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institute is now owned by the Islamic Academy of Education of Yenepoya Group of Institutions & Yenepoya University, an organization well-known for quality education. Yenepoya Institute of Technology is located in the picturesquely beautiful location of Moodbidri, Mangaluru, Karnataka. The college stands out for its magnificent buildings & ultra-modern infrastructure; a fascinating blend of architectural excellence & functional values. The institute has been a forerunner & prime mover in imparting technical education in Mangaluru, India. Affiliated to Visvesvaraya Technological University, approved by AICTE India, New Delhi. The engineering College has grown by leaps & bounds since Its inception in 2008.

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YIT will set the standard for Engineering Sciences education in the Twenty-First century. We are committed to creating new milestones and standards for students to experience an unparalleled educational journey that is intellectual, socially and personally transformative.

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YIT will endeavor to educate and transform the student community by instilling in them pride in their gifts and talents, nurturing them and guiding them in how best to utilize it for human welfare and progress.

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The 2nd International Conference on Frontiers in Engineering Science and Technology (ICFEST-2022) aims to provide an opportunity for exchange of ideas and dissemination of information and to provide a platform for gathering of scientists, leading engineers, industry experts, research scholars and advanced student learners to focus on new advances and research results in the field of theoretical and experimental fields of Mechanical Engineering, Electrical Engineering, Electronics and Communication Engineering, Computer Science and Engineering and Information Science and Engineering

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CONTENTS

A Review on Experimental Investigation of Abrasive Wear Behaviour of Al-6061 WC, Metal matrix Composites

Pawan[1], Pranam Shetty[2], Pratham Shetty[1], Preethesh Adappa[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology Thodar, Moodbidri-574236,

Karnataka, India

ABSTRACT

Aluminium and its alloys have a wide range of applications in the field of automobile, aerospace and marine. Aluminium based Metal Matrix Composites (MMC's) reinforced with hard particulate offer superior operating performance and wear resistance. Aluminium based MMC's provide higher abrasive resistance and provide a longer service life compared to other materials. In this paper Aluminium matrix composite is fabricated using stir casting technique with addition of WC as reinforcement was employed for production of castings. Here an attempt is made to study the abrasive wear behavior of Al 6061 alloy reinforced with WC particulates. Al 6061 was used as a matrix material with density 2.8 gram/cm3, tensile strength of 310 Mpa and modulus of elasticity 70 Gpa. The results of the above investigation are useful to the foundry men, automobile sector and aerospace industries to select as the candidate material for the specific application.

Keywords— Al 6061-WC, Stir casting, Abrasive wear behavior, Morphology analysis

I. INTRODUCTION

Aluminium alloy are generally preferred engineering materials for automobile, aerospace and mineral processing industries for various applications because of their low weight, good thermal conductivity properties. Among several series of aluminium alloys, Al6061 is much preferred for their excellent properties. Al6061 alloys are heat treatable. They are height resistant to corrosion and are of excellent extricable in nature and exhibits moderate strength. The composites made out of aluminium alloys are of wide interest owing to high strength, fracture toughness, wear resistance and stiffness. Al MMC's containing particulate reinforcement are considered to be the most promising solution for imparting better wear resistance to aluminium alloys. The addition of silicon- carbide and alumina to aluminium alloys was reported to improve their wear resistance. Various other types of reinforcement such as titanium carbide, aluminium nitride, granite, nickel aluminide, garnet, glass, beryl, boron carbide, titanium dioxide, aluminium diboride and cerium dioxide etc.

II. LITERATURE SURVEY

Sorosh Mohammadi et al. (2019) attempted to study the inherent poor tribological behavior of aluminium (Al), reinforcement of this metal with Nano scale fillers. Spherical silicon carbide Nano particles and graphene mono

a layer on the surface was used on the surface of the base lime Al matrix. The result reveal that in-depth study on the pile up features was carried out and found prominent plastic deformation zones in the samples. They found the solution and presented that there is increase in the mechanical performance of the Al based Nano composites in the presence of graphene sheets.

A.Prasad Reddy et al. (2019) tried to deal with the study on tribological study on SiC and nanoparticles reinforced Al6061 alloy fabricated through ultrasonically assisted casting technique. They studied micro structure of particle sizes, phases, worn surfaces, wear debris are analyzed to understand the tribological behavior of hybrid Nano composites micro structural studies revealed the uniform dispersion of SiC and Gr Nano reinforcement in the matrix.

L.Reinert et al. (2018) investigating the dominant friction and wear mechanism in case of dry sliding of carbon nanoparticle reinforced nickel matrix composite under elastic and elasto -plastic contact condition. Contact simulation based on the Greenwood –Williamson model are conducted in order to calculate the required contact loads. Friction and wear analysis is characterized by scanning electron microscope, transmission electron microscopy, energy dispersive spectroscopy.

Sayed Sajad Mirjavadi et al. (2017) tried to identify the influence of the TiO2 nanoparticles on friction stir welded 5083 Al alloy. Pin on disc wear test machine was used for the study. Speed range of 300-710rpm and 14 -28 mm/min was used in the study. They conclude that nanoparticle incorporated friction stir welded joint has better wear resistance characteristics in two body abrasions.

Hemaraju et al. (2016) attempted to evaluate the elastic and inelastic study of different graded steel in three body abrasion. They conducted the experiments using the dry sand abrader with different sized sand grains and normal load. They found that the volume loss of the material was mainly depending on size of abrader then the effect of normal load.

Aluminium 6061:

Al 6061 alloy is a precipitation- hardened aluminium alloy, containing magnesium and silicon as its major alloying elements. Originally called "Alloy 61S", it was developed in 1935. It has good mechanical properties, exhibits good weldability, and is very commonly extruded. It is one of the most common alloys of aluminium for general purpose use.

Table 1: Chemical composition of Al 6061 by wt%

Chemical composition	Al6061
Si	0.62
Fe	0.23
Cu	0.22
Mn	0.03
Mg	0.84
Cr	0.22
Zn	0.10
Ti	0.1
Al	Bal

Table 2: Properties of Al6061

Properties	Al6061
Elastic modulus (Gpa)	70-80
Density g/cc	2.7
Poisons ratio	0.33
Hardness (HB500)	30
Tensile Strength (Mpa)	115

Tungsten carbide (WC):

Tungsten carbide (WC) is typically referred to as carbide. It is an inorganic compound having tungsten and carbon atoms. It is a far satisfactory grey powder. It is widely used in commercial machinery, tools, abrasive and additionally in excessive hardness. It is largely used in manufacturing of friction pads and linear tubes in furnace etc. the tungsten carbide is about 3 times stiffer than steel, and much more denser than steel.

Table 3: Properties of WC

Properties	Al6061
Elastic modulus (Gpa)	627
Density g/cc	14.9
Hardness (HB500)	1630
Compressive Strength (Mpa)	5000
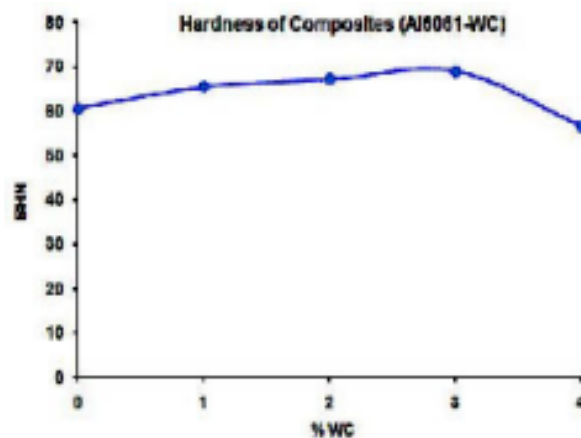
Fig. 1: Effect of WC on the hardness of Al6061- WC composites

Dry sand abrader test:

The three body abrasion study is carried out to do the analysis. Dry sand abrader followed with ASTM G-65 test method is to planned conduct the analysis. Normal load of 3 kg is selected for conducting the study. Sand abrader of 106 microns, 212 microns and 425 microns is selected for the study. The speed of the wheel is maintained at 100 rpm. The time of the test was 5 minutes. The abrader flow rate was 90 grams/minute. Role of different normal loads and different sized abrader on the surface of target material has been studied.

Fig. 2: Dry sand abrasion testing machine

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5

Experimental Study on Processing Parameters of Micromachining on Soda Lime Glass

Ravindra Naik[1], Sharan[2], Velroy Mascarenhas[2], Vinith[2], Zahir Ahemad[2]

[1]Assistant Professor, [2]Student

Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri-574236, Karnataka, India

ABSTRACT

Electro Chemical Discharge Machining (ECDM) is a hybrid machining process which is combination of Electro Chemical Machining (ECM) & Electro Discharge Machining (EDM) and more suitable for machining of non-conductive engineering materials, such as ceramics, glass, zirconium oxide, composites and silicon nitrides. The proposed work is experimental study on processing parameters of micromachining on sodalime glass using ECDM. Furthermore, the influence of effect of parameters such as applied Voltage, Electrolyte concentration and Inter-electrode gap, Material removal rate (MRR), Heat affected zone (HAZ) in ECDM process will be discussed.

Keywords: ECDM, sodalime glass, material removal rate, HAZ.

I. INTRODUCTION

Electro chemical discharge machining (ECDM) has the ability to machine hard and brittle materials as compared with different existing traditional and also non-traditional machining processes. Electro chemical discharge machining (ECDM) is a hybrid machining process that combines the electro chemical machining (ECM) and electro discharge machining (EDM) The working principle in ECDM process involves the combination of thermal and chemical mechanisms electrically. To enhanced the capabilities of the machining processes, two or more than two machining process are combined to take advantage of the worthiness of the constituent processes are called hybrid processes

In today's scenario every organization try to increase machining quality and reduce other parameter like cost so improve the performance and get maximum profitability, so to achieve this a new hybrid process Shamakhi et al developed the mathematical model using RBFNN (Radial basic function network) during micro drilling of ECDM of silicon nitride ceramics work piece of ECDM process. They established the model with Input parameters such as applied voltage, electrolyte concentration and inter electrode gap, and output parameters material removal rate (MRR), radial overcut and heat affected zone and also optimize the process parameter using genetic algorithm (GA) and particle swarm optimization (PSO) methods, finally they validated the experimental result GA-trained RBFNN (GA-RBFNN) and PSO-trained RBFNN (PSO-RBFNN) with the

experimental test cases, and observed that PSO-RBFNN is better than GARBFNN Some researchers also investigated that overcut is a major reason for the dimensional deviations, especially during high aspect ratio micromachining in ECDM and is explained with an analytical model and found that effect of concentration on the overcut, some researchers also develop analytical model of the gas film, involving bubble growth and departure on electrode, gas film evolution, and electrolysis characteristics. High speed camera imaging demonstrated the formation of a gas film on the tool electrode. Experiments on critical voltages and currents further revealed the characteristics of the gas fill the model considers the thermal effects on material removal for ECDM assuming a high temperature chemical etching mechanism for the material removal. It describes the effect of electrolyte concentration as well as machining time on material removal.

II. METHEDOLOGY

Development of Setup

⇩

Selection of Parameters

⇩

Experimentation

⇩

Results and Discussions

Initial studies include literature review is done. Literature reviews was done on research papers and articles which had close relation to the present investigation. The next step was to find problem definition. The development of the experimental setup was done. Material selection is done. The input and output process parameters (voltage, EC, IEG & MRR, HAZ) are selected. The Experimentation is conducted. The results are optimized and discussion are done. Then the conclusion is given.

III. COMPONENTS USED

The various components used for the construction of our prototype model on atmospheric water generator is shown below.

Fig 4.1. Variable DC Motor

Fig 4.2. Tool bit (cathode)

Fig 4.3. Auxiliary electrode (anode)
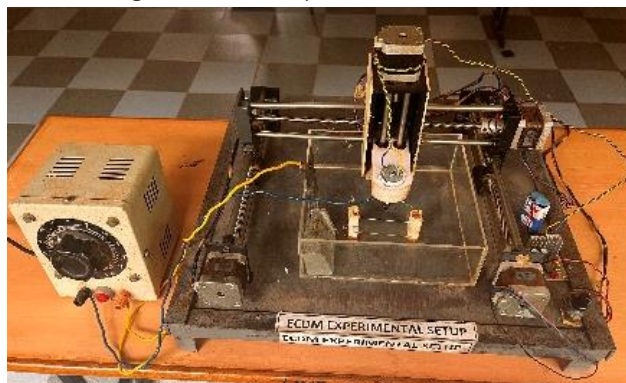
Fig 4.4. ECDM Setup

IV. APPLICATION

In recent times, the operation of atomic products and their operations has significantly increased. This has led to an increase in the demand to produce complex shapes with precise confines and high quality. These bias are exhaustively studied, which allows for formative operations for chemical and natural disquisition.

