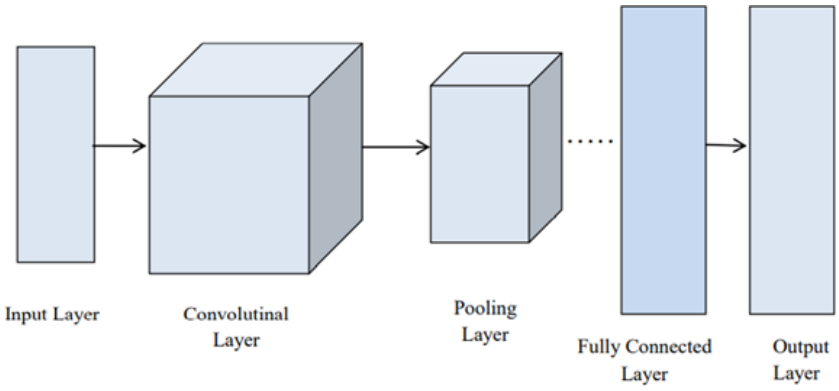
Pre-Processing method cropping and Padding

3.3. Training the Model

We trained the model with images of 15 categories using the classifier CNN (convolutional Neural Network) which is a class of deep, feed forward artificial neural networks that has successfully been applied to analysing visual imagery.

3.4. Convolutional Neural Network (CNN)

Convolution Neural Network is one of the popular neural networks mainly used for image classification. .CNN is widely used in food recognition and provides high performance than the traditional methods. Over the last few years, due to the enhancements in deep learning, especially in the convolutional neural networks, the accuracy in detecting and recognizing food images has increased. This is not only because of larger datasets but also new algorithms and improved deep architectures. Convolutional Neural Network (CNN) is also known as LeNet due to its inventor.CNN mainly comprises convolutional layers, pooling layers and sub-sampling layers followed by fully-connected layers. The CNN takes an input image and applies convolutional and then sub-sampling. After two such computations, the data is fed into the fully connected neural network, where it performs the classification task. The main advantage of CNN is the ability to learn the high-level efficient features and in addition to that, it is robust against small rotations and shifts.



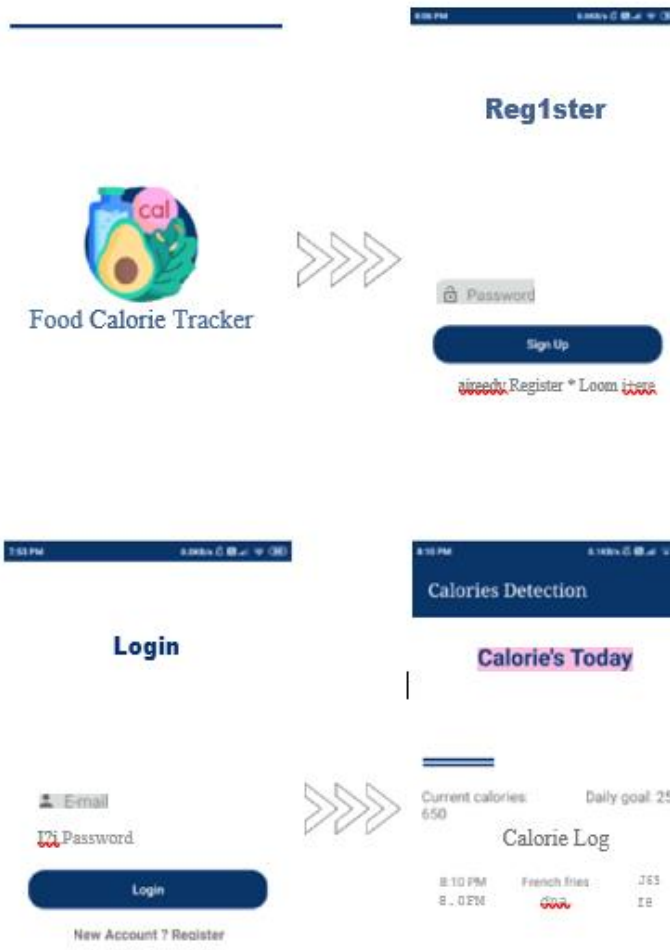
Layers of Convolutional neural network

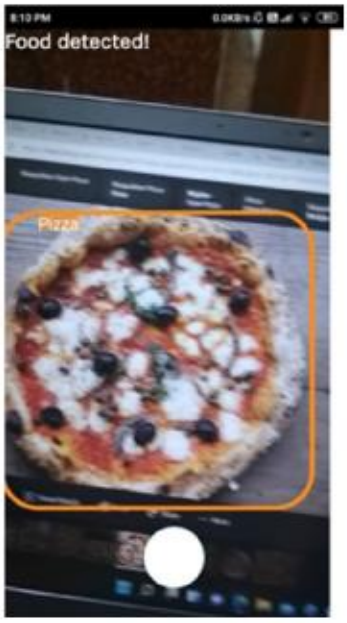
3.5. Calorie Estimation

The calorie data for this application is listed manually to match our dataset. As we cannot find specific data of calories for the food category dataset. The collected calorie data is standardised for 100 gm. As we have not implemented food-weight or size estimation until the making of this report, we are using the 100-gram calorie data to make our calorie estimation and present it to the user.

3.6. Graphical User Interface

We have created Mobile application for calorie estimation. When this program opens the user will see a button below to capture the image. When the user captures the image he will be redirected to the home screen where he will get to see the list of food items along with the calorie. Another button for Graphical representation will be enabled. Where the user will get to see how much percent calories he had intake in a day.





GUI Representation

IV. RESULTS

Table shows the summarised results of the proposed model.

No	Name	Top 1	Top 5
1	Pizza	61	83
2	Burger	20	58
3	French Fries	32	69
4	Pan Cake	40	74
5	Grapes	13	53

The top-1 accuracy is the percentage of the times that the actual label is the first predicted label by the model and the top-5 accuracy is the percentage of the times that the actual label is among the first five predicted labels by the model.

V. CHALLENGES

- Recognizing the food item with the help of a single picture.
- Similar type of images for example pizza and dosa, both are in the same shape which we find difficult to recognize.
- Dataset becomes much larger when it comes to food images, so currently we take a finite dataset for training.

VI. CONCLUSION

The traditional models of Machine learning are not able to attain much accuracy when it comes to image classification. In this project, the CNN model is applied in image recognition.Much of data augmentation and segmentation has to be performed as well and clean pixel values are not necessary in CNN as it on it's own learn the generalised pattern required to identify and recognize new images.So using CNN model, the accuracy is comparatively a lot higher than all other traditional models. . The final application implemented in light GUI with a trained model could help the user to easily recognize the food calorie with the light MobileNetV2 based model will be suitable for mobile application implementation in the future.

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Design of Multi-Operation Agricultural Robot with Renawable Energy Source

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ABSTRACT

The Indian Academy has a strong emphasis on agriculture. Agriculture in India has expanded rapidly in recent decades. This has been carried out. Despite the fact that huge agricultural machinery and robots have been developed for maximum yield, the multipurpose farming robot is a fundamentally novel concept in this business. Weeding, spreading seeds, and applying insecticides are all time-consuming tasks. Bullocks, horses, and buffalo are still used by many Indian farmers for agricultural purposes. This would be insufficient to meet agricultural energy needs in comparison to other countries across the world. We believe that a sophisticated mechanism suitable for small-scale farms can economically substitute human and animal labour. As a result, we're building this prototype with the expectation that it will meet all of the requirements and address all of the problems in real life. India is a predominantly agricultural country, with 70% of the population relying on the fruits of their labour. However, as the population grows, the farm is divided among the family, and Indian farmers now have only two acres of land on average. However, as the population grows, the farm is divided among the family, and Indian farmers now have only two acres of land on average As a result, we're working on machinery that will suit all of these needs while simultaneously solving the human problem. The paper is about a multi-purpose farming machine that can feed seeds, spray insecticides, fungicides, and fertilizers, as well as cut grass. As a result, more cost-effective and multi-use equipment for farmers is becoming available, which is also easy to clean and maintain, easy to handle, and does not require fuel, decreasing expenses and supporting farmers in their fields to a greater extent.

Keywords : Agricultural robot, Design of robot, Seed box, Feed shaft, Mass flow metering device, Ground wheel, Furrow opener

I. INTRODUCTION

Agriculture is India's primary source of income. Because agriculture is the backbone of the Indian economy, there is a pressing need to improve the equipment used in the cultivation or agricultural process. The most critical phase in the farming process is seed sowing. In a conventional seed sowing operation, bullock-driven sowing equipment is used. Animals are regarded as the backbone of the rural economy in India. Aside from

human labour, animal power was used by 97.6% of farmers (landowners) in India, who held 77.2 percent of the country's land. Animals are used in farming to a lesser extent in India because the Indian economy is based on them.