V. CONCLUSION AND FUTURE SCOPE

This work concentrated on the Electro Chemical Discharge Machining which is non-conventional hybrid process. It is combination of ECM & EDM processes used for machining of non-conductive materials Less work has been reported on the effect of process parameters on output characteristics. Hence the present work focused on development of experimental setup of ECDM Machining of non-conductive materials is carried out by drilling a hole in Borosilicate glass with the use of stainless steel as tool and Sodium Hydroxide (NaOH) as electrolyte. Experiments were conducted as per La orthogonal array by selecting different parameters like electrolyte concentration, applied voltage and machining time and then observed the drilled holes by using optical microscope.

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Plant Extract Corrosion Inhibitors on Mild Steel in Acidic Medium

Dinol Monteiro, Aboobackar Jazeel

Department of Mechanical Engineering, Yenepoya Institute of Technology, Moodbidri, India

ABSTRACT

Corrosion inhibitors like green inhibitors are chosen and their ability to inhibit corrosion was studied, in the inhibitor impact of these inhibitors on mild steel in acidic medium is investigated. Corrosion rate was determined by using chemical and electrochemical methods in these works, corrosion inhibition was increased with concentration of inhibitor and decreased with temperature, adsorption and thermodynamics mechanism was decreased in all these works, surface morphology was discussed by scanning electron microscopic studies. Experimental inhibitant efficiency were correlated with quantum mechanical parameters.

Keywords— Corrosion, Green inhibitor, mild steel, corrosion rate, SEM.

I. INTRODUCTION

Mild steel is a widely used engineering material for structural applications. It is exposed to various aggressive environments during their usage and hence undergoes corrosion[1-4.] Corrosion of steel and their protection have become fundamental, academic and industrial concern. Mild steel has been used under alkaline, acid and salt solutions. Development of new methods to control such corrosion is a challenge to chemists and scientists working in this area[5-6]. So large number of methods has been employed. Among the several methods of corrosion control, use of organic and inorganic compounds, Pharmaceutical drug compounds, dyes and plant extracts are used as corrosion inhibitors for control the corrosion of mild steel. Various types of inhibitors were developed to control the corrosion. Which is influenced by a new regulation have been developed to check toxicity & environmental damages, results from use of such compounds. There is a trend to replace some inhibitors such as chromates and cyanides because of their toxicity. Inhibitors are an electro active compounds, which contain heteroatom such as O,N,S & multiple bonds. Through this inhibitors are easily adsorbed over the surface of the mild steel to control the corrosion.[7-8] Adsorption of inhibitors depends on certain physio-chemical properties such as functional groups, electron density at the donor atom, electronic structure of the molecule and electron density at donor site. Mechanism of corrosion control can be studied by analytical and theoretical studies like thermodynamic parameters, quantum studies, chemical, electrochemical, IR and Scanning electron microscopic (SEM) studies.

II. LITERATURE SURVEY

Most of the metals tend to corrode easily due to their thermodynamic instability. Mild steel is very prone to corrosion in acidic medium, prevention of its corrosion is very essential. Corrosion inhibition performed by chemical compounds added to the electrolyte is to the adsorption of the additives to the metal or solution interface. The inhibitor molecules are bonded to the metal surface by chemisorption, physisorption. The adsorption of an inhibitor on a metal surface depends on a few factors

i)   Nature of the metal
ii)   Surface of the metal
iii) Charge of the metal
iv) Adsorption mode
v)   The chemical structure,
vi) The electrolyte

Table -1: Plant extracts as corrosion inhibitors for mild steel:

SI. No	Name of the Inhibitor	Active constituents	Inhibition efficiency (%)	Remarks	Ref
1	Cotula cinerea	Anagyrine, cytosine	67 %	Weight loss and electrochemical methods were used to investigate mild steel corrosion in sulphuric acid.	18
2	Rauvolfia serpentina	Reserpine, ajmalicine, ajmaline, isoajmaline, ajmalinine, chandrine	94%	Corrosion studies at 303,313,and 323 K	19
3	Nauclea latifolia	Monoterpene, triterpene indole alkaloid	76%	Corrosion studies in H2SO4 solutions at 300&600C	20
4	Carica papaya	Chymopapain,pectin,carposide,carpaine,pseudocarpaine,dehydrocarpines,carotenoids, cryptoglavine, cisviolaxanthin, and antheraxanthin	92%	Gravimetric and gasometric techniques were used	21
5	Acacia seyal	Catechu, dimethyltryptamine(D MT)	95%	Chemical and Electrochemical method was used	22
6	Datura metel	Scopolamine, bsitosterol, daturadiol, tropine, and daturilin	86%	Electrochemical studies were carried out in these experiments	23

| 7 | Calotropis procera | a-and   bAmyrins,cyanidin-3-rhamnoglucoside,cyclo art-23-en-3b,25- diol,cyclosadol | 89% | Chemical and Electrochemical method was used | 24 |
| 8 | Mentha pulegium | Pugelone,   alphapinene, limonene,   methone, andpiperitone | 85% | Corrosion rate was decreases with temperature | 25 |

Many works have been done for controlling corrosion of mild steel in acidic and neutal medium ,some of them discussed below

Table -2: Few Organic Corrosion Inhibitors and its Properties

Name of the Compound (Drug)	Biology of Compound	Adsorption Method	Features	Inhibition efficiency with respect to inhibitor concentration	Reference
Donaxine	Adiponectin receptor (AdipoR1)1	Langmuir adsorption is followed by a mixed type inhibitor	Temperature is an adverse effect on inhibition efficiency	98% at 7.5 mM	9
Penicillin G	Antibacterial	Langmuir adsorption is followed by a mixed type inhibitor	Water soluble	98% at 10 mM	10
Atenolol	β1receptorantagonist	Langmuir adsorption is followed by a mixed type inhibitor	Theoretical studies supports practical results	93.8% at 300ppm	11
Cephalothin	Broad spectrum antibiotics	Langmuir adsorption	Efficiency decreases with temperature	92% ppm at 660	12
Telmisartan	Angiotensin II receptor, Antihypertension	Mixed type and follows Temkin adsorption	Mechanism was established	97.39% at 125 mgL-1	13
Metronidazole	antimicrobial, anti-trichomonas antigiardial,	Anodic type inhibitor and follows Temkin adsorption	Theoretical Studies were carried out	80.01% at10μM	14

Tinidazole	Antibacterial, anticancer, antitubercular, antifungal	Langmuir adsorption is followed by a mixed type inhibitor	Higher efficiency at room temperature	90% at 400 Ppm	15
Cimetidine	Histamine H2 receptor Antagonist	Langmuir adsorption is followed by a mixed type inhibitor	Theoretical Studies were carried out	95.6% at 500ppm	16
Ranitidine	H2 histamine receptor Antagonist	Langmuir adsorption is followed by a mixed type inhibitor	Theoretical Studies were carried out	carried out 95.53% at 2x10- 3M	17

III. METHODOLOGY

The methodology of the proposed research work has been significantly divided in following steps:
Preparation of Steel specimens.Corrosion rate evolution by chemical and electrochemical methods. Calculation of the thermodynamic parameters.Theoretical evaluation of inhibition action by Quantum studies.Surface characteristics by Scanning electron microscope (SEM) images and FTIR techniques.

IV. CONCLUSIONS

Eco Friendly Corrosion inhibitors were tabulates in this paper. With increasing concentrations, all of these inhibitors show increased inhibitory efficiency. In our research, the majority of the inhibitors were discovered to be mixed inhibitors. Electrochemical impedance spectroscopy, linear polarisation resistance, and weight loss all provide similar findings. This paper will give the more benefits for the fresh researchers to initiate the research in corrosion topic.

V. FUTURE SCOPE

All the study described in this paper show that mild steel can be inhibited effectively in acidic environment. Inshort,there is urgent need of suitable green inhibitors given the extensive use of mild steel and the resulting economical loss in the form of corrosion.The development of an adequate and commercial plant -extract-based green inhibitor suitable for trialing in oil and gas fields appears to be a practically beneficial research area with great potential for innovation in inhibitor formulations.

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A Review on Waste Segregation

Abhishek S Bhat[1], Manikanta[1], Shubhakara Nayak[1], Sudarshan S Salian[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

The expeditious growth in amount and types of waste due to incessant economic growth, migration to the urban area, and large-scale industrialization is becoming a significant problem for the governments. The separation, management, transfer, and discarding of waste needs to be done in such a way that it will reduce the risk to the health and safety of people and the environment. The waste can be converted to wealth when it is properly separated. Currently, there is no such system of segregation of Organic, Plastic, and metallic wastes at the municipal level. We are proposing a highly advanced economical way of segregating waste. This method of segregation comprises machine learning, Image processing, and IoT to provide accurate solutions for problems in the process of segregation.

Keywords— waste, segregation, sensors, Automation

I. INTRODUCTION

As the population increases year after year, the quantity of waste is also increasing parallelly. This is causing many serious problems. The assemblage of waste in larger areas of land gives rise to the formation of landfills which causes hazardous problems. These landfills produce the odour of rotten waste which pollutes the environment around it. The dumping of the waste in the water bodies pollutes all the connecting seas and oceans. This causes disturbance in aquatic life as well as humans by degrading the quality of drinking water [1]. The remarkable increase in population is due to urban migration problems and changes in lifestyle a large amount of is generated. The management of waste is the biggest problem in the current situation. The improper management of waste can directly affect the lives of human beings as well as other organisms too [2]. Currently, India is facing various challenges in the environment due to improper waste collection as well as improper disposal. The most difficult challenge is to dispose of waste properly. Waste can be glass, metallic or organic each type of waste will have to be separately disposed of. Segregation of waste helps in the reduction of the quantity of waste that gets landfilled and also reduces air and water pollution [3]. To recycle and reuse any waste it should be properly segregated and managed the segregation process helps separate waste by its type. Usually, the manual separation method is used to sort the type of waste. But manual separation method is not efficient enough because it challenges the health of separating labor, therefore there is a need for an automatic waste segregation method to sort a different type of waste efficiently and properly manage it [4].

II. CATEGORY OF WASTE

Waste can be classified into different categories. Moreover, some types of waste can be recycled and others may not.

A. **Liquid Waste:** Liquid waste is the waste consisting of sewage and domestic wastewater, processed water, or other liquid, produced by industrial activity, particularly in food and chemical industries.

B. **Solid Waste:** It is the type of waste consisting of everyday items that are discarded by the public. There are usually different types, they are,

1. **Paper Waste:** It consists of printed paper, junk mail, billings, and packaging. The paper may comprise up to 70% of the company's total waste.

2. **Metals:** Mostly generated as industrial or household waste. It can be recycled and thus should be preferably disposed of separately.

3. **Plastic Waste:** plastic waste or plastic pollution is the accumulation of plastic objects in the earth's environment that adversely affects wildlife, wildlife habitat, aquatic life, and humans.

4. **Ceramic and Glass:** Ceramic wastes are produced during the process of polishing ceramic tiles, and are dumped in landfills which causes soil, air, and groundwater pollution. Glass is found in municipal solid waste, primarily in the form of containers such as beers and soft drink bottles; wine and liquor bottles; and bottles and jars for food, cosmetics, and other products.

C. **Organic Waste:** Organic waste is any material that is biodegradable and comes from either a plant or an animal. Biodegradable waste is a type of organic waste whose molecules can be broken into simple carbon components such as methane and carbon monoxide, etc,

D. **Ferrous Metals:** By weight, ferrous metals are the largest category of metals in municipal solid waste. Ferrous metal wastes can be found in automobile parts and other structural materials.

E.   **Hazardous Waste:** Hazardous waste is waste that has substantial or potential threats to public health or the environment. Characteristic hazardous wastes are materials that are known or tested to exhibit one or more hazardous traits like ignitability, reactivity, and corrosivity.

III. RECYCLING OF WASTE

Recycling is a process of converting waste materials into materials that can be used further or reused. Recycling can limit the wastage of potentially useful materials and reduce the consumption of fresh raw materials, thereby reducing energy usage, air pollution, and water pollution. As discussed above some can be recycled and some cannot be recycled [5].

IV. NEED FOR SEGRIGETION

Separation of waste helps us to know how to minimize waste generation by segregation. By segregation, one can identify the waste which can be reused and which can be recycled separation of waste will provide highly

accurate and efficient methods of waste management. Successful separation of waste will reduce the count of landfills. Thereby, protecting the environment from hazardous gases and harmful chemicals which are released from landfills. Proper segregation of waste will provide the benefits such as lowering waste cost, increased recycling rate potential revenue streams reduced landfills impact, etc.

In [8] authors K Abhinav Nishanth et al. discuss the importance of waste segregation. Segregation of waste helps to the recycling process very much easier. Proper segregation will reduce the number of landfills which is helpful for both people and the environment. Public health can also be improved by adopting a proper waste segregation method. An automatic waste separation method will reduce dependency on ragpickers because waste segregation takes place at the very source of municipal waste generation. An automatic method of waste segregation gives a user-friendly, time-efficient, and healthy operating environment.

In [9] authors S. Lokesh, S. Kiran et al. gives information about the benefits of automatic sorting of waste. Sorting is the process of arranging two or more objects of similar or dissimilar characteristics. Automatic waste sorting can effectively reduce human intervention. Automatic separation of waste not only reduces manual efforts but it reduces the time consumed for the segregation process. Automation greatly improves productivity and is very claimable. The application of automation in waste segregation will reduce the cost of manual labor payment and also reduces the risk of harmful diseases which may be caused due to the organisms present in the untreated waste.

In [10] authors Md Abdullah Al Rakib et al. brief the importance of segregation and recycling of waste. The waste can be converted into wealth by proper management and recycling processes. When the waste is differentiated into essential parts, for example, wet and dry gives higher chances of reusability. The wet waste part can be efficiently reused as fertilizers or for methane gas production.

Although recycling of waste has enormous scope, due to poor management and segregation it is not happening. An automatic waste segregation method will diminish the risk of waste laborers additionally, the separated waste can be straightly shipped for reusing and recycling.

In [11] authors Abdhul Azeem et al. worked on a project named 'Automatic Metal, Plastic, and other Dry Waste Sorter and Status Alert'. This project proposes to separate metallic and plastic. The moisture sensor module is used to detect wet waste and plastic is sensed by plastic sensors. These separated wastes are dumped into allocated bins.

In [12] authors Aleena V.J et al. worked on a project named 'Automatic waste segregator and monitoring system'. This system segregates wastes into organic, plastic, and metallic, thereby making waste management more effective. Ultrasonic sensors are used for monitoring the waste collection process and indicate the level of waste in bin to the microcontroller. Once the bin is full the message will be sent to the collection truck through GSM technology.

In [13] authors Emmanuel Atta Williams et al. worked on a project named 'Design and Implementation of a Microcontroller-Based Automatic Waste Management Sorting Unit for a Recycling Plant'. In this project microcontrollers and sensors automatically sort organic and inorganic materials to be recycled. This method uses a gas detection system and sends data to the controller through an analog to digital converter.

In [14] authors M K Pushpa et al. worked on a project named 'Microcontroller based Automatic Waste Segregator'. This machine is designed to sort waste into metallic, wet, and dry, thereby making waste management more effective.

In [15] authors Nimisha S Gupta et al. worked on the project named 'Automatic waste segregation'. This system proposes a spot automatic waste segregation unit. To segregate metallic waste a parallel resonance impedance system is used and for the separation of wet and dry waste capacitive sensors are used.

In [16] author Sharanya. A et al. worked on the paper named 'Automatic Waste segregator'. This paper aims to sort the waste into three major categories namely metallic, wet, and dry, and further classification of dry into plastic and paper. Each of these wastes is detected by respective sensors and discarded into bins assigned to them.

In [17] authors Vivi Tri Widyaningrum et al. worked on a project named 'Automatic waste sorter machine using proximity sensor'. In this machine, Arduino Mega 2650 is used as the main brain which will work according to the input obtained from the PIR sensor, LDR sensor, inductive proximity sensor, capacitive proximity sensor, and IR sensor. This project claims to separate five types of waste namely cans, non-transparent plastic bottles that contain water, transparent plastic bottles, transparent plastic, and report books.

V. CONCLUSION

In this paper, we have gone through different methods proposed for the efficient sorting of waste. The study shows that mainly IoT- based techniques are mostly used for waste segregation but the cost of implementing IoT-based systems is very high. Machine learning and Artificial Intelligence can provide highly advanced solutions for the current problems we have facing right now. And this mentioned method can also reduce the cost and time in the process of segregation.

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Development of a Prototype Model on Atmospheric Water Generator

Jaganesh GC[1], Shyam Sunder[2], Pranav KK[2], Shan Suresh[2], Shiv Sai Amarnath[2]

[1]Assistant Professor, [2]Student

Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri- 574236, Karnataka, India

ABSTRACT

In several countries like Asian country, it's troublesome to get water resources for consumption, particularly in arid regions. the matter of water scarceness is additionally discovered in different places of the globe because of a scarcity of rain fall. However, in extremely wet areas, like places on the brink of the ocean, water is obtained by compressing the water vapor gift within the air. The part Water Generator (AWG) is one among the choice solutions for fresh water recovery from the atmosphere, that directly condenses the wet content from the air which will be directly used. This example of AWG is predicated on a Thermo-electric cooler (TEC) that uses twelve V DC power, therefore its quality for using renewable energy resources. The system consists of cooling parts and warmth exchange units. A study of the condensation of copper and Al has conjointly been conducted to optimise that material is appropriate for the condensation method.

Keywords– Atmospheric water generator, Thermo electric cooler

I. INTRODUCTION

The Atmosphere contains water within the type of vapour, wet etc. inside that quantity nearly thirty fifth of the water is wasted. This quantity of water may be used with the assistance of a atmospherical Water Generator. This device is capable of changing atmospherical moisture directly into usable and even drinkable. The device uses the principle of heat energy to convert vapour molecules into water droplets. In several countries like India, there are several places that are set in temperate region like desert, rain forest areas and even flooded areas wherever atmospherical wetness is eminent. However resources of water are restricted. in line with previous data, we all know that the temperature required to condense water is known as saturation point temperature. Here, the goal is to get that specific temperature much or through an experiment to condense water with the assistance of some physical science devices. This project consists of a condenser that to form atmosphere the setting of water condensing temperature or saturation point. The condensed water are collected to use for drinking purpose and varied different uses.

A common method accustomed generate clean water is chemical action, though chemical action processes for water treatment are energy intensive and aren't economically appropriate for areas of the globe in would like of

unpolluted water. Two widespread ways for chemical action embrace membrane filtration and distillation. Reverse diffusion and nanofiltration chemical action need pressures up to 1,000 psi as driving forces for the membrane filtration system, whereas distillation needs Associate in Nursing abounding quantity of warmth to evaporate and condense the water for mineral separation. at the side of being extraordinarily pricey, these processes cause a threat to the setting and end in a waste answer that needs disposal. These water purification ways conjointly need access to an area body of water, which cannot be accessible.

II. METHEDOLOGY

Construct a conceptual framework

⇩

Develop a system architecture

⇩

Analyse and design the system

⇩

Build the system prototype

⇩

Observe and evaluate the system
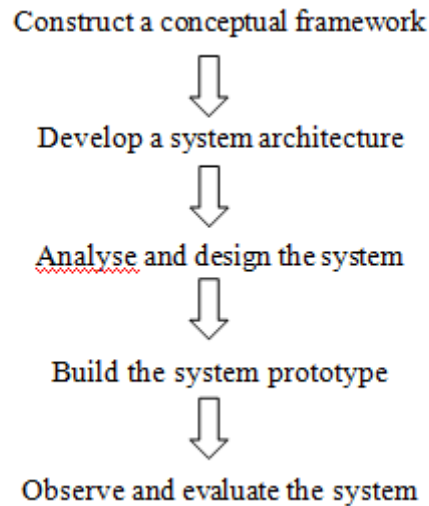
The vital step during this initial stage is to ascertain the problem domain and analysis queries. once the literature search has been utilised, it'll give helpful connected work that may be useful for this thesis. it's additionally an excellent chance to research the sphere space of physical science and state change, and use that to then additional develop the system. The survey should be conducted on humidness, Velocity, close temperature of the chosen region that is appropriate for the project. An acceptable style for the model is made and also the appropriate elements in keeping with the look constraints square measure purchased and also the example is invented. The made model is then tested and evaluated.

III. COMPONENTS USED

The various components used for the construction of our prototype model on atmospheric water generator is shown below.

Fig 4.1. AC to DC Convertor
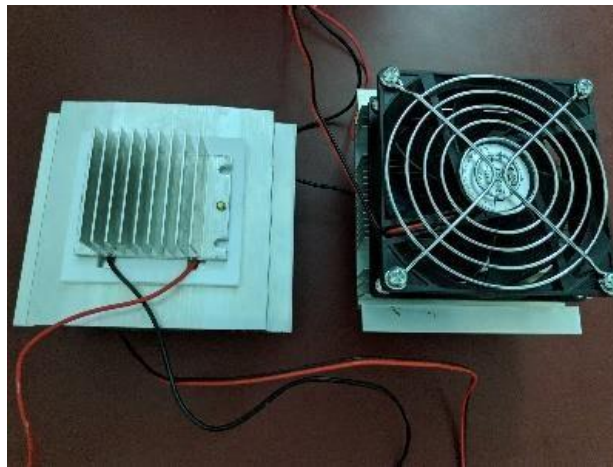
Fig 4.2. Peltier Module

Fig 4.3. Aluminium Tube

Fig 4.4. Copper Tube

IV. APPLICATION

There are hardly any possibilities to refuse that this device is moveable for its straightforward design and endurance capability. So, the atmospheric Water Generator is the device which may be enforced for extreme situation, to use throughout flood, in desert areas, and in rural areas. it's great benefits because it works sort of a renewable supply of atmosphere water and doesn't need an important power supply. several company   like 'Watermaker Asian country ltd', 'Aerowater', etc have already this type of device for domestic purpose. It can be implemented for Industrial development wherever the water may be a matter of crisis.

V. CONCLUSION AND FUTURE SCOPE

Applying this method during a extremely wet region virtually 1.5 metric capacity unit of condensed water may be made per hour during the day light, this can be a promising result; then a more advanced system may be designed that encounters higher power solar cells and additionally has the adroitness to store the surplus energy throughout the day light that's to be used at night; so the economical advantage of this type of system could be a bit obscure because of the comparatively high installation price.
1) for big scale implementation, RO and UV water filter may be used for manufacturing such water that meets the standard of WHO and BIS simply. 2) Peltier device has many varieties of models that are much efficient than TEC1. Those may be used. 3) The conception of this project can even be used as a far better alternative in refrigeration science against typical systems. It can even be determined during this method i.e. the usage of such low power semiconductor devices are indicating towards additional outstanding evolution of cooling engineering that's attending to alter the entire situation and myths regarding the ability consumption of refrigeration science. therefore in close to future we'll be able to use such devices that are currently restricted inside the project works.

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Experimental Investigation on Wear Rate of Poly-Oxy-Methylene and Nano Clay - A Review

Anish[1], Krithik Shetty[1], Vivin Ranjith Jathanna[1], Yogish[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Thodar, Moodbidri-574236, Karnataka, India

ABSTRACT

Polymeric Nanocomposite are the material which are investigated enormously because performance of the material can be improved when a small amount of Nano sized particles are added to the polymer matrix. The extreme changes on physical and mechanical properties of the polymer due to addition of Nano particles are noted. Therefore, in this research will make an overview about routes to prepare polymer based Nano composites by extrusion, and by injection moulding techniques. Injection moulding is considered to be one of the most prominent processes for mass production of the polymer product. The process governs the quality of the parts produced, whereas traditional manufacturing process removes layer by layer of materials to attain the desired shape of component, which are used for the direct production of components for manufacturing and trails in the industries. Here we conduct wear test to check the wear rate of the given composition of material. The parts can be injected directly into the mould and effectively integrated into structures. Also, the parts can be produced by means of additive manufacturing process.

Keywords— Nano particles, Extrusion, Injection Moulding

I. INTRODUCTION

Polymer Nanocomposites have been reported by several scholars in recent years. Polymer materials such as poly- oxy- methylene, polypropylene, nylon, polystyrene, polyamide and filler materials such as vapour grown carbon fibres are used as composite materials for filament [1]. Nano clay are Nano particles of layered mineral silicates. Conventional Fillers such as metallic powdery filler, mineral fillers, and carbon fibres are used to improve the mechanical and thermal effects [2]. Polyoxymethylene is used for surface compounding since it is a widely used polymer due to its low friction and superior mechanical effect [3]. Polymers are less expensive, weighs less and a substitute to metal in many applications [4].

II. METHODOLOGY

A. Poly-oxy-methylene

Polyoxymethylene (POM) is also known as polyacetal, acetal, and polyformaldehyde. It is an engineering thermoplastic applied in precision parts requiring high stiffness, low friction, and excellent dimensional stability. It is broadly used in mechanical engineering applications such as polymer gears, aerospace, gear rotor pump, seals, biomedical and automobile elements. Polyoxymethylene is often used as a straight replacement for metals because of its stiffness, dimensional stability and corrosion resistance [10,11].

B. Nano clay

Nanoclays are the nanoparticles that are made up layered mineral silicates. Depending on the chemical composition and nanoparticle morphology, nanoclays are classified into various groups such as montmorillonite, bentonite, kaolinite, hectorite, and halloysite [16].

C. Specimens preparation and testing

Poly-oxy-methylene and Nano clay is used to manufacture the specimens. The specimens are fabricated through extrusion process and injection moulding. The tests for tensile and flexural strengths are conducted on all specimens as per the ASTM standards [17].

D. Wear Test

Wear test of the specimens are conducted on a pin-on-disc wear testing machine as per the ASTM standard. The ASTM specification is designed to refer to polymer material. The wear testing machines disc is made of hardened steel, with minimum roughness on the surface. With the specimen holder and screws, the specimen is kept on the disc, with four screw fasteners perpendicular to the spinning disc, and load is added with a lever link. And iterations are done accordingly.

E. SEM Analysis

Scanning Electron Microscope (SEM) Model: EVO18, ZEISS is used to take the morphology of the fracture and worn surface of the tested specimen [18].