As a result, we must upgrade the bullock-driven sowing machines or equipment, as well as the tractor-driven sowing machines or equipment, in order to increase their effectiveness and, as a result, the cultivation capacity. Because most planters are unable to attain equidistance spacing between crops, lesser producing crops with nutritional deficits occur. Equidistance planting or sowing in the right location, according to research, leads in the highest potential yield, quality, and uniformity of crops. The basic purpose of seed sowing operations is to plant seed and fertilizer in rows and at desired depths, taking into consideration different seed kinds and sizes. As a result, seed sowing machine inventions, as well as future refinement and improvement, are necessary. A seed sowing machine that is a modification of a previous model is the Roller Seed Sowing Machine Design And Fabrication. A bull or tractor is used to pull the equipment. With the customized equipment, we can not only sow the seeds, but also the fertilizer. The revised seed sowing machine can distribute seed at the same distance and depth as before, as well as sow fertilizer at the same depth and distance.

Fig 1: Working model

The metering system controls the depth of sowing, while a mechanism powered by a belt drive and propelled by a ground wheel achieves equidistance sowing. The machine is more efficient and valuable to the farmer because it is simple and has fewer complicated mechanisms. Agriculture has long been and will continue to be the backbone of the Indian economy. The demand for food will rise as India's population expands, necessitating the deployment of more efficient farming techniques to increase crop output. This will necessitate improved seed planting and fertiliser placement processes. The basic purpose of seed sowing is to ensure that seeds are planted at the proper depth, spaced properly, and covered with soil to ensure that they yield. Depending on the crop and the agricultural climate, seed planting depth and seed-to-seed distance vary. The goal of this study is to construct a machine that meets the aforementioned requirements while saving time and money. Traditional methods have significant disadvantages, and tractors and other advanced sowing equipment are prohibitively expensive for small and medium-scale farmers. The equipment we're creating

and building is multifunctional, which means it can both plant seed and apply nutrients. A bull cart or a small tractor can be used to power this device.

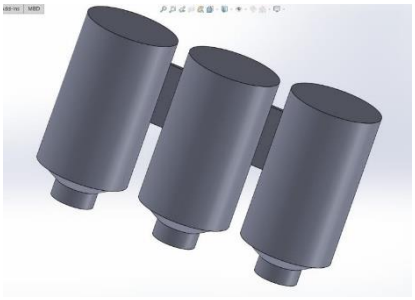

Fig 2: Hopper

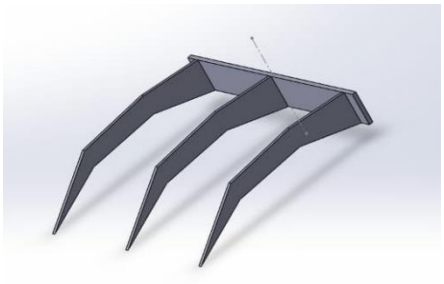

Fig 3: Plough

II. PROBLEM IDENTIFIED

- It has no adjustment of depth and seed distance.
- No arrangement for fertilizers sawing.
- Due to less power self-propelled vehicle the depth of sawing is restricted.
- Continuous refill of seed hopper is needed

III.MATERIALS AND METHODS

During the winter of 2005-2006, the experiment was carried out at the PCSIR laboratory in Quetta. Three ploughs were provided to the soil in this manner in order to prepare a good seed bed. The experiment was set out in a Randomized Complete Block Design with four. were irrigated for 25 days at a time. Data collection: 100 plants were chosen at random from each treatment and submitted to normal data collection methods. For the experiment, the following two tactics were used. Crop Management: Throughout the growing season, all mandatory agronomic techniques were followed consistently in all plots.

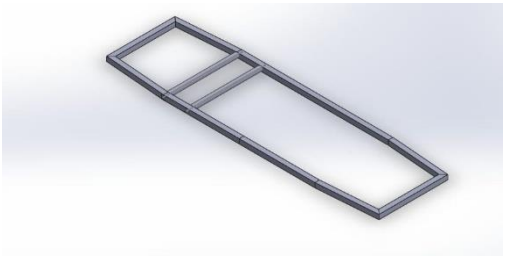

Fig 4: Chassis

IV DESIGN CONCEPT

The key step in seed sowing is to place a seed in the correct row, taking into account the varied types and sizes of seed. As a result, a seed sowing machine will need to be invented in order to continue to develop and progress. The goal of designing and manufacturing a roller type seed sowing machine is to sow seeds into the soil using multiple teeth on the perimeter of the wheel, ensuring maximum soil penetration. Sowing is the procedure of putting seeds in the earth for improved field germination.

The components that include seeds that have been planted are referred to as seed sowed. Thanks to this device, we can plant seeds with the proper spacing between them. As a result, the amount of seed that must be planted per hector is predetermined. This also helps with seed germination because the seed-to-seed spacing is ideal, allowing the plant to thrive.

Reduce The most important purpose of this invention is to reduce the time it takes to fertilize seeds. The traditional method of sowing by hand (manually) takes far too long to cover the entire surface area. Increased efficiency = less time. Because the farmer no longer has to carry the heavy bag of seeds and fertiliser throughout the sowing operation, the total amount of work done by the farmer for sowing has dropped, as has the amount of work done by hand.

Fig 5: 3d view of Wheel

V. EXPRIMENTATION OF CONCEPTUAL DESIGN

The roller seed sowing machine is an equipment that is used in agriculture for seed sowing. This machine may be used to sow a variety of seed kinds with varying sizes and diameters. The seed that is sowing into the soil fills the hopper of the machine to a level that exceeds 70% of its total volume. The initial task of the machine when it is pushed by a tractor or manually is to drill the soil with a hollow knife edge tooth on the roller wheel at a depth of the tooth, also known as a soil drill. When the machine is moved, the wheel begins to rotate, allowing the hollow tooth to drill into the dirt. When the machine is moved, the drilling process is done, and the seeds are dropped into the channel pipe due to gravitational force and vibration caused in the machine. The channel pipe is attached to the machine's hollow axle rod, which supports the wheel. The seed is deposited into the machine's roller wheel from this hollow axle rod. Because the bearing is installed on the wheel, both wheels rotate at the same speed. A number of holes are bored on the wheel's periphery at identical pitch distance. The or teeth mounted on the wheel above this drill hole on this wheel cause the seed to fall inside the roller wheel and into the hole tool through this hole. As a result, when a tool is used to drill the earth, the seed is sown into the soil at the same moment.

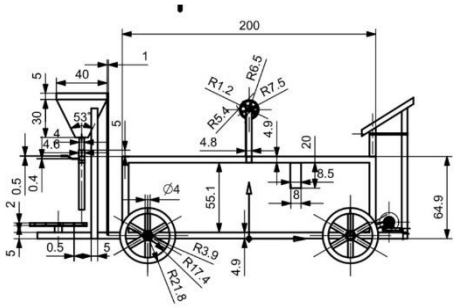

Fig 6: Side view of model

VI. DESIGN AND CALCULATION OF MACHINE:

Total weight of machine = weight of machine + capacity of Hopper

The capacity of Hopper is 5kg but we will feel the hopper only 40%

Assume weight of seed in copper is 2kg W= 20+2= 22kg

W=22×9.81 = 215.82 N Rn = 215.82

Friction force F = u ×Rn

F = friction force, u= coefficient of friction, N = normal force Assume coefficient of friction u = 1

F= 1×215.82 =215.82

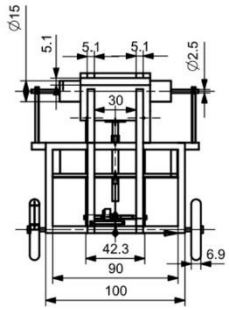

Fig 7: Top view of model

VII DESIGN OF CHANNEL PIPE:

Force = yield strength × Area Ap =

$\pi /4 (D^2+d^2)$

Assume yield strength = 276 Mpa 215.82 = 276 × /4 × (2.54 + d) D = 2.54 cm , d = 2.35 ,

t =0.20 cm

VIII DESIGN OF BEARING:

Design of Bearing Axial force = F = 215.82 N. Radial force = 2000 N

Equivalent load on bearing

Fe = [X.Fr + Y.Fa] . Ks . Ko Kp Kr

Fa/Fr = 0.085 , e = 0.25for deep groove ball

bearing X = 1 , Y = 0, Moderate shock Ks = 2

Non-constant rotational condition , Ko = 1

Non preloaded bearing Kp = 1 Fe =

(1×2000+0) ×2 × 1 × 1× 1)

Fe = 4000 N.