III. RESULTS AND DISCUSSION

Wear Properties

A total of 27 tests are performed by using Taguchi Design. Values of mass loss(mg) are considered as a variable response.

A. Analysis of Variance (ANOVA)

The ANOVA general linear model for the response of mass loss(mg) can be seen in Table1. From Table1, it is evident that all the factors influence the wear properties of NECs. P-values of all the factors are less than 0.05(95% significance), which indicates that all the factors contribute to the mass loss [7].

Table- 1 Analysis of variance

Source	DF	Adj SS	Adj MS	F-value	P-value	% of contribution
Nanoclay	2	11362.7	5681.37	151.88	0.000	32.55
Speed	2	3006.5	1503.26	40.19	0.000	8.61
Load	2	14567.2	7283.59	194.71	0.000	41.73
Time	2	5291.0	2645.48	70.72	0.000	15.16
Error	18	673.3	37.41			
Total	26	34900.7				
S=6.11616, R-sq=98.07%, R-sq(adj)=97.21%						

B. MAIN effects plots

The main effect plots, which are shown in Fig.1 indicate the effect of different process parameters on mass loss in wear test(higher slope indicates the greater influence). The slopes of speed, load, and time indicate that the higher the value, the greater the mass loss. The slope of the load is very steep, which influences more on mass loss. The slope of nan- oclay indicates higher the nano clay content lowers the mass loss. The drastic increase in mass loss found when the speed increased from 200 to 300 RPM as well as time from 10 to   15 min due to the heat generated as a result of friction between the disc and specimen. The maximum mass loss resulted in pure epoxy at 300 RPM speed, 3 kg load, and 15 min of testing time. The improvement of wear resistance (lower mass loss) can be explained by the reinforcement of pure epoxy by high strength and hardness nanoclay [19,20].
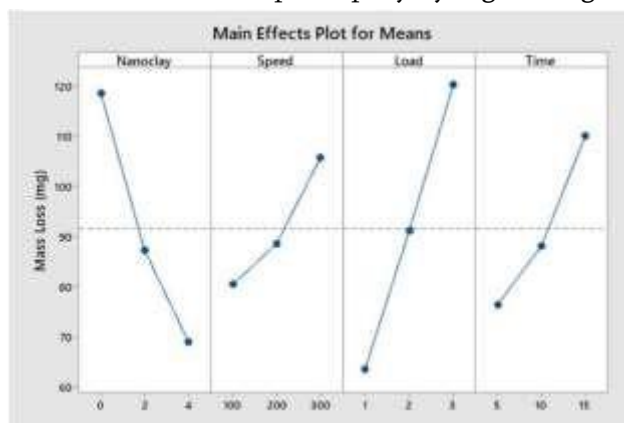
Fig. 1 Main effect plots for mass loss.

C. RESIDUAL PLOTS

As shown in Fig. 2, the normal probability plot indicates that the residuals are distributed adjacent to the equipped line, with only a minimal variation from the normal spread. This determines that there is a regular dispersion of the residuals, validating the best linear relationship between the response variable and control factors. The graphs of residual vs. fit- ted value, residual vs. frequency, and residual vs. observation order,

display little agreement or the residuals show up with each other haphazardly. This is a crucial organization for reasonable compatibility between the experimental and fitted value [21,22].
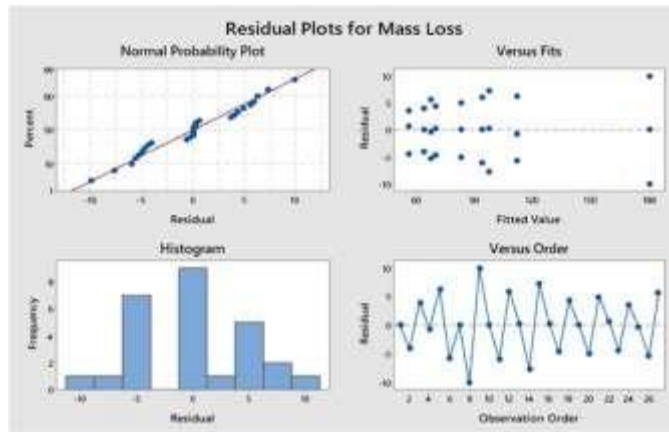
Fig. 2 Residual plots for flexural strength

D. SEM ANALYSIS

Fig. 3 displays the worn surfaces of pure epoxy. At a lower level (i.e., 100 RPM speed, 1 kg load, and 5 min time), the worn sur- face (Fig. 3 (a)) is relatively rough. At mid-level (i.e., 200 RPM speed, 2 kg load, and 10 min time), the worn surface is associ- ated with micro-cracks in the matrix (Fig. 3 (b)). At a higher level (i.e., 300 RPM speed, 3 kg load, and 15 min time), SEM image (Fig. 3 (c)) presents the greater damage of the specimen, viz., removal of a higher amount of matrix from the surface. The contact temperature and the loss in mass are increased considerably, resulting in an accelerated split of the matrix. Due to this phenomenon, the damage on the surface increased. Grooves are formed due to matrix removal. The SEM micrograph of the worn-out surfaces of 4 wt.% nanoclay added NECs are as shown in Fig. 3. In comparison with pure epoxy, it is evident that the worn-out sur- faces are considerably smoother under similar wear factors and levels, and with the introduction of nanoclay, the matrix detachment is considerably reduced [23].
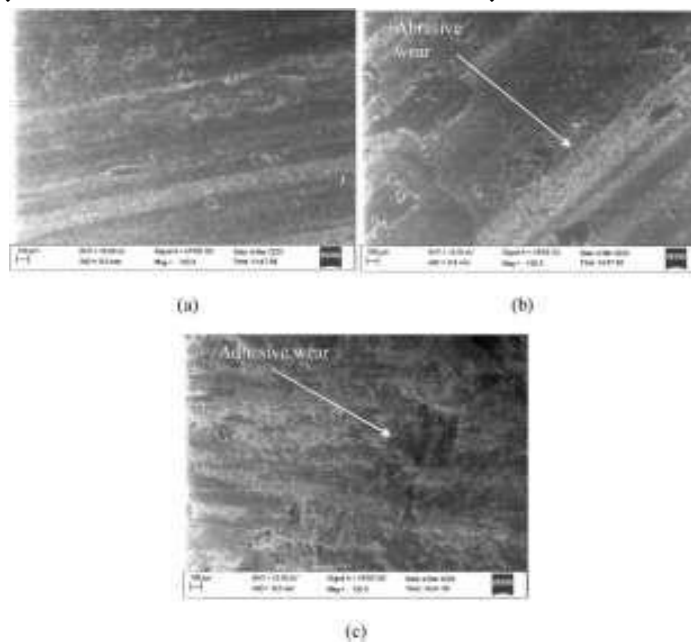
Fig. 3 SEM images of worn surface of NEC (4 wt.% of nanoclay)

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Accident Detection System for Two-wheelers Using Tilt Sensor

G Sujaykumar[1], Steny Joseph[1], Sourabha M[1], Mithun Ragunath[1], Shreyas[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Accidents endanger people's lives more frequently these days, with road accidents being the most common. No one knows when or how it will happen. Accidents occur even when one vehicle is stationary and another is moving. Accident Alert System (AAS) research is relatively new. To avoid such collisions, we created the "Tilt sensor-based accident detection system". This project describes an automotive localization system that makes use of GPS and SMS services. Many lives could have been saved if the necessary care had been provided at the time of need. The victim can receive the necessary attention with the help of this system, as the smart accelerometer and GSM built into the system alerts hospitals or Ambulance And dears. The system allows for the localization of a vehicle and the transmission of its location to loved ones via GSM technology at his/her request. This system also includes an emergency switch which can be manually deactivated if the victim no longer requires help and support.

Keywords: - GPS, GSM, Accelerometer, Tilt sensor, Arduino, Messaging to Dears numbers

I. INTRODUCTION

The new generation of cars has been developed to reduce the number of accidents. In order to lessen the chance of an accident, innovative ideas have been applied and created for cars. Some accident detection systems and intelligent controlled devices have been devised and developed in recent years in order to improve the safety of automobiles and reduce the number of deaths caused by accidents. This system describes a design of effective accident detection system that can monitor a two-wheeler if accident occur while travelling. This system is designed to prevent the deaths due to accident and to inform emergency about an accident that has occurred. According to a recent World Health Organization (WHO) estimate, 1.35 million people die each year, and 50 million people are injured. Road accidents are the eighth largest cause of mortality, with the Association for Safe International Road Travel (ASIRT) forecasting that unless substantial improvements are made, they would soon move to the fifth major cause of death. According to ASIRT, road accidents account for one to two percent of each country's annual budget. Road traffic accidents, which are the tenth leading cause of mortality worldwide and the tenth leading cause of all deaths, now account for a shockingly considerable portion of the global burden of disease. Every year, an estimated 1.2 million people are killed in traffic accidents! and up to 50 million more individuals are injured, accounting for 30 percent to 70 percent of orthopaedic beds in hospitals in underdeveloped nations [1]-[3]. The majority of motorcycle accidents, according to the In-Depth Investigation

of Motorcycle Accidents (MAIDS) initiative, occurred in urban settings. In motorcycle accidents, fractures to the lower and upper limbs were the most prevalent injuries. Thoracic (50%) and head (44%) injuries were the most common major injuries in a study of 11.800 injured motorcyclists in France, and 90% of the injuries were to the internal organs. The most common type of collision was with a passenger automobile (64 percent), and over half of all incidents involved the PTW's frontal portion [2].

The system's primary objective is to provide help to two-wheeler users and, if an accident occurs, to detect it and notify the appropriate authorities using wireless technologies such as GSM and GPS. The vehicle crash alerting system is designed to locate the collision and make it easier to get there. For the ambulance, every second counts. When a collision occurs, the sensors are immediately activated. There has been no loss of life as a result of the ambulance's late arrival. The goal of the project is to locate the vehicle by sending a message through a system that is installed inside the vehicle. We may not be able to locate the accident site since we do not know where the accident will occur. To provide treatment for injured persons, we must first determine the location of the accident using GPS tracking and delivering a message to loved ones while a siren is activated.

II. METHODOLOGY

A. Components used

Arduino Uno is a micro controller board based on the ATmega328P. It receives the value of the velocity and the tilting from the accelerometer and checks whether it matches with the defined condition and continue with further proceeding. Accelerometer is an accelerometer sensor is a sensor that can measure acceleration. It is usually composed of masses, dampers, elastic components, sensitive components, and adaptive circuits. In the process of acceleration, the sensor obtains the acceleration value by using Newton's second law, measuring the inertial force on the mass block. A tilt sensor is an instrument that is used for measuring the change in tilt and monitoring of inclination and vertical rotation in vertical structures. Tilt sensor produces an electrical signal which is proportional to the degree of tilt in multiple axes (Uniaxial & Biaxial). Tilt sensors measure the tilting position with its original reference. This sensor provides valuable information about both the vertical and horizontal inclination tilt. GSM as a media which is used to control and monitor the transformer load from anywhere by sending a message. It has its own deterministic character. Thereby, here GSM is used to monitor and control the DC motor, Stepper motor, Temperature sensor and Solid-State Relay by sending a message through GSM modem. GPS Module, GPS stands for Global Positioning System and is used to detect the latitude and longitude of any location on the earth, with the exact UTC time. PS module is used in our project to track the location of the accident. This device receives the coordinates from the satellite for each and every second, with time and date. In our project, we have used GPS module SKG13BL, which is an Ultra High Sensitivity and Low Power GPS Receiver Module [4]-[7]

B. Control unit

The control unit flow chart shows how the circuits and sensors are connected. When an accident occurs, the tilt sensor will measure the angle and determine whether or not an accident has occurred. And the system will

only operate if the Two-Wheeler is travelling faster than 10 km/hr and the crucial angle is greater than 40 degrees
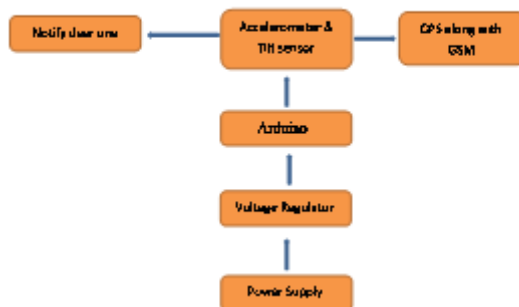
Fig 1. Control unit

C. Working
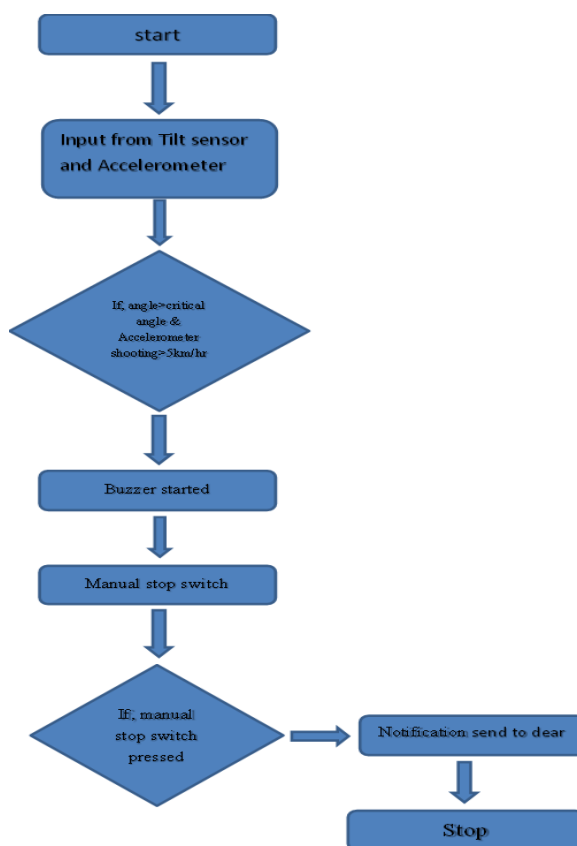
Fig 2. Working

Flowchart illustrates how the proposed system works in order to obtain a good understanding of it. If the values collected from the sensors result in a value that is more than the threshold value, it indicates or shows that an accident has occurred. An alarm is generated and sent to the vehicle driver when certain conditions are met. To avoid false reporting, if the driver cancels the alert, the information is not forwarded to the hospital. The GSM sends a notification to the ambulance and Dears if the driver does not response within 10 seconds.

III. CONCLUSION AND FUTURE SCOPE

The number of vehicles in urban cities has grown significantly in recent years. The number of accidents has increased as a result of the increased traffic. Despite the fact that various accident detection systems are on the market, a considerable percentage of fatalities still occur. e. The lack of effective systems, combined with price and retrofitting capability issues, exacerbates the problem. to raise awareness of these issues we have proposed an Arduino-based system for accident detection. We have demonstrated that using a range of different types of sensors can assist in more accurately and efficiently identifying a traffic accident. However, there are no accurate and reliable systems for two-wheeler accidents. The suggested system locates the accident site quickly and sends an emergency request for assistance or assistance to the appropriate hospital department and ambulance. This system makes decisions based on information about the vehicle's state and position received from the tilt sensor module. [8]-[13]

IV. RESULT

When the angle of a two-wheeler exceeds the critical angle for one minute, the buzzer will sound and SMS will be ready to sent. If the manual key is not hit, this system will send a text message to the phone number specified in the code, as well as the latitude and longitude in the form of Google maps. The message is sent to the given mobile number and includes the location.
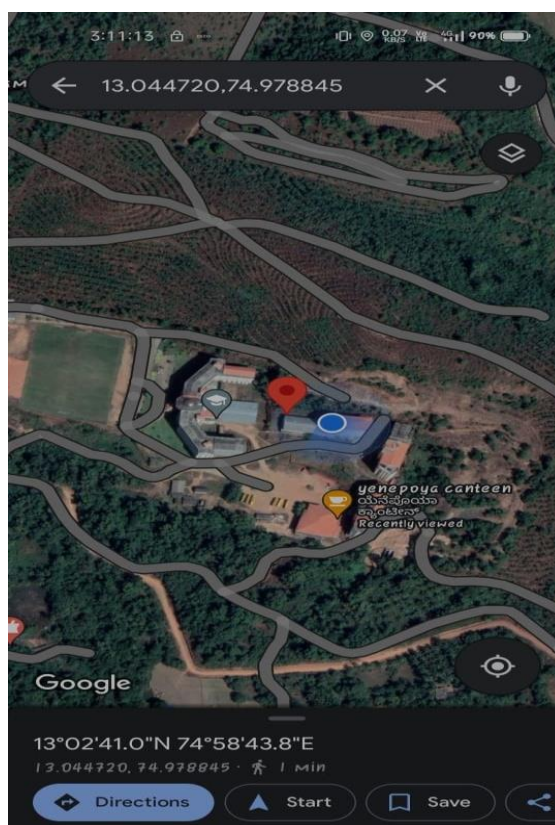
Fig. 3 Result for the location shown on google maps
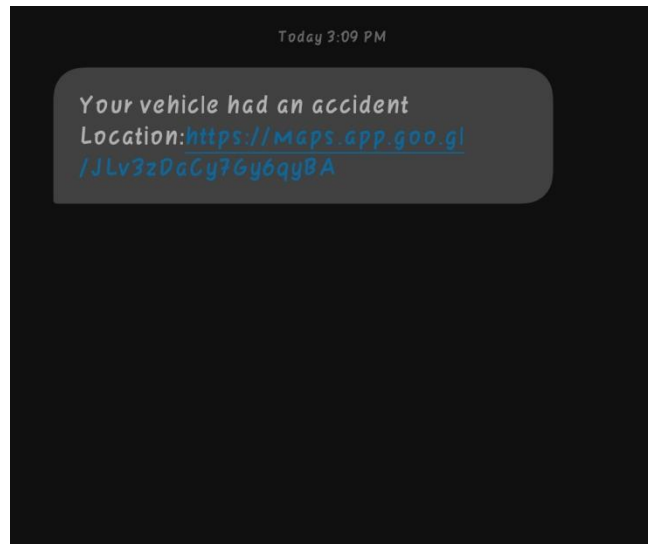
Fig. 3 Results for the GSM module send SMS

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Design and Fabrication of Automatic Tender Coconut Cutting Machine

Raghavendra Baliga[1], Charan Acharya[1], Kathyayini Anil Nath Singh[1], Mahammad Hasil[1], Nethravathi[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Karnataka, India

ABSTRACT

Nowadays tender coconuts are extensively used in the temple or religious centres to perform Pooja rituals. Some temples use more than one thousand tender coconuts on daily basis for Abhishekam. The tender coconut has to be kept ready for abhishekam by chopping it on both sides. The traditional method employed earlier to cut tender coconut is quite a tedious job and requires skilled workers. Also, day-today there is a huge scarcity of skilled workers. So it is necessary to automate the tender coconut cutting process which will fulfil the daily needs of many temples in our country. In this project work, automatic tender coconut cutting machine is designed and fabricated. The tender coconut is placed on the wheel, which moves towards the blade and the two rotating blades situated on the shaft, chop the ends of the tender coconut. The tender coconut is collected in the bin and the waste is collected in the waste bin placed below the machine.

Keywords— Tender coconut, rotating blade, shaft, wheel, frame, motor.

I. INTRODUCTION

The coconut tree (Cocos nucifera. L) popularly known as "Kalpa Vriksha" is one of the most useful trees in the world. The coconut tree is a member of the family Arecaceae (palm family). It belongs to the species in the genus Cocos. Coconut palms are grown in more than 90 countries of the world with a total production of 62 million tonnes per year. The coconut tree also called the tree of heaven, provides many necessities of life including food and shelter. It is mainly cultivated for its nuts; it yields oil, oil cake and fibre. Tender coconut (7 to 8 months old maturity) is valued both for its sweet water, which is a refreshing drink and for the "Pooja ritual" in the temple. The cytokinins present in the young covert water have anti-ageing properties and anti-thrombotic and anti-carcinogenic effects. It has calcium, sodium, potassium and magnesium which helps to maintain the level of electrolyte in our body. The other benefits of tender coconut are that it may help to improve kidney function and immunity, prevent urinary tract infection and reduce high blood pressure. Some mothers find that drinking coconut water helps relieve morning sickness, acid and wand which are common problems during pregnancy. In traditional medicine or Ayurveda, tender coconut water is used as a laxative, it is cooling believed to ward off vomiting. Tender coconut water is a wholesome natural beverage sold on roadsides and there is no means to sell the same inside the offices and buildings as the process of cutting it is a hazardous and risky job and needs special skills. Tender coconut water is an unadulterated, natural and

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medicinal drink that people of all ages can consume. Tender coconut plays an important role in the development of economic, social and cultural activities of millions of people in our country. India is the major producer of tender coconut in the world.

Figure 1: Tender coconut

Tender coconut vending is one of the common street vending businesses. It provides nutritional water to drink and kernel to eat. It is, at its peak, especially in the summer season. The common traditional tool used for cutting and making a hole on tender coconut is a hand sickle. The time required for cutting the top portion of the tender coconut demands manpower. The existing methods used to punch and slice the young coconut are:

A) Conventional method of opening young coconut in past years is being cut by a completely manual effort by using a hard knife. The tools used are unsafe and messy and need skill and training before use.

 The drawbacks of using this method are:

1.   Risk of injury
2.   Aged people not able to cut

B)   Manual operated punch cum splitting the young coconut:

The force required for slicing a young coconut is more and during punching dust particles (impurities) present on the top of the young coconut enter young coconut water which is not feasible to drink.

The existing methods for cutting tender coconut are risky, unsafe, time-consuming and not suitable for some classes of people to operate the machine.

Figure 2: Manual punch cum splitter for cutting tender coconut

II. COMPONENTS

The main components of the tender coconut cutting machine are as follows:

Rotating wheel: The rotating wheel is made of a special V-shaped configuration that acts as a feeder which is made up of steel material with a diameter of 380mm and a thickness of 10mm. The V-shaped configuration helps in holding the tender coconut firmly. The rotating wheel is fixed on the shaft which is driven by a motor. It provides support during cutting.

Circular blade: Two blades made up of alloy steel material having 60 teeth, whose tip is coated with tungsten carbide are used. Its purpose is to cut the tender coconut. It is mounted on the shaft opposite the rotating wheel. Its direction of rotation is opposite to the direction of the rotating wheel.

Motor: The motor is the powering system, which is connected to the shaft and drives the rotating wheel and the circular blade. ½ HP power motor is used.

Frame: It is an outer shell which is used for protection and support of other components. It is made up of stainless steel.
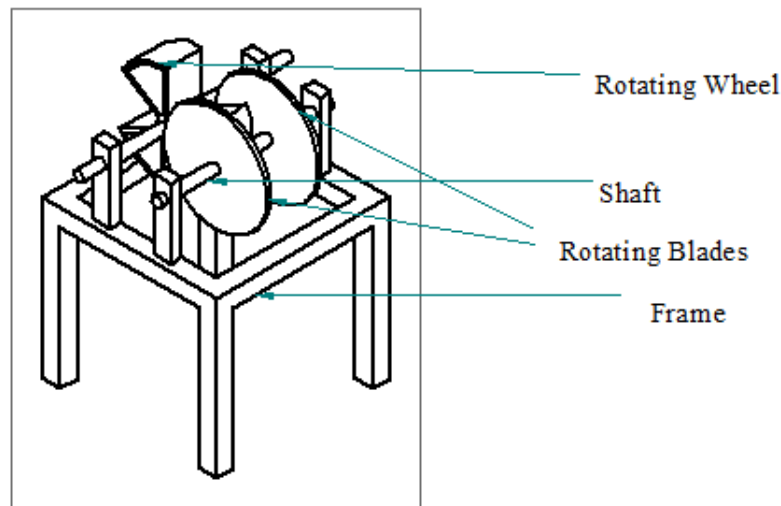
Figure 3: Different components of the machine.

III. METHODOLOGY

Pre-processing: The available tender coconuts are sorted according to different shapes and sizes. The movable blade and rotating wheel are set according to the size and shape of the tender coconut that has to be fed first.

Processing: The machine is switched ON and the tender coconut is placed on the V-shaped rotating wheel. The wheel feeds the tender coconut against the rotating blade. The blade is rotating in opposite direction with a relatively high speed compared to the wheel. Two blades provided on the shaft chop the top and bottom of the tender coconut. Chopped tender coconut will move with the wheel and drop inside the collecting bin situated below the stand of the frame. The waste is collected inside the bin placed below the blades.

Post-processing: The collected chopped tender coconut is utilized to perform Abhishekam.
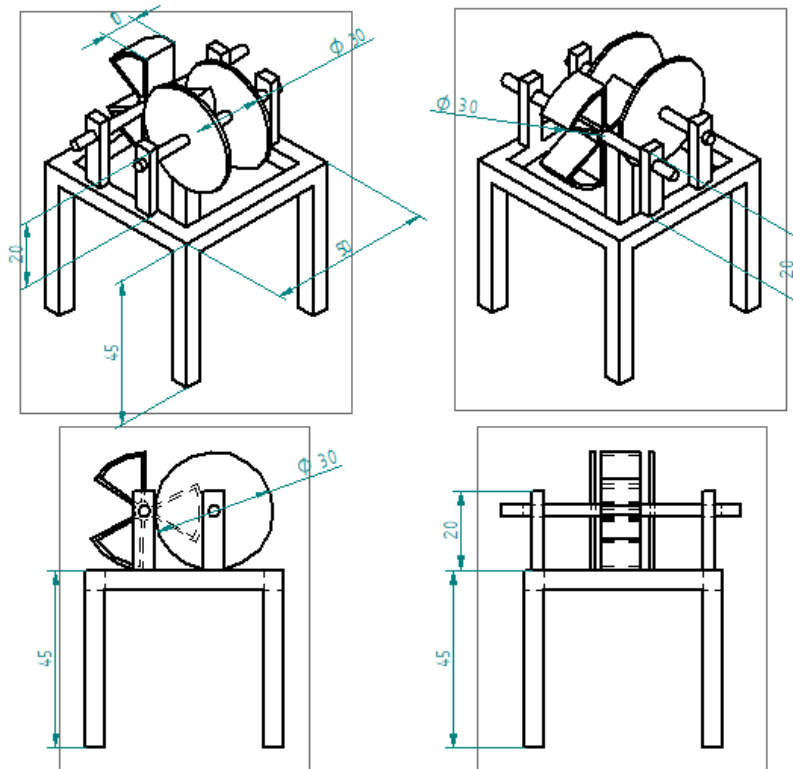
Figure 3: Schematic representation of automatic tender coconut cutting machine

IV. CONCLUSIONS

The automatic tender coconut cutting machine is designed and fabricated. This machine is more efficient than the conventional tender coconut cutting methods and take less time to cut the young coconut. It is observed that the productivity is increased. A less skilled person can also operate this machine and safety has been improved. The machine can also be used for splitting coconut and tender coconut in the middle as per consumer requirements. The greatest challenge of cutting different sizes and shapes of tender coconuts has been effectively overcome by using this machine.