Average life of bearing :- L = (c/ Fe) × krel

For 50 % reliability

Krel = 5.0 , C = 1100 , n =3

for roller bearing Assume ball bearing 6204

L = (18000/4000) × 5.0

L = 7910 hours.

Fig 8 : 3d view of bearing

IX.CONCLUSION

In the case of small farm units, the cost and operational simplicity are the most important aspects of our design. As a result, this multipurpose machine is designed to lower the cost of seed preparation, spraying, and feeding. In the production of multipurpose equipment, we leverage historical data and methodologies. As a result, the design of multipurpose agricultural equipment is beneficial. Small and middle-class farmers will benefit greatly from human-powered machine systems that increase production per acre and increase profitability. A new form of multipurpose mechanism is being developed that is separate from previous devices and runs on a non-conventional energy source that is purely powered by humans. Such systems are critical in Asian countries, as almost all of them have energy and electricity shortages, resulting in shipment delays of twelve to fourteen hours in rural areas, particularly in India. As a result, a multipurpose agricultural robot must be developed locally.

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Artificial intelligence and Internet of things for Precision Agriculture - A Review

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ABSTRACT

The agriculture sector is seeking innovative technologies for increasing food-grain production and productivity because of the rapid increase in population, unpredictable climatic changes and food security concerns. The inherently complex, dynamic, and non-linear nature of agricultural system require solutions based on advance techniques and technologies that can monitor, control, and visualize various farm operations in real-time to provide greater accuracy, better understanding, and appropriate solutions. Thus, artificial intelligence and internet of things is progressively emerging across all the industries including agriculture. Advancement in artificial intelligence and IoT based technologies has made revolutionary changes in agriculture to maximize the crop productivity. In this paper a comprehensive review on artificial intelligence and internet of things(IoT) in the areas of the agriculture is presented. The main objective of this paper is to review various potential applications of artificial intelligence and IoT such as robotics, drones, fertilizer application, weed and pest control, IoT based smart irrigation, real time weather forecasting etc.

Keywords: Artificial intelligence, Internet of things, Robotics, Smart irrigation.

I. INTRODUCTION

The global population is expected to reach 10 billion people by 2050 (FAO, 2017). This puts a huge burden on the agriculture sector to increase crop production and yield per hectare. The rapid increase in global population and high demand of quality products intensify the modernization and automation of agricultural practices which provides high efficiency and precision in the use of water and other resources like pesticides, fertilizers etc. (Pandey and Mukherjee 2022). Emerging technologies like artificial intelligence and IoT have the potential to revolutionise precision agriculture and smart farming.

The application of artificial intelligence with its rigorous learning capabilities to agriculture could be key technique in providing potential answers to solve major issues such as inadequate application of chemicals, pest and disease infestation, yield prediction and weed control. By incorporating the use of digital technologies like

artificial intelligence and internet of things, better insights can be formed effectively from data gathered from the field and allowing farming practices to be planned systematically with minimal manual labor (Subeesh and Mehta 2021). With the help of IoT devices and sensors, the crop field can be monitored.

In IoT-based Smart farming, a system is constructed for monitoring crops with the goal of automating many important agricultural operations such as crop growth monitoring, irrigation, fertiliser application and disease detection, etc. In this context, technologies such as IoT can assist in the acquisition of real-time information from the agricultural field can be timely processed and exploited to support critical decisions regarding the management of the crops (Tsourosm *et al.* 2019). For real-time and site-specific field management artificial intelligence and internet of things offers a new perspective for precision agriculture.

II. Applications of artificial intelligence and internet of things for precision agriculture

Smarter applications based on artificial intelligence and internet of things has huge potential to make the farming more controlled and precise. The brief details of applications of artificial intelligence and internet of things for precision agriculture are given below:

2.1. Robotics

One of the main aspects of agricultural robotics is concerned with the substitution of the human workforce by field robots or mechanized systems that can handle the tasks more accurately and uniformly at a lower cost and higher efficiency (Shamshiri *et al.*, 2018). Agricultural field robots can play a key role in increasing productivity, quality, reducing production cost and enabling customized plant and crop treatments. A review of the recent advances in agricultural robotics for (i) harvesting (ii) field scouting and data collection, and (iii) weed control and targeted spraying are given below.

2.1.1. Harvesting robots

Traditional harvesting of fruits and vegetables for is a labor-intensive task that demands shifting from traditional manual operation to automated harvesting. Despite advancements in agricultural automation, millions of tonnes of fruits and vegetables are still hand-picked from open fields and greenhouses. Research on robotic harvesting of fruits and vegetable were carried out by many researchers. Figure 1 shows some robotic harvesting platforms:

(a) Harvey, an autonomous robotic harvester that can harvest sweet pepper with 46% success rate for unmodified crop, and 58% for modified crop grown in protected cropping environments (Lehnert *et al.*, 2017). (b) an apple harvesting robot which uses image-based vision servo control system for harvesting apple. The average harvesting time was approximately 15s per apple and success rate of apple harvesting was 77% (De-An *et al.*, 2011). (c) The citrus harvesting robot (Mehta *et al.*, 2016) which uses a robust image-based visual servo controller to regulate a robotic manipulator to a target fruit in the presence of unknown fruit motion. (d) Dual robot coordination for fruit collection uses kinematically redundant picking manipulator with eight degrees of freedom for apple harvesting. Over 50% reduction of average cycle time resulted in pick-and-catch harvesting method as compared to the pick-and-place method (Davidson *et al.*, 2017).

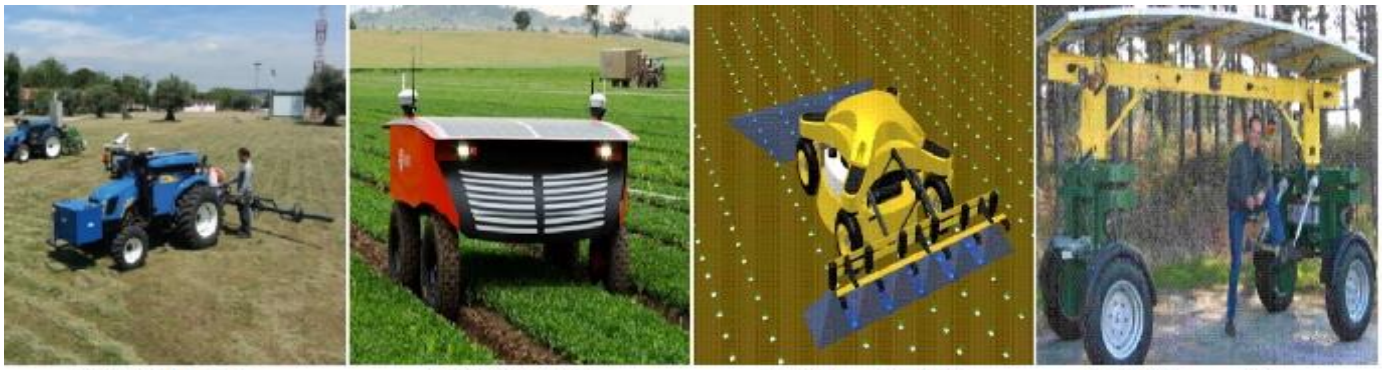
(a) Harvey (b) Apple harvesting robot (c) Citrus harvesting robot (d) Apple harvesting robot

Fig. 1 Harvesting robots

2.1.2. Weed control and targeted spraying robots

Weed control and targeted spraying are the most needed applications for agricultural robots. Agricultural field robots not only substitute the traditional manual weed removal operation, but also reduces the application of agrochemical and pesticide on the field. Figure 2 shows:

(a) RHEA (Emmi *et al.*, 2014) uses advanced perception systems to identify crop status, including crop row detection and innovative actuation systems to remove or eliminate weeds directly as well as to apply herbicides and fertilizers precisely. (b) RIPPA (Bogue, 2016) is equipped with an array of cameras and sensor and is designed to operate autonomously to detect and classify weeds and manage them either mechanically or chemically, as well as applying fertilisers for site-specific crop management. (c) HortiBot (Sorensen *et al.* 2016) is a robust tool carrier that enable an automatic execution of one-sided repetitive weeding for outdoor gardening. (d) GreenTrac (Sorensen *et al.* 2016) is a future tool carrier to be used in the growing season with light tools such as an inter-row cultivator for row crops.