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Disc Type Oil Skimmer

Sankeerth S[1], Mohammed Basith[1], Mohammed Tasif[1], Roshik C P[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri-574236, Karnataka, India

ABSTRACT

Today oil pollution is serious problem causing harm not only to marine life but also to the ecology, while working as an environmentalist you will face significant hurdles. Treating oil spills and device a different approach a low price. There are several methods for doing this, on of which is using a disc type oil skimmer. It has a simple operation and a high efficiency of roughly 90-95%. The idea behind employing disc style oil recovery technology to combating the oil spill situation is very efficient and effective method. Possibly it has a number of advantages over chemical or mechanical alternatives. Sponge suction techniques are now widely employed removing oil from water's surface. Acrylic material will be used for the disc and the results will be compared with traditionally used material of stainless steel.

Keywords— Acrylic, Stainless steel, Disc type, Oil, Sponge.

I. INTRODUCTION

Arduino Oil is one of the important energy and raw material source for synthetic polymer and chemical worldwide. As long as oil is explored, transported, store and used there will be the risk of spillage. Oil pollution particularly of see and navigable water, has excited more public concern than other water and spilt materials. Oil pollution has continuously increased with the increase in oil consumption. In 2017, oil spill occurred at Kamarajar port in Ennore in Chennai. This oil occurred because of collision of two ships of which one ship had containers of crude oil. Just about 9.9 million gallons of oil was spilt. The oil was cleaned by using buckets which employed human workforce.

Nowadays world requires speed in each field. Hence quick working is most important. For achieving rapidness, various machines and the equipment are being fabricated. In such case, small-scale industries are contributing highly for for the development of our country.

II. TYPES OF OIL SKIMMER

There are different types oil skimmers to extract oil mixture. They are belt type, disc type, weir type, drum type, brush type oil skimmer etc. Compare to other oil skimmer disc type is more efficient with low cost.

A disc type oil skimmer is a mechanical device particularly designed for separate oil from water-oil mixture with reliable and efficient technique. Oil is skimmed due to the physical properties of oils, namely specific gravity surface tension etc. Most of the oils have a lower specific gravity than water, which allows it to separate from water. This oil are possible to collect using an oil skimmer from the surface of water.

III. MATERIALS AND METHODS

A. Design and fabrication of float
The float of oil skimmer is made of PVC (polyvinylchloride) pipe which as diameter 4 inches. The length of the float has 1000 mm and width of 600 mm. The design of float in this experiment is shown in figure 1.

B. Components are used
The Battery of 12V DC is used and Motor 100 rpm is used to drive the disc. Two motors of 1000 rpm is used for propeller. Collecting tank with the capacity of 1liter. Arduino uno , Bluetooth module , motor driver.

C. Disc materials
Materials of the disc are used in the experiment are

1. **Acrylic:** It is a transparent plastic material with outstanding strength, stiffness, and optical clarity. Acrylic material is easy to fabricate, bonds well with adhesives and solvents, and is easy to thermoform. It has higher weathering properties compared to many other transparent plastics.

2. **Stainless steel:** It is a of a group of ferrous alloys that contain a minimum of approximately 11% chromium, a composition that largely inhibits the iron from rusting and provides heat-resistant properties.
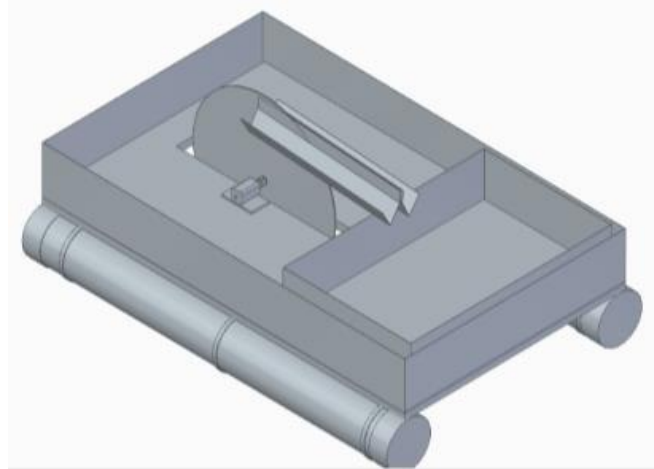
Figure 1: Float design

IV. CONCLUSIONS

As we studied in the past, the oil leakage occurred many times around the globe. These oil leakage made several damage to the aquatic life in the region. Oil pollution occurs due to dumping of oil wastes into water reservoirs from various industries. In order to prevent oil pollution and separate oil water mixture, we are fabricating disc type oil skimmer.

In this paper, we have gone through different material used for the disc. The study show by changing material of the disc the efficiency of the skimmer can be increased. And this method can also reduce the cost and time in the process of skimmer. Acrylic material is more efficient than stainless steel and mild steel. Acrylic is more cheaper than other material and also very useful in oil skimming industry.

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A Review on Optimization of WEDM on Al7075/WC MMC

Chethan[1], Giridhar Shenoy[1], Milan Shetty[1], Praveen Acharya[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

In the prevailing paintings, hybrid metallic matrix composites containing Aluminium alloy (Al7075) and Tungsten Carbide (WC) had been fabricated the usage of stir casting ap- proach. Wire Electrical discharge machining (EDM) seems to be a promising approach for machining hybrid composites. The goal of this paintings is to research the impact of EDM method param- eters like Current, Pulse on time, Pulse off time on metallic elim- ination price (MRR), in addition to floor roughness (SR) at the same time as machining hybrid Al7075 metallic matrix compo- sites strengthened with 1.5,3,4.5 weight percent of WC particles. Design of Experiments (DOE) approach became used on this re- search. The mixture of WEDM method parameters had been se- lected primarily based totally on Taguchi's L27 orthogonal array. Further, decide the layout parameters appreciably influencing the reaction variables like MRR and SR. The effect of those parame- ters at the responses has been analysed the usage of Signal to Noise (S/N) ratio analysis. The greatest mixture of WEDM method parameters had been recognized the usage of MINITAB R16 software program for achieving most fabric elimination price and minimal floor roughness. Further, affirmation test has been finished to become aware of the effectiveness of the proposed method.

Keywords— wire EDM, Hybrid metal matrix

I. INTRODUCTION

Metal matrix composites (MMC's) like maximum composite sub- stances provide more potent houses over monolithic substances, stiffness, hardness and weight savings. Aluminium primarily based totally steel matrix composites are concentrating extra for engineering programs considering the fact that it's far the elegance of mild weight and excessive overall performance aluminium cen- tric substances systems. Nowadays MMC's advantage interna- tional cognizance with inside the area of studies for aerospace and automobile industries due to their better houses like excessive strength, light weight, low thermal conductivity, and high quality put on resistance and excessive running temperature. As an oppor- tunity machining technique for the manufacturing of complicated, problematic from conductive ceramic composition, electric ma- chining additionally referred to as EDM has proven. It's a non- conventional operation. Electric power is used to reduce the very last shape and scale with inside the electric powered discharged phase. There are tries to apply the whole power at the right area that the interest needs to be performed. Between workpiece and electrode there's no mechanical urgent

due to the fact there's no direct touch. EDM might also additionally be used for machining of a few shape of conductive cloth irrespective of hardness or durability.

II. MATERIALS

A. Aluminium 7075: The cloth used with inside the gift have a look at is Al7075 whose chemical composition is indexed in Table 1. It therefore as a low melting factor 660ºC. The molten steel as immoderate fluidity and solidifies at everyday temperature it system amazing mechanical properties, which include proper corrosion resistance, proper deformation behaviour, excessive unique modules, tensile strength, hardness, proper put on re- sistance and occasional coefficient of thermal expansion.

Table 1: Chemical composition of Al7075 matrix used in the pre- sent study

Che mi- cal com po-	Cu	Mg	Si	Fe	Mn	Zn	Cr	Al
Al7 075	1.1 6	1.92	0.1 19	0.1 32	0.0 03	4. 57	0. 00	Ba 1

B. Tungsten carbide: Tungsten carbide (WC) is typically referred to as carbide. It is an inorganic compound having tungsten and car- bon atoms is identical quantity that is colloquially known as car- bide. In its maximum simple from its far satisfactory grey powder. It is extensively utilized in commercial machinery, tools, abrasive and additionally in excessive hardness. It is largely used within side the manufacture of friction pads and liner tubes in furnace etc. The tungsten carbide is about 3 instances stiffer than steel, and plenty denser than steel.

C. Preparation of Al7075-WC composites: with inside the gift study, stir casting technique is used for the guidance of metallic matrix composite. In this procedure Al7075 bars are reduce into small in- gots. These ingots are paced in Graphite crucible wherein it's miles stored in induction furnace. The ingots are melted at a temperature of 800ºC, after powerful degassing predetermined mass of pre- heated WC of 1.5wt%, 3wt%, 4.5wt%, at appropriate periods of 1.5wt% in steps of three is brought into the alloy and stirred constantly in an effort to attain uniform distribution of debris within side the matrix. After the integration metallic is poured into the mold die and allowed to solidify. After the solidification, the casted specimen is eliminated and machined as in step with ASTM requirements for testing.

Table -2 weight percentage of Al 7075/WC Aluminium Metal Matrix Composites

S. NO	COMPOSITION
A	Al7075+1.5%WC
B	Al7075+3%WC
C	Al7075+4.5%WC

D. Determination of material removal rate and surface roughness: material removal rate is the amount of material removed per unit time by the cutting tool. Material removal rate (mm2/min) in a WEDM process is determined by multiplying the cutting speed (mm/min) and work height (mm) .surface roughness is the meas- ure of the texture of the surface. It is quantity by vertical devia- tions of areal surface from its ideal one .if variations is minimum then the surface is smooth. The measurements are usually made along a line running at right angle to the general direction of tool marks on the surface and expressed in micrometre.

Fig. 1 Mitutoyo Surface Roughness tester

Table 3 Experimental Design using L9 Orthogonal Array

Trail	Ton	T of	SV	MRR(mm²/min)	Ra(μm)	S/N ratio	S/N Ratio
1	100	40	15	47.52	1.904	33.5357	-5.593
2	100	45	20	36.17	1.960	31.1670	-5.845
3	100	50	25	26.24	1.840	28.3793	-5.296
4	103	40	20	56.00	3.177	34.9638	-10.04
5	103	45	25	44.00	3.508	32.8691	-10.90
6	103	50	15	41.44	3.126	32.3484	-9.899
7	106	40	25	88.32	3.221	38.9212	-10.15
8	106	45	15	86.44	3.418	38.6332	-10.67
9	106	50	20	56.70	3.513	35.0717	-10.91

III. RESULTS AND DISCUSSION

A.   Determination of optimum parameters

The effect of three process parameters on MRR and Ra is shown graphically in Figure 2 and Figure 3 From the main effect plots, the level corresponding to the higher S/N ratio is obtained. Using MINITAB 18, response tables for S/N ratio of MRR and Ra is calculated as shown in Table 4 and Table 5. Based on the analysis of S/N ratio, the optimum process parameters for MRR and Ra along with their corresponding levels are obtained and is shown in Table 4 and Table 5
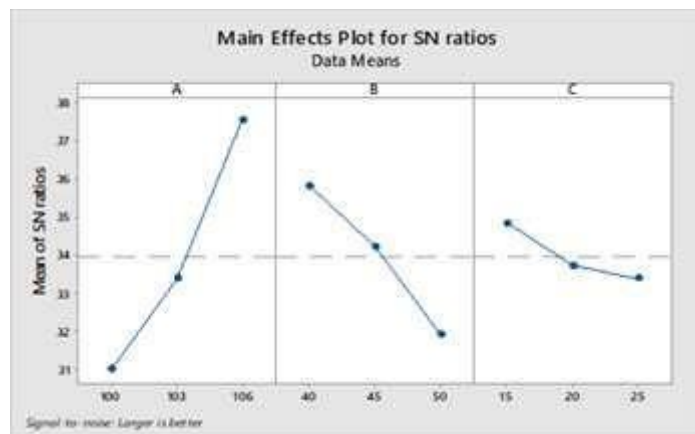
Fig 2 Main effects plot for MRR

Fig 3 Main effects plot for Ra

Table 4 Response table for S/N ratio of MRR

Levels	A (T_{ON})	B (T_{OFF})	C (SV)
1	31.03	35.81	34.84
2	33.39	34.22	33.73
3	37.54	31.93	33.39
Delta	6.51	3.87	1.45
Rank	1	2	3

Table 5 Response table for S/N ratio of Ra

Level	A (Ton)	B (T off)	C (SV)
1	-5.578	-8.598	-8.723
2	-10.280	-9-141	-8.933
3	-10.583	-8.703	-8.786
DELTA	5.005	0.543	0.210
RANK	1	2	3

Table 5 Response table for S/N ratio of Ra

Parameters	Level	Optimum
T on	1	100
T off	2	40
SV	3	15

B. Material Removal Rate (MRR)

Using optimum process parameters obtained for higher MRR (TON =100, TOFF =40, SV = 15), machining was conducted to determine material removal rate and by using optimum parameters obtained for Ra (TON =106, TOFF =40, SV = 15), surface rough- ness of Aluminum alloy was determined. Table 7 and Table 8 lists the MRR and Ra of Aluminum alloy.