(a) RHEA (b) RIPPA (c) HortiBot (d) GreenTrac

Fig. 2 Weed control and targeted spraying robots

2.1.3. Field scouting and data collection robots

For providing reliable data and measurements, field scouting and data collection robots can be used and processed by precision agriculture and crop modelsField scouting robots are developed for data collection and modern farming, and improved sensors are used extensively for precision agriculture. Some of the agricultural field robots for automated field scouting and data collection are shown in Figure 3:

(a) Ladybird robot (Bogue, 2016), an autonomous robot which uses a laser sensor to determined height of the crops and could be used by farmers to optimise their crop yield. (b) VinBot (Lopes *et al.*, 2016), an autonomous cloud-computing vineyard robot to optimise yield management and wine quality which uses sensor head composed with a set of sensors capable of capturing vineyard images and 3D data. (c) Shrimp is equipped with a colour camera and strobes, a 3D LiDAR and a global positioning inertial navigation system (GPS/INS) which is capable of real-time-kinematic (RTK) correction and is used for data collection. (d) Field survey mobile robot (Shamshiri and Ismail, 2013) uses a digital camera mounted on a two link arm attached on the robot base that moves between plants rows to perform image acquisition task.

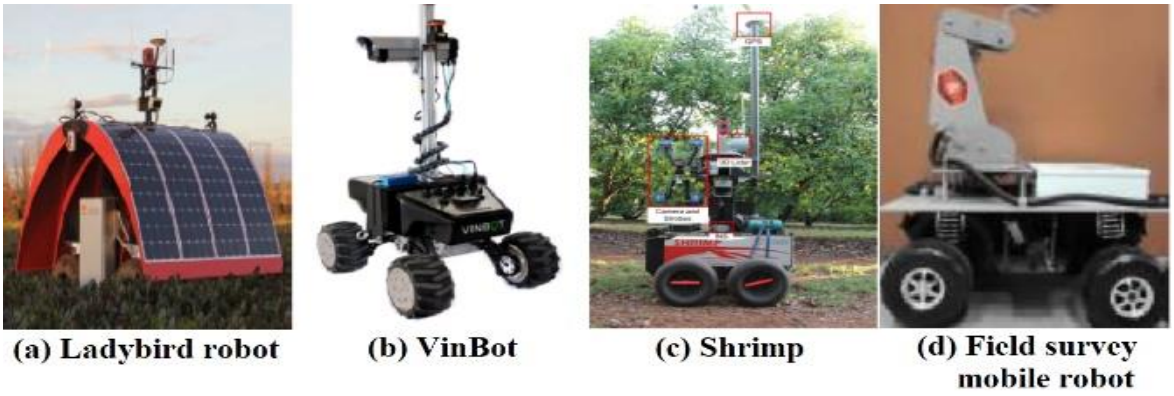


Fig. 3 Field scouting and data collection robots

2.2. Drones or UAV

UAV-based IoT technology is the future of remote sensing in precision agriculture. Drones or UAV in agriculture have become another breakthrough in automating various agricultural operation such as pesticide spraying, land monitoring, etc. The ability of UAVs to fly at a low altitude results in images of the crops with ultra-high spatial resolution. Furthermore, UAVs or drones are improving modern agriculture research and production by providing data at higher temporal and spatial resolution scales and at a cheaper cost than traditional data collection methods. This increases the flexibility of the image acquisition process.

A UAV-mounted measurement system is developed by Anthony *et al.* (2014) that compute crop heights, a critical indicator of crop health by utilizing a laser scanner. Micro-UAV measuring crop height is shown in figure 3. The system can precisely fly over crops and measure their height to within 5cm of measurements gathered using current measurement technologies, despite the dense canopy and highly variable sensor readings.

Fig. 4 Micro-UAV measuring crop height (Anthony *et al.* 2014)

The FREYR Drone (Spoorthi *et al.*, 2017) is a pesticide spraying quad copter that will precisely route the land area using GPS, regardless of the shape of the field and type of crop. The farmer can use an android app to operate the drone, and can connect to the app using the Wi-Fi module (ESP 8266) that is interfaced into the drone. An object-based image analysis (OBIA) procedure for UAV images is presented by de Souza *et al.* (2017) which is designed to map and extract information about skips in sugarcane planting rows. The OBIA technique allows for a high level of automation and adaptability, as well as providing useful information for decision-making, agricultural monitoring, and reduction of cost of operation.

A real time system that successfully detect trees in a scene and also recognizes them in each and every frame is developed by Bassine *et al.* (2018) to create detailed maps having information about trees health, sizes, stem density and trees distribution. To detect and count trees all image processing stages starting from camera raw image acquisition to image processing is done completely on C++ framework. To reduce the time gap between image collection and herbicide treatment Deng *et al.* (2020) conducted real-time image processing onboard a UAV. A hardware environment is created for real-time image processing onboard a UAV that incorporates flight control, map visualisation, image collection, and real-time image processing. To develop a lightweight network architecture for weed mapping tasks the proposed model design is exploited

Novel applications for edge intelligence are applied by Chen *et al.* (2021) to establish an intelligent pest recognition system to manage the pest problem. The system architecture flow chart is shown in figure 5. To detect *T. papillosa* in the orchard, a detecting drone is used to photograph the pest and a Tiny-YOLOv3 neural network model built on an embedded system NVIDIA Jetson TX2 to determine the position of the pests in realtime. To plan the optimal pesticide spraying route for the agricultural drone pests' positions are used.

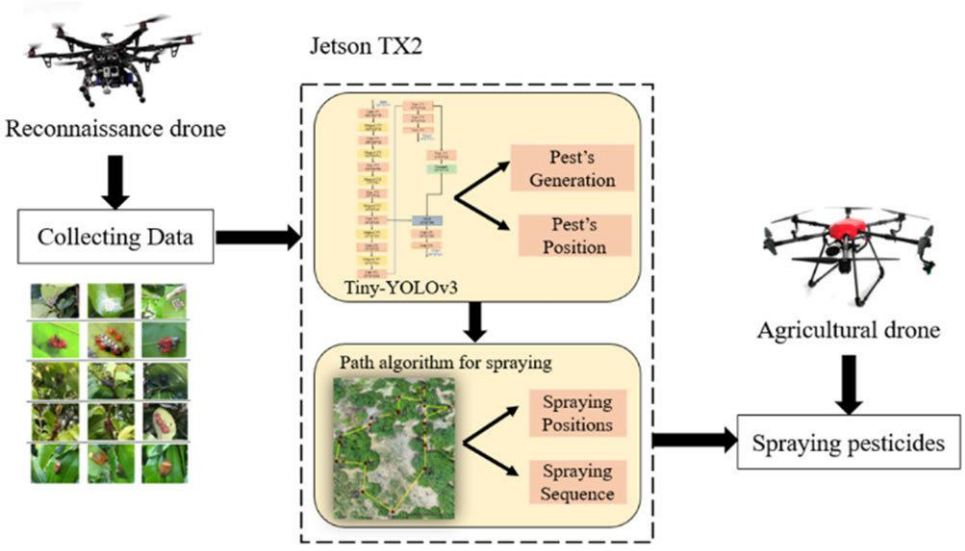


Fig. 5 The system architecture flow chart (Chen *et al.* 2021)

2.3. Fertilizer Application

Variable fertilization technology is an important part of precision agriculture. This technology seeks to achieve on- demand fertilization and fixed-point fertilization, which

greatly increases the utilization of fertilizers, reduces production costs, reduces the adverse impact of excess fertilizers on the environment, and increases farmers' income. The backward fertilization method, blind and extensive fertilization and severe partial planting have caused problems such as the decline of crop yield, excessive harmful substances, groundwater pollution, and soil compaction in China. These problems seriously affect the ecological environment and food safety, which are extremely unfavorable to our country's construct

A centrifugal variable-rate fertilizer applicator is developed by Yinyan *et al.* (2018) to improve the spreading performance and fertilizer distribution uniformity. To simulate the field spreading performance of the developed centrifugal variable-rate fertilizer applicator and to evaluate the uniformity and consistency of fertilizer spreading simulation model is used. A novel method to optimize the control sequence (L, N) is presented by Zhang *et al.* (2019) to improve fertilization accuracy and uniformity, while guaranteeing the rapidity of equipment adjustment. By using an improved General Regression Neural Network (GRNN) the variable-rate fertilization process model was formed and by using a differential evolutionary (DE) algorithm the optimum spread parameter was calculated.