Table 7 Material removal rate of Aluminum alloy

Trail #	Material removal rate (MRR) mm^2/min	Average MRR mm^2/min
1	87.56	
2	86.15	
3	83.20	88.24
4	96.05	

Table 8 Surface Roughness of Aluminum alloy

Trail #	Surface roughness (Ra) in μm	Average Ra μm
1	1.895	
2	1.913	
3	1908	1.904
4	1.900	

IV. CONCLUSION

The experimental investigation on the optimization of WEDM pro- cess parameters of Aluminum alloy for MRR and Ra leads to the following conclusions:

➢ The optimum process parameters in WEDM for higher MRR and lower Ra is determined for Al 7075-T651 alloy using Taguchi's technique. WEDM parameters for higher MRR deter- mined is TON=106, TOFF=40 and SV=15 and for lower Ra, TON=100, TOFF=40 and SV=15.

➢ TON is the most significant WEDM parameter for higher MRR and lower Ra.

➢ The experimental and predicted values of MRR and Ra shows good agreement.

➢ The experimental MRR and Ra value of aluminum alloy for op- timum WEDM parameters is 88.24 mm2/min and 1.904μm re- spectively. The predicted MRR and Ra va

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Optimization of Building Wall Parameters for Energy Saving by Anova

Ravindra Naik[1], Nithin Lesley Varghese[2*], Greeshith KV[2], Ranjith KV[2], Vishnu K[2]

[1]Assistant Professor, Department of Mechanical Engineering, YIT, Moodbidri, Karnataka, India

[2]Department of Mechanical Engineering, YIT, Moodbidri, Karnataka, India

ABSTRACT

The extreme heat waves bigger influenced by global climate change have prompted the cooling demand within the building sector. Therefore,thermal comfort in buildings has become a big energy consumption issue. close to wall small setting refers to parameters like wind speed, temperature, ratio, radiation that affects the indoor temperature.Comfortless in indoor temperature is influenced by thickness of the wall and building material that employed in the wall. Thermal Insulation Material (TIM) or Phase-Change Material (PCM) had been usually used to enhance the thermal performance of hollow forge bricks. to realize affordable and effective filling teams of TIM or PCM, whereas the numerical simulation was designed and verified by the experimental knowledge. Results discovered filling TIM and PCM had the various operation mechanisms on rising the thermal behavior of bricks. Filling TIM had principally increased the thermal resistance, whereas using PCM had the additional contribution on rising the thermal inertia.

Keywords–Phase-Change Material, Thermal Insulation Material

I. INTRODUCTION

With the continual worsening of environmental pollution and also the energy crisis, building energy consumption has attracted a lot of attention because the largest terminal energy consumption. as a result of quite hr of warmth energy was lost through building envelopes, the thermal performance of building envelopes was of important importance. Moreover, light-weight materials were extensively utilized to manage the building weight with the event of high-rise and super high-rise buildings, however thermal inertia was reduced clearly and so air-conditioning and heating load fluctuates greatly, that leaded to increasing the urban power consumption crest and so, enlarging the match between energy provide and consumption. Therefore, the traditional building materials couldn't meet each thermal performance demand and also the light-weight construction demand. Therefore, some new materials, together with Thermal Insulation Material (TIM) and Phase-Change Material (PCM), were wide applied within the building engineering. The high insulation performance of TIM may cut back the warmth transfer through building envelopes and thereby, lower the building consumption. TIM contribution was extremely effective to scale back the common heat transfer, however its impact was terribly low on the thermal inertia, that was vital for the high-rise or super high-rise

buildings. PCM became the cheap choice to boost the thermal inertia of envelopes, thanks to thanks to its vital thermal storage capability at a relentless temperature. as an example, beneath identical thickness, the thermal storage capability of PCM was 5–10 times over that of concrete. TIM may cut back the warmth flow by increasing the thermal resistance expeditiously, whereas PCM may regulate the temperature fluctuation and cut back the height heat flow. supported this, to satisfy the thermal inertia demand in high buildings and cut back the energy consumption within the building operation, integration the TIM and PCM at the same time can be thought-about.

II. METHEDOLOGY

WEATHER DATA ANALYSIS

The environmental impact of PCMs may well be bigger than the traditional construction materials, looking on the kind of PCM and climate. The PCM behaviour varies with variable the climate. the advantages of PCM will increase in sites wherever the climate are similar all year on. meteorology but plays a vital role if it's enclosed associated an inaccurate forecast will adversely have an effect on the performance of the building system considerably. Weather predictions even have been with success tested to cut back the electricity consumption of huge buildings likewise as buildings with active thermal storage materials. Weather variables in the main represent close radiation intensity, wind speed, wetness of air, pressure of air, temperature of air etc. Weather info is well out there for any major location within the world within the kind of International Weather Energy Calculation (IWEC).

CHOOSING SUITABLE BRICK MODEL

Bricks are building blocks of a structure. Brick is most extensively used materials of building construction. Bricks are manufactured using a variety of manufacturing techniques which creates different aesthetic effects and performance qualities. Bricks classified according to these applications as facing bricks, engineering bricks, common bricks, hollow bricks etc. Factors which affecting the selection of the brick as colour, type, size, texture, mortar, bond, orientation, materials etc.
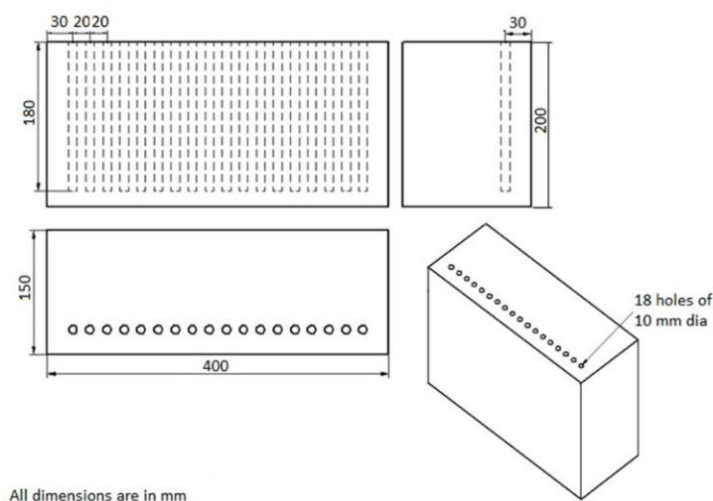
Figure 2.2 (a) Dimensioning of brick model
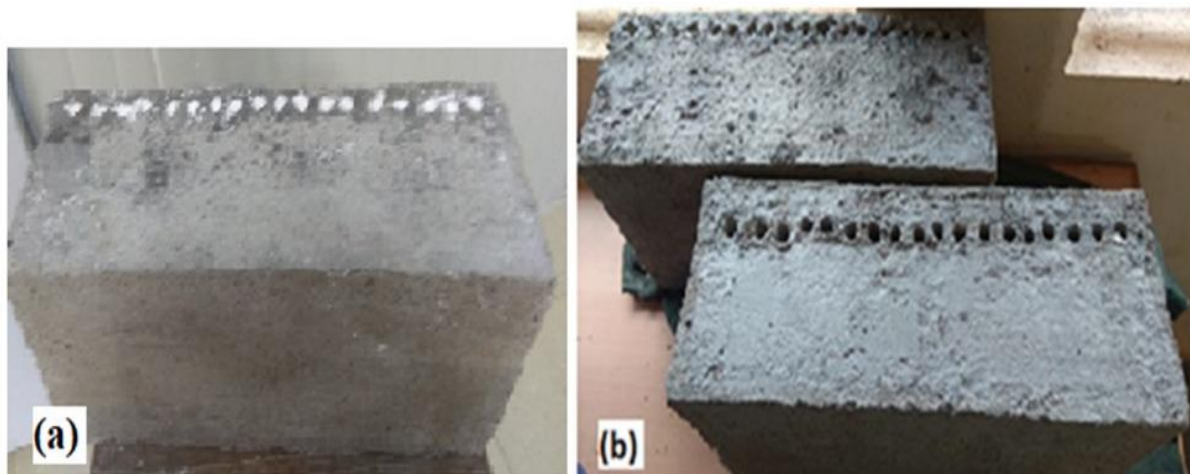
Figure 2.2 (b) Develop brick model for experimentation

PARAMETERS FOR BUILDING PERFORMANCE

There are various parameters which influence the performance characteristic of building. The input parameters which affect the performance of building are Thickness of the brick, Position of PCM layer, Quantity of PCM, Shape of the brick hole, Number of holes used in brick, Diameter of the brick hole etc. The output parameters which influence the building performance are Indoor Temperature and Heat Energy.

OPTIMISATION BY USING ANOVA

The Taguchi method, which is based on the Analysis-of-Variance (ANOVA) approach, is utilized for the analysis and optimisation of building energy parameters. The optimization of building energy saving by using ANOVA system to analyse the reduction of energy consumption. ANOVA method is among suitable method to analyse energy saving with more accurate and simple approach.

III. COMPONENTS USED

The various components used for the experimentation analysis setup of our building wall parameter optimization is shown below.

Fig 3.1. Cement and Sand

Fig 3.2. Helium Lamp

Fig 3.3. Mould and Frame for brick modelling

Fig 3.4. Phase Change Material

IV. OBJECTIVES

TO DEVELOP BRICK MODEL FOR THE EXPERIMENTATION

Develop the model of brick with appropriate dimensions and orientations for the experimental analysis. Bricks are manufactured using a variety of manufacturing techniques which creates different aesthetic effects and

performance qualities. According to their quality, standards and applications bricks are classified as facing bricks, engineering bricks, common bricks, hollow bricks etc. Factors which influencing the selection of the brick as colour, type, size, texture, mortar, bond, orientation, materials etc.

TO DECIDE THE PROCESS PARAMETERS FOR BUILDING ENERGY

Decide the convenient parameters which influencing the optimization of building energy. There are various parameters which influence the performance characteristic of building. The input parameters which affect the performance of building are Thickness of the brick, Position of PCM layer, Quantity of PCM, Shape of the brick hole etc. The output parameters which influence the building performance are Indoor Temperature and Heat Energy.

TO INVESTIGATE THE EFFECT OF PROCESS PARAMETERS ON THE BASIS OF TEMPRATURE AND MULTI RESPONSE

Conduct the experimental and software analysis of process parameters such as Thickness of the brick, Position of PCM layer, Quantity of PCM, Shape of the brick hole on the basis of minimum indoor temperature and heat energy.

OPTIMISATION OF PROCESS PARAMETERS USING GRA

Multi Optimization of parameters should be done through GRA software.

V. CONCLUSION AND FUTURE SCOPE

The use of phase change materials in Thermal Energy storage (TES) is well known. By incorporating the PCM in building envelope improves thermal comfort of the inside room and also it increases the energy efficiency of the building. If the thermal mass of the building wall is low, the PCM encapsulation will help to reduce the temperature fluctuations. In this analysis it is proved that, by applying a PCM in various position of the brick, the inside wall temperature gets reduced . This method is very effective in case of high rise buildings, where a considerable amount of cooling load is entered through wall.

This method also helps to shifts the peak temperature time. But during the cooling cycle of the PCM, there is a chance to release the heat into the interior space. This can be avoided by offsetting the PCM application distance towards the exterior side.

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Effect of Cryogenic Ball Burnishing Parameters on Mechanical Properties of Mg-4Zn-2Sr- A Review

Akshay[1], Shravan[1], Suhas[1], Sumanth[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

Metallic materials are used as biomaterials to help in the repair or replacement of sick or damaged bone tissue. Metallic materials have a high mechanical strength and fracture toughness combination. The Cryogenic Ball burnishing process can improve the surface characteristics of magnesium alloys. Mg-4Zn-2Sr cast alloys are homogenised at 320°C for 24 hours before being burnished with a cryogenic ball. The impacts of changing ball burnishing process parameters such depth of press, number of passes, and feed rate on surface roughness and micro hardness were examined. For number of passes: 1, depth of press: 1 mm, and feed rate: 750 mm/min, a surface roughness of 1.853 m was produced. The micro hardness of the material was 78 HV.