An Internet of Things (IoT) based system is developed by Lavanya *et al.* (2020) by designing a novel Nitrogen-Phosphorus-Potassium (NPK) sensor with Light Emitting Diodes (LED) and Light Dependent Resistor (LDR). Block diagram of proposed IoT based fertilizer intimation system is shown in figure 6. To detect the deficiency of nutrients from the sensed data of fuzzy logic concept is applied. Since cloud services like google cloud platforms provide scalable, timely, uninterrupted service and this option can be utilized for SMS service. An alert message is sent to the farmer's mobile phones about the recommended fertilizer quantities.

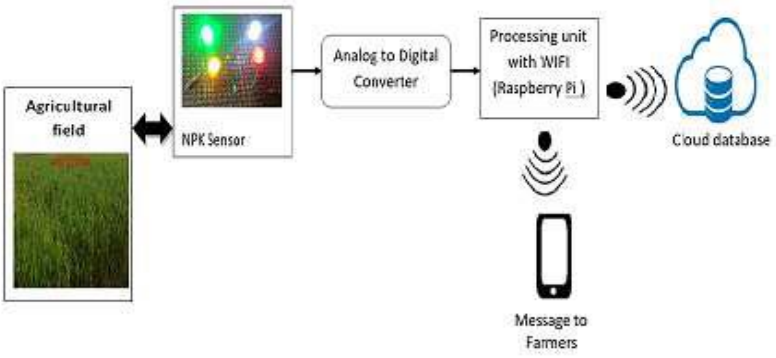


Fig. 6 Block diagram of proposed IoT based fertilizer intimation system (Lavanya *et al.* 2020)

2.4. Pest and weed control

The conventional sprayers apply the agrochemicals at a uniform rate, which leads to excessive, injudicious, and less effective utilization of applied chemicals (Tewari *et al.* 2014). The conventional practice of applying herbicides uniformly across a whole field seems undesirable from both economic and environmental view points (Christensen et al., 1996). The use of advanced technologies in agriculture such as microcontrollers, sensors, and software tools allow the precise use of agrochemical by regulating the application rate according to the site-specific requirement, which can significantly reduce the amount of applied agrochemicals and disease control costs.

A tractor mounted site-specific, real time herbicide applicator is developed by Tangwongkit *et al.* (2006) for variable rate herbicide application between sugarcane rows. The picture frames captured by the web camera were analysed using the software-based machine vision system, and the quantified greenness level due to weeds was utilized to actuate the controllers of a sprayer pump system. 20.6% reduction in herbicide quantity archived during the laboratory performance evolution. A microcontroller based manually operated three row roller contact type herbicide applicator is designed and developed by Tewari *et al.* (2014) for control of the weed population in field crops. To apply the quantity of the herbicide based on quantified weed information a control system was developed. MATLAB software is used for image acquisition and processing in a laptop and for controlling the application of herbicide through a relay, and a dc solenoid valve for variable rate application of herbicide a microcontroller is used. An average of 50% saving in the amount of herbicide, with weeding efficiency of 90% is achieved during the field test of machine.

Machine vision and artificial intelligence based a smart sprayer is designed and developed by Partel *et al.* (2019) to differentiate target weeds from crops and precisely spray on the desired target/location. As the smart sprayer processing unit, two different embedded graphics processing unit (GPU) i.e. more powerful GPU (NVIDIA GTX 1070 Ti) and less powerful GPU (NVIDIA Jetson TX2) were tested for image processing and target detection. To automatically generate weed maps and visualize the collected data, an RTK GPS was connected to the smart sprayer.

An integrated machine vision based weed detection system was developed by Rehman *et al.* (2019) to target goldenrod weed spot-specifically. Schematic diagram of VR sprayer showing different components of machine vision and flow control system is shown in figure 7. For the goldenrod detection color co-occurrence matrices and statistical classifiers were used. By using different reduced sub-sets of textural features the linear and quadratic classifiers (DM-HIS$_{SD}$ model and DM-HIS model) were developed. Depending on the weed and sprayed area the potential and actual chemical savings were in ranges between 46.71% and 74.83% and 30.12% and 60.58%, respectively.

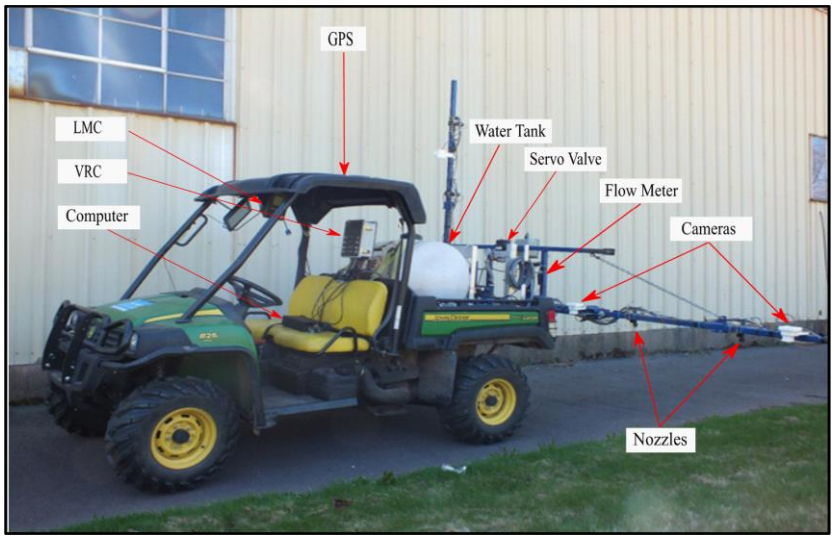


Fig. 7 Schematic diagram of VR sprayer showing different components of machine vision and flow control system (Rehman *et al.* 2019)

An image processing based real-time variable-rate chemical spraying system is developed by Tewari *et al.* (2020) for the precise application of agrochemicals in diseased paddy crop based on crop disease severity. To detect the diseased region of paddy plants the chromatic aberration (CA) based image segmentation method was used. A minimum 33.88% reduction in applied chemical is observed while operating in the VRA mode as compared with the CRA mode.

2.5. IoT based smart irrigation

Irrigation is the one of the most important part of the agriculture. It plays an important role in crop productivity. Agriculture accounts for 83% of total water consumption in India (Hegde). For water supply for field farmers mostly depend on the rainfall. They need to depend on the available water resources if rainfall doesn't happen. Water scarcity is a major issue in remote locations, farmers mostly depends on underground water for irrigation. Improper management and unplanned use of water for irrigation results in high wastage of water. Hence to prevent wastage of water there is need to develop systems for efficient water management. For efficient water management technological intervention has been started from years, but the evolution of the Internet of things has made revolutionary changes in the area of irrigation.

An IoT based system is proposed by Saraf and Gawali (2017) that uses real time input data. For remote monitoring and controlling of drips through wireless sensor network and to reduce human intervention smart farm irrigation system uses android phone. To make communication between base station and sensor nodes Zigbee is used. A set of sensors and actuators are used to assess the plants water need with the help of a cloud-based wireless communication system. To monitor and maintain the correct soil moisture content Rawal (2017) suggested an automated irrigation system that uses automatic watering. To implement the control unit microcontroller ATMEGA328P on arduino uno platform is used. The setup measures the exact moisture level in soil with the help of soil moisture sensors. This value allows the system to use the proper amount of water, avoiding over- and under-irrigation. To keep the farmers updated about the status of sprinklers IoT is used.

For identifying the rice diseases and nutrient deficiencies Rau *et al.* (2017) devised a cost effective automated irrigation and fertigation along with MATLAB based image processing. DHT11 temperature, Raspberry Pi, and solenoid valves and humidity sensor are the major components of the system. Furthermore, the proposed model allows the farmer to use an android application to monitor weather conditions. A low cost intelligent smart irrigation system is developed by Nawandar and Satpute (2019). To talk and connect on their own it uses IoT, with capabilities like: one-time setup for irrigation schedule estimation, remote data monitoring, admin mode for user interaction, neural based decision making for intelligent support. User can get information about the current crop situation even from a distant location with the help of MQTT and HTTP.

An autonomous monitoring of irrigation system for both large- and small-scale plantation was developed by Dasgupta *et al.* (2019). Temperature, humidity, soil moisture content, and other physical parameters such as the presence of major pollutants in the air such as PM2.5, PM10, NOx and CO will all be monitored by this system. To predict whether irrigation is necessary or not the factors and the crop yield are compared with dataset of past surveys. The rate at which water is released from the pump is determined by using this information, and it is transmitted to a microcontroller system that monitors and controls the entire irrigation system. A smart irrigation system is proposed by Krishnan *et al.* (2019) that helps farmers to water their agricultural fields using Global System for Mobile Communication (GSM). Fuzzy logic controller is used to

compute input parameters such as soil moisture, surrounding environment temperature and humidity level of soil and to produce outputs of motor status regarding main power supply or solar power. To save the power the system switches off the motor when there is an availability of rain.

2.6. Real time weather forecasting

Weather and the condition of the day by day which creates unpredictable effect on the agriculture. From sowing of seed to harvesting the crops, farming is completely reliant on the weather factors (humidity, precipitation, moisture and temperature). Unpredictable climate changes affect the farmers and agriculture fields are continuously. So, it is an essential to have real-time meteorological data that can inform farmers in advance and provide a solution to save their crops.

A low-cost weather monitoring system is proposed by Kodali and Sahu (2016) which uses a cloud database management system to retrieve the weather conditions of any area and displays the results on an OLED display. The proposed system uses an ESP8266-EX microcontroller-based WeMos D1 board and implemented on the Arduino platform, which retrieves data from the cloud. To monitor the weather changes in the environment a system is proposed by Sowjanya and Ameenuddin (2016) which is based on the micro-electro-mechanical system and wireless sensor network technologies. By using wireless networks data from environment can be collected and displayed on the webpage.

An IoT based real-time local weather station for precision agriculture is proposed by Math and Dharwadkar (2018) which allow farmers to automate their agricultural operations (irrigation, fertilization, and harvesting) at the appropriate time. The proposed system also helps farmers to carry out agricultural operations in real time, which in turn allow them to utilize agricultural resources more efficiently and at the times when required by the crops. A smart farmer system that helps people to monitor plants on their farms is developed by Utama *et al.* (2019). Weather parameters (temperature, humidity conditions and soil moisture conditions) can be monitored by this system. Water will automatically be pumped and flow to the plant if soil moisture is reduced due to heat. A new weather monitoring system is developed by Joseph (2019) by using various sensors connecting to Raspberry Pi. Temperature, humidity, PM 2.5 and PM 10 concentrations, and the Air Quality Index (AQI) are all monitored and represented graphically using the Raspberry Pi.A solution to completely satisfy the needs of automated and real-time monitoring of environmental parameters (temperature, rain and humidity) is proposed by Marwa *et al.* (2020). To meet the requirements for large-scale agricultural farm calculation, transmission and storage the results of the proposed solution can be utilized as a reference model.

III. Conclusion

In the agriculture sector crop yields, soil and plant health, weeds, and disease are major issues that can be addressed with artificial intelligence and IoT-driven technology. From crop monitoring to autonomous harvesting robots, these technologies are rapidly revolutionising agriculture and making farmers lives easier and faster. This review paper has provided an overall idea and state of art work regarding various potential applications of artificial intelligence and IoT in some core areas of agriculture, e.g. robotics, drones, fertilizer application, weed and pest control, IoT based smart irrigation, real time weather forecasting. Robotic harvesting and weeding have received more and more attention in the recent years due to the decrease of the workforce

and the increase of production cost. Irrigation is one of the most critical operation of farming, but nowadays the farm owner can monitor the IoT enabled irrigation system online through remote access without going into the field. An accurate and intelligent IoT system that automatically informs about the fertilizer can be accessed by farmers at the appropriate time through SMS. ssThis study is an attempt to introduce the concept of agricultural automation through artificial intelligence and IoT in order to increase crop productivity with reducing labour and time.

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A Web Application to Boost Productivity

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ABSTRACT

This Web app consists of a timer and a list of tasks that provide how many sessions will be required and how many of those sessions have been done by the user. The timer and its break time have been set according to the Pomodoro method which is considered ideal because following the approach gives users enough time to get significant amounts of work done at the same time they are not extremely long so the user doesn't lose motivation in getting their tasks done. As everyone has their own time requirement for doing their tasks our web app also has the option of customizable focus and break time option.

In the Pomodoro method the focus time is 25-minutes and the break time is 5-minutes.

Keywords : Pomodoro, productivity, time management, task management, reliable

I. INTRODUCTION

Procrastination can be a nasty demon to overcome. It's a constant threat and is capable of destroying our productivity.

This is especially the case in the era of computers and phones. We're always faced with millions of potential distractions. We lose count of the number of times we've been writing or researching an article only to give in to the temptation and click on a YouTube video. It might only be 10-15 minutes long, but a few of those and a terribly unproductive hour has passed.

It may not appear to be an enormous deal, but if you lose an hour every day, it quickly stacks up into an enormous pile of wasted time. And that's time that would be used for something more productive. It also happens to be a compounding problem, each time you concede to temptation, you're reinforcing it. Procrastinating is becoming a habit. And that results in even longer being wasted.

We can't afford that. Luckily, there's an excellent solution — the Pomodoro Technique.

There are many tricks for study success, but when assignments are piling up and exams are looming, maintaining momentum is vital.

If you're starved for time, the Pomodoro Technique can assist you to digest your to-do list.

And so, the tactic was born — Pomodoro being an Italian term for tomato.

People altogether have made use of this easy but effective technique that will benefit anyone with the task at hand and a desire to beat procrastination.

The idea is to specialize in one task, uninterrupted, for brief sprints.

The Pomodoro Method

The Pomodoro Technique may be a time management strategy invented by Francesco Cirillo. Cirillo named it the Pomodoro Technique after a tomato-shaped timer he utilized in college to stay himself on target as he studied. The idea is to increase productivity by dividing your workday into highly focused chunks separated by short breaks. Here is how it works:

What makes Pomodoro so effective?

The arbitrary silliness of using tomato as a stand-in for units of time belies the Pomodoro Technique's serious effectiveness when it comes to helping people get things done. Here's what makes the method uniquely suited to boosting productivity:

Making it easy to just get started

Research has shown procrastination has little to do with laziness or lack of self-control. Rather, we put things off to avoid negative feelings, it's uncomfortable to stare down at a big task or project one you may not be sure how to even do or one that involves a lot of uncertainty. So we address Twitter or Netflix instead to spice up our mood, if only temporarily.

Luckily, studies have also shown an efficient way to escape from the avoidance cycle: shrink whatever it's you're adjourning right down to a small and benignant initiative. For example, instead of sitting down to write a novel, sit down to write for 5 minutes. Still, too hard? Try just sitting right down to edit a paragraph. Doing something small for a short period of time is a whole lot easier than trying to take on a big project all at once.

That procrastination-busting strategy is exactly what the Pomodoro technique asks you to do: break down your big tasks, projects, or goals into something you only have to do for the next 25 minutes. It keeps you hyper-focused on the one next thing you would like to try to do instead of getting overwhelmed by the enormity of what you are taking on. Don't worry about the outcome — just take it one Pomodoro at a time.

Combating distractions

If you've ever been interrupted once you were during a flow state, you recognize how difficult regaining focus is often, yet the constant stream of data pouring in via emails, team chats, and social media notifications demands more and more of our attention.

While it might be nice responsible technology for everything, recent studies suggest over half all workday distractions are self-inflicted — meaning we pull ourselves out of focus. At the moment, it is often easy to justify these internal pulls — "This email is just too important to attend to" or "It took but a moment to see my Twitter; it isn't a real distraction."

But those small interruptions just add up! It isn't just the time you lose because you get distracted, it also takes time and energy to refocus your attention. After switching gears, our minds can dwell on the previous task for upwards of 20 minutes until regaining full concentration. Indulging the impulse to see Facebook "just for a minute" can become 20 minutes of trying to urge back on task.

The Pomodoro Technique helps you resist all of these self-interruptions and retrain your brains to focus. Each Pomodoro is dedicated to a minimum of one task and each break could also be an opportunity to reset and convey your attention back to what you need to be performing and plan for further tasks.

Becoming more conscious of where some time goes

When planning out our future projects, most folks fall victim to the design fallacy — our tendency to vastly underestimate the time needed to finish future tasks, even when we know similar tasks have taken longer within the past "Your present-self imagines your future-self operating under entirely different circumstances and time restraints".

The Pomodoro Technique is often a valuable weapon against the design fallacy. When you start working briefly, timed sessions, time is not any longer an abstract concept but a concrete event. It becomes a Pomodoro — a unit of both time and energy. Distinct from the thought of 25 minutes of general "work," the Pomodoro is an occasion that specializes in one task (or several simple tasks).

The concept of your time changes from a negative — something that has been lost — to a positive representation of events accomplished. Cirillo calls this "inverting time" because it changes the perception of your time passing from an abstract source of hysteria to a particular measure of productivity, this leads to much more realistic time estimates.

Writer Ben Dolnick describes how his perception of your time changed while using the method:

"Five minutes on the web, as measured by my timer, would pass in what appeared to be about 45 seconds. A timed hour of research would appear to require between three and 4 hours. My timer was a crisp metal yardstick laid down within the fog of my temporal intuitions."

When you use the Pomodoro Technique, you've got a transparent measurement of your finite time and your efforts, allowing you to reflect and plan your days more accurately and efficiently. With practice, you will be ready to accurately assess what percentage Pomodoro a task will take and build more consistent work habits.

Gamifying your productivity

Every Pomodoro provides a chance to enhance upon the last.

The Pomodoro technique is approachable because it's more about consistency than perfection. Each session may be a clean slate to reevaluate your goals, challenge yourself to focus, and limit distractions, you can make the system work for you.

Motivate yourself to create your success by setting a goal to feature an additional Pomodoro every day. Challenge yourself to end an enormous task during a set number of Pomodoro. Try setting a goal number of Pomodoro for every day without breaking the chain. Thinking in tomatoes instead of hours is simply more fun.

Quick tips for Pomodoro-ing

While the 25/5 minute work/break intervals are the guts of the Pomodoro Technique, there are a couple of belongings you can do to form your Pomodoro more effective:

Plan out your Pomodoro in advance

Take a quarter-hour at the start of your workday (or at the top if you're planning for a subsequent day), to plan out your Pomodoro. Take your to-do list for the day and note what percentage Pomodoro each task will take. (Remember, tasks that will take quite 5 Pomodoro should be weakened into smaller, more manageable tasks. Smaller tasks, like responding to emails, are often batched together during a single Pomodoro.

If you're employed for an 8-hour workday, confirm your Pomodoro for the day, don't re-evaluate sixteen. If they do, postpone the smallest amount of urgent/ the least important tasks for later within the week.

Build overflow Pomodoro into your day

While an 8-hour workday technically leaves room for sixteen Pomodoro, it is best to create during a buffer of 2-4 "overflow" Pomodoro, in case. Use your overflow Pomodoro for the tasks that take longer than you planned or for the unexpected tasks that come up during the day.

If you do not find yourself needing them, use the additional Pomodoro for learning or lower priority tasks that always get pushed to the top of your to-do list. It's much less stressful to finish the day with Pomodoro to spare than to over-schedule yourself and get behind.

How many Pomodoro are in a day?

Over time, you will get a far better sense of what percentage of high-quality Pomodoro you're actually capable of completing during a day. It's OK if it isn't a full sixteen. The overwhelming majority of individuals aren't actually produced for the complete 8 hours of a workday, and people who think they're probably haven't been paying close enough attention. When it involves Pomodoro, challenge yourself, but keep the main target on quality over quantity.

Experiment with the length of your Pomodoro

For some sorts of work that need extended periods during a creative "flow" state — thinking to code, writing, composing, etc. — 25 minutes could also be too short. Try extended work sessions with longer breaks. A Desk Time study found that a 50-minute focus and 15-minute break is a perfect balance. Others prefer 90 full minutes with a 20-30-minute break, supported by an ultradian rhythm.

For tasks that you've been adjourning for one reason or another, 25 minutes could be too long. If you are feeling tons of mental resistance, otherwise you just can't get yourself to remain focused for 25 minutes, try a 15-, 10-, or maybe 5-minute Pomodoro.

For most people, most of the time, the sweet spot will be in the 20-45 minute range to reach the peak concentration with a 5-15 minute break. Try mixing your intervals supporting your available energy, the sort of labor, and the way much a task causes you to want to bury your head in cute puppy videos on YouTube instead.

Get away from screens during breaks

Not all breaks are created equal. If your Pomodoro work sessions happen on your computer, don't just switch to Twitter or Instagram when the timer pops. Give your eyes and brain an opportunity from screens — meaning your phone too! Stand up, stretch, go outside, do a mini-meditation, grab a snack. If you're employed from home, fold some clothes or clear away the table.

Whatever you are doing, your break is going to be far more mentally refreshing if you escape from the glowing hypnosis of your computer or phone.

II. METHODOLOGY of THE PROPOSED RESEARCH

Objective 1 (Module-1)

This web app works by following the concept of the Pomodoro method and it will provide three buttons, i.e. Focus Pause/Resume and reset on the screen. (We have designed our UI by using HTML, CSS, JavaScript, and their libraries according to requirement).

As the user clicks on the Focus button, the timer will start accordingly.

Objective 2 (Module-2)

There will be a feature of creating a list of tasks. The elements in the list will be a checkbox and data like the name of the task and the estimated number of Pomodoro required for completing that specific task.

The list rendering will be done dynamically by using AJAX in JavaScript.

After each Pomodoro session ends, the number of sessions required will be reduced.

Objective 3 (Module-3)

We have created a setting option that can be used to customize the focus and break time according to the user's will.

It consists of a basic form that has two input fields to get focus and break time. After providing the time according to the user's need, they have to click on the "submit" button and this will make the changes in the timer.

III. Literature Survey

In the year 2020, Salman Usman, from Lancaster University, approached the idea of using Pomodoro Technique to help undergraduate students better manage technology-based multitasking during independent study featuring a design-based research investigation while facing the challenge; Student multitasking.

In 2018, the authors Robert Browne, Luke Rae side and Geraldine Gray, form European Conference on Games Based Learning; Reading, (Oct 2018), approached the concept of Gamification in education: Productivity and Motivation through gamified time management software, featuring gamification, Pomodoro technique, time management, motivation, education while facing the challenges; Preventing procrastination and gamifying time management.

In the year 2014, Felix Bast from F Bast, Secret of waking-up fresh and having a great day!, Science Reporter, Vol.51, No.9, p.11, 2014 approached the concept of Crux of time management for students featuring some of the most important methods of time management and personal productivity are thoroughly reviewed before concluding with a few pedagogical suggestions while facing the challenge of time management and personal productivity.

IV. OUTCOME

The user will be able to start the focus timer by clicking the focus button.

After clicking on the start button the timer will start and the user has to start working on their task.

After that session is over that same focus button will become a "break" button which will give a break.

There will be a Pause/Resume button that will be able to stop the timer and then start it again from where it was stopped. The app also contains a Reset button that can reset the timer.

This app also contains a setting in a simple form that the user can use to customize their focus and break time according to their preferences and needs. The user has to simply provide the input in the input fields and click on the "submit" button and the changes will be applied to the focus time and break time accordingly.

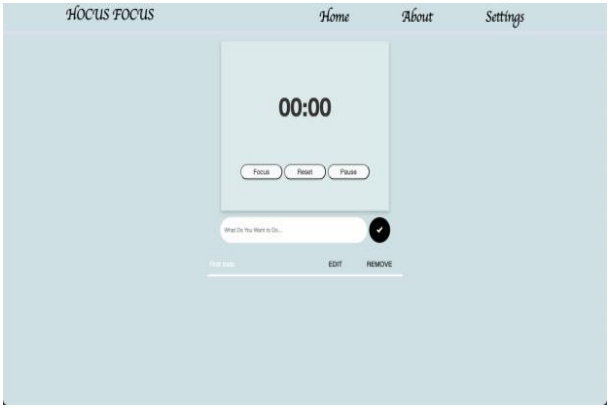

Figure 1 (Basic Layout the user sees after opening the app)

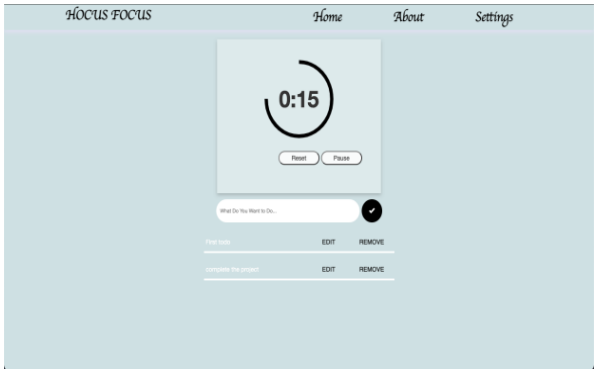

Figure 2 (Seconds left after clicking on the start focus button)

Figure 3 (The Settings page that appears after the user clicks in the settings option)

V. Conclusion

1. This web app provides the functionality to plan and prioritize your daily tasks into a doable list of tasks.
2. We can actually estimate and calculate how much time it will take to complete a task and our long list of tasks as well and see our progress as we complete our Pomodoro.
3. With this web app we can do work more efficiently and it improves productivity. We break our work into Pomodoro.
4. It makes it easier to get started as we have to work for 25 minutes only at a time. And while we are working on one task at a time we don't get distracted by other tasks.

VI. Future work

In the future, we are planning on having a list option that the user will create and it will contain the tasks the user has to do and the number of Pomodoro sessions that will be required to complete it.

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An Android Based Face Recognition Application

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ABSTRACT

This paper presents an android app utilized for securing data, files, and apps additionally, for authenticating into the system the app utilizes the username, password, and face authentication as credentials provided by the utilizer at the time of signing up in the app. The main aim is to provide security to the paramount documents or apps, and it can be utilized by any sector like banks, personal use, corporates, etc. It utilizes face authentication as its vigorous aspect of the overall app. This can truncate fraud and larceny of documents from sundry mobile phones.

Keywords : Face Authentication, Security, ML Kit, Flutter, Android, And Python.

I. INTRODUCTION

In the world of advanced technologies where any system or mobile can be hacked easily by professionals, it is very consequential to have a secured system that not only secures the data files but additionally gives a surety about the auspices against hackers and data crashes. In the market, many apps and security software are available that provide accommodations for documents but they failed due to less security. We present an affordable app that provides a vigorous security system with the utilization of the latest technologies (python and flutter).

The information age is expeditiously revolutionizing the way transactions are consummated. Everyday actions are increasingly being handled electronically, in lieu of with pencil and paper or face to face. This magnification in electronic transactions has resulted in a more preponderant demand for expeditious and precise utilizer identification and authentication. Access codes for buildings, banks accounts, and computer systems often use PINs for identification and security clearances. Utilizing the congruous PIN gains access, but the utilizer of the PIN is not verified. When credit and ATM cards are disoriented or purloined, an unauthorized utilizer can often come up with the correct personal codes. Despite admonition, many people perpetuate easily conjectured PIN‟s and passwords: days of inception, phone numbers and gregarious security numbers. Recent cases of identity larceny have heightened the desire for methods to prove that someone is genuinely who he/she claims to be. Face apperception technology may solve this quandary since a face is indisputably connected to its owner except in the case of identical twins.

II. LITERATURE SURVEY

There have been various techniques used to develop Attendance management system (AMS). Some of these techniques used Radio Frequency Identification (RFID) [7, 8], fingerprint [9, 10], iris [11, 12], palm print [13, 14], voice [14, 10] etc. For instance, a wireless

Attendance management system that used Iris identification was proposed by [12]. The system consisted of three modules: Iris verification and identification module, Iris management module and Wireless communication module. The implementation of the system was carried out with Daugman. Local Binary Pattern Histogram algorithm was used to design an application for both facial detection and identification of students by [13]. The algorithm identifies face by matching some parameters in which the algorithm was trained. An Embedded Computer-based Lecture Attendance Management System based on a single chip computer was used to capture the lecture attendance of different students. The identity of each student was validated through a card reader interface with a computer system [12]. An efficient management system based biometric design was proposed by [13].

III. METHODOLOGY

Existing System:

Many face apperception software has been implemented during the past decade. Each software uses different methods and different algorithms than other software. Some facial apperception software extracts the facial features from the input image to identify the face [1]. Other algorithms normalize a set of face images and then compress the face data, then preserve the data in one image that can be utilized for facial apperception. The input image is compared with the face data [2]. An incipient method for face apperception is being utilized which is three-dimensional facial apperception. In this method, a 3-D sensor [3] is utilized to capture information about the shape of the face so that only distinctive features of the face, such as the contour of ocular perceiver sockets, nasal discerner, and chin, are utilized for face apperception [1]. This incipient method offers some advantages over other algorithms in that apperception is immune to the vicissitude of light, and the face can be identified from a variety of angles, including a profile view.

Proposed System:

Fig. 1 Processing of ML kit

For image covertering to bytes, bgra and yuv420 algorithms are used by tensorflow lite library[4]. For image processing, google ml kit is used to process face detection which is applied by internal algorithms.

Module Working:

ML kit for connecting Android and Python:

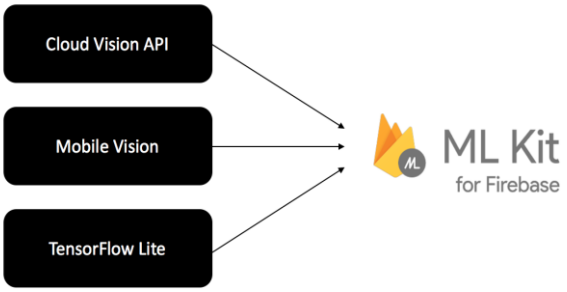

Fig. 2 ML kit uses

- While signing up, it pops with the camera in which users have to take a snap of the face so as to recognize the process being completed by ML-Kit.
- ML- kit developed by google is distributed as an open source package for Mobile Developers to maintain their
- ML-kit developed by Google is distributed as an open source package for Mobile Developers to maintain their computation faster, access over network and numerous API under the consideration to modify.
- Flutter's ML kit package we used in this project to recognize the face of the user and capture the image to bytes. Its Vision API engine is so powerful even in dark places it recognizes the faces by adjusting brightness.

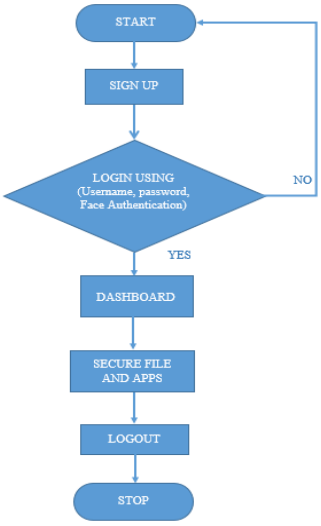

Fig. 3 App Working Flowchart

Aim of this project is to check security and authentications while signup in the app, it provides access control for the system by checking to see if a user's credentials matchthe credentials (username password, face_registration) in a database of authorized users. By providing this additional input, authentication systems help ensure that users are who they say they are. Generally, we see for security purposes username, Alphanumeric password, Pattern Based are used but Face_Registration app will recognise you at glance and make you sign up quickly. It saves your data to access from an unauthorized person and provides safety and security.

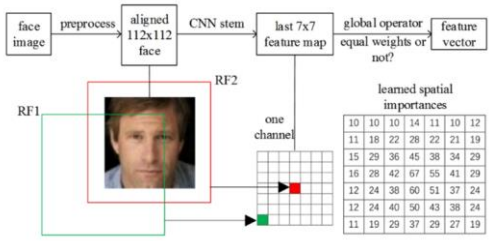

Fig. 4 Image Processing Method

IV. RESULT

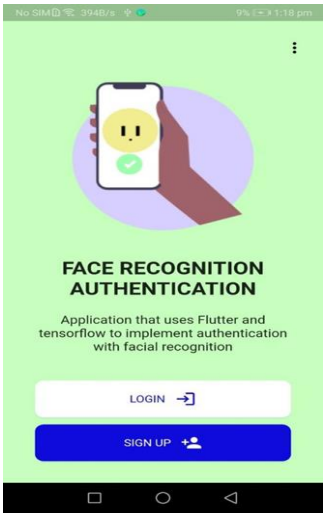

Fig. 5 Signup and Login Page

Fig. 6 Face Registration Window

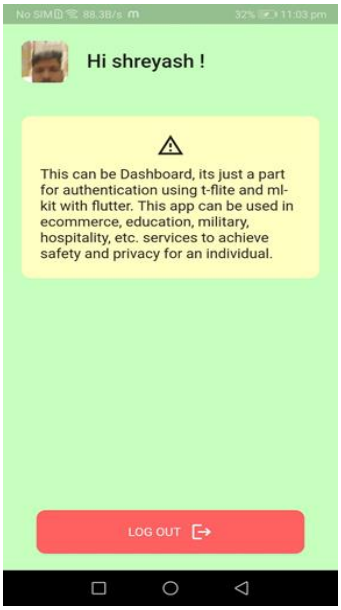

Fig. 7 Main Dashboard

V. CONCLUSION

Face apperception technologies have been associated generally with very costly top secure applications. Today the core technologies have evolved and the cost of equipment is going down dramatically due to the integration

and the incrementing processing puissance. Certain applications of face apperception technology are now cost-efficacious, reliable, and highly precise

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