Keywords— Cryogenic ball burnishing,Microhardness,Surface roughness

I. INTRODUCTION

One of the most promising topics in biomedical engineering is the research and development of new orthopaedic implants. Mg alloys, which are biodegradable and biocompatible, are being considered as an alternative to permanent metallic implants. Mg alloys have a serious difficulty with fast corrosion in human body fluid—the implant degrades quickly and loses mechanical integrity before the bone heals completely[2]. The question today is how to solve this problem with magnesium alloys. One solution is to alter the characteristics of Mg alloys by modifying their composition and microstructure [3,4]. Furthermore, while the experimental approach is critical, computational techniques are required to build the underlying knowledge and forecast process characteristics in a shorter time frame.

II. METHODOLOGY

A. Casting of Mg alloy

High grade magnesium (99.9 wt. percent) ingots, zinc (99.9 wt. percent), and strontium (>99.2 wt. percent) granules were used to cast Mg–9Al-1Zn binary alloys with various amounts of Zn (4 wt. percent). In an electrical resistance furnace, melting was carried out at 750–800 °C under 99 percent CO_2 control, with mechanical agitation carried out throughout the process to eliminate impurities in the molten [6].

B.   Homogenization

Homogenization is a type of heat treatment. Heat treatments can be used to homogenise cast metal alloys to increase their hot workability, soften metals before, during, and after hot and cold processing processes, or change their microstructure to achieve the appropriate mechanical properties. In this project, the cast samples are homogenised in an electric furnace for 24 hours at 320degree celcius. Intermetallic phases in the alloys are dissolved during the homogenization operation, and the alloy is compositionally homogenised. [6].

C.   Cryogenic ball burnishing process

Burnishing is becoming more popular as a finishing technique because it delivers additional benefits such enhanced surface hardness, fatigue strength, and wear resistance. To get a nice surface roughness, burnishing is widely utilised. In a FANUC CNC milling machine, cryogenic ball burnishing was performed utilising liquid nitrogen as a lubricant. The substance was maintained in a container that was submerged in 200 mL liquid nitrogen. The temperature was measured with an infrared thermometer at the beginning and completion of the milling operation. Mg-4Zn-2Sr alloys with a diameter of 10 mm and a length of 180 mm were employed in this experiment. The samples are then trimmed to a 5 mm length. [7,8]

D.   Micro Hardness Test

With a maximum test weight of 50 kilogrammes, the Vickers hardness test can be done on both micro and macro sizes. Using a square-based diamond pyramid indenter to provide regulated pressure for a set amount of time. Under a microscope, the diagonal of the resulting indention is measured, and this measurement, along with the test load, is utilised in a formula to obtain the Vickers hardness value. The Omni-tech micro hardness machine will be used to conduct Vickers hardness tests on homogenised and PVD coated Mg-1 percent Zn alloy samples. [9]

E.   Microstructure

Microstructural analysis of cast and ball burnished samples was performed to investigate dimensional changes, bonding quality, and grain refinement. Acrylic powder and resins were used to cold mount metallographic specimens. The specimens were polished up to 2000 grit SiC paper, and the final polishing was done with 0.25 m diamond paste and a towel. To visualise grain boundaries for microstructure investigation, chemical etching was used. Polished samples were etched in an acetic-picral solution (3 ml picric acid, 70 ml ethanol, 20 ml glacial acetic acid, and 20 ml distilled water) and dried in hot air. [10,11].

III. RESULTS AND DISCUSSION

Microstructure

The optical microstructure of homogenised sample and ball burnished Mg-4Zn-2Sr sample was obtained at 1 mm depth of press, 750 mm/min feed rate, and 1 pass. The microstructure of a homogenised Mg-4Zn-2Sr alloy with an average grain size of 266m is shown in Figure (a). Figure (b) illustrates the microstructure of the

cryogenic ball burnished sample, which displayed fine grain structure due to grain refinement during the cryogenic ball burnishing process. [12,13]
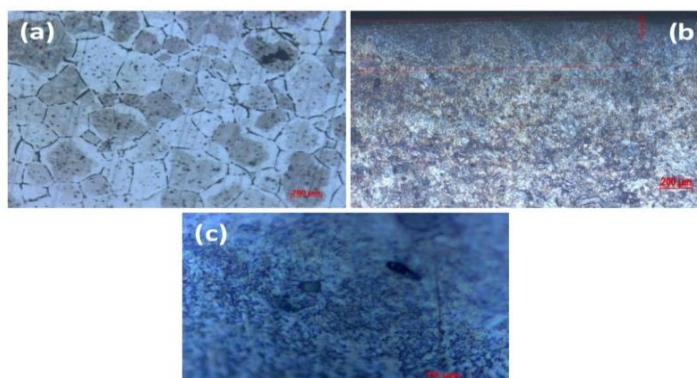
Fig.1 Optical microstructure

Micro Hardness

The micro hardness of the cast Mg-4Zn-2Sr sample was 58 HV, while the micro hardness of the homogenised sample was 54 HV. After Cryogenic Ball burnishing for a depth of cut of 0.6 mm, number of passes 1, and feed rate of 750 mm/min, the material's micro hardness increased to 67 HV, which can be attributed to material strain. For a depth of cut of 1 mm, number of passes 1, and a feed rate of 750 mm/min, the micro hardness increased to 78 HV, which can be attributed to the combined effect of strain hardening and grain refining. [13,14].

Table -1Micro Hardness values

Experiment no	Depth of press (mm)	Feed Rate (mm/min)	Number of passes	Micro hardness (HV)	Sample code
As cast				58	-
Homogenized				54	-
1	0.6	750	1	67	DFN-671
2	0.8	750	1	73	DFN-871
3	1	750	1	78	DFN-171
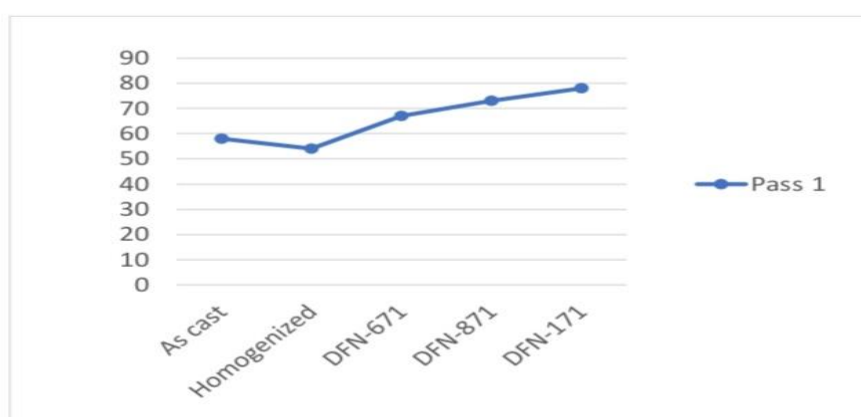
Fig-1Micro Hardness VS Ball burnished samples

Surface Roughness

Table-2 Surface Roughnessvalues

Sample	Depth of Press (mm)	Feed Rate (mm/min)	Number of pass	Surface roughness (µm)
Homogenized Mg-4Zn-2Sr alloy				3.376
A	0.6	750	1	2.470
B	0.8	750	1	2.185
C	1	750	1	1.853
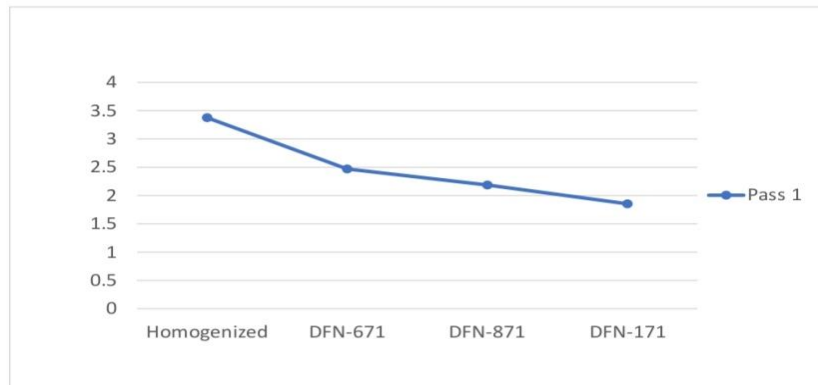
Figure 2: Surface roughness vs. material graph

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A Review on Effect of Process Parameters in CNC Milling of Al7075/WC MMC

Ashuthosh acharya[1], Abdul Rafih[1], Mohammed Shabeer[1], Mohammed Raisuddin[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

Surface finish and material removal rate are two essential manufacturing characteristics that influence product acceptability, which has an impact on the company's profitability. Many studies have looked at the factors that influence the Surface finish and material removal rate during the CNC milling process for Al7075 strengthened with different weight percent of reinforcments. The influence of cutting parameters such as cutting speed, feed rate, and depth of cut on surface roughness and material removal rate was investigated using design of experiments. The DOE techniques like Taguchi, Full Factorial, Response Surface Methodology etc were utilised to describe the primary factors that affect surface roughness and material removal rate using the results of the machining operations. The response surface methodology (RSM) is a useful approach for resilient design since it provides a simple and systematic qualitative optimal design at a cheap cost. RSMand DOE approach used by various researchers to analyse the effect of process parameters such as cutting speed, feed, and depth of cut on Surface Roughness and MRR of Al7075 MMC while machining with various tools, and to obtain an optimal setting of these parameters that may result in good surface finish and MRR is discussed in this paper.

Keywords—Surface Roughness,MRR-material removal rate,CNC-computer numerical control,DOE-design of experimentsMMC- Metal Matrix Composite

I. INTRODUCTION

Optimization of process parameters in milling of Al7075 MMC's have been researched and reported by several scholars in recent years. In milling of Al7075-MMC with WC as reinforcing element, the influence of process parameters on metal removal rate and surface roughness was examined. [1]. In three level response surface approaches utilised for experimentation, cutting speed, feed, and depth of cut were used as input elements. The experiement was designed using MINI-TAB17.Since max MRR and min SR is acceptable, the optimal values of MRR and SR was investigated using the same tool. The major goal of the research was to determine the ideal cutting parameters for machining AL MMC-WC reinforcement in order to produce minimal surface roughness and maximum MRR. A mathematical model was constructed using experimental data, and the developed models were verified for adequacy.

II. METHODOLOGY

A. Design of Experiments

DOE was created using a central composite response surface design process. The mathematical model shows the relationship between the response factors (S.F. and MRR) and the input variables (cutting parameters). Some cutting parameters were changed. Table 1 shows the cutting settings and process response factor.

	Level 1	Level 2	Level 3
Feed (mm/min)	10	15	20
Speed (rpm)	1000	1500	2000
Depth of cut (mm)	0.75	1.50	2.25
Composition (%)	5	10	15

Work material:an Al-WC graphite hybrid composite material was employed. The work piece measured 38x18x5 mm in size.

Tool and equipment: For experimentation, the CNC XLMILL was used.

Figure1 CNC xl mill

Figure 2 CNC cutting tool with holder

<div align="center">TABLE NO.3: Design of experiments</div>

S.NO	%comp	Speed	FR	DC	MRR	S R
1	5	1000	10	0.75	45	1.3
2	15	1000	10	0.75	45	3.02
3	5	2000	10	0.75	45	3.69
4	15	2000	10	0.75	45	2.71
5	5	1000	20	0.75	90	2.72
6	15	1000	20	0.75	90	4.16
7	5	2000	20	0.75	90	1.81
8	15	2000	20	0.75	90	4.64
9	5	1000	10	2.25	270	8.18
10	15	1000	10	2.25	135	3.51
11	5	2000	10	2.25	135	6.52
12	15	2000	10	2.25	135	2.93
13	5	1000	20	2.25	270	3.1
14	15	1000	20	2.25	270	3.75
15	5	2000	20	2.25	270	4.23
16	15	2000	20	2.25	270	4.38
17	5	1500	15	1.5	135	4.89
18	15	1500	15	1.5	135	3.54
19	10	1000	15	1.5	135	10.08
20	10	2000	15	1.5	135	3.7
21	10	1500	10	1.5	90	8.47
22	10	1500	20	1.5	130	3.77
23	10	1500	15	0.75	67.5	2.3
24	10	1500	15	2.25	202.5	7.2
25	10	1500	15	1.5	135	4.53
26	10	1500	15	1.5	135	4.53
27	10	1500	15	1.5	135	4.53

figure 3 with out machining

Figure 4 with machining

Figure 5 rougness tester

Analysis of Process Factor

The response surface methodology is a frequently used tool in the quality engineering area. RSM's mathematical and statistical techniques make extensive use of analysis of variances, which results in an appropriate model and response optimization. Several variables influence response in this process. The fundamental goal of RSM is to predict and optimise response by determining and solving multivariable equations from experimental data. A regression of response model equation is a multi variable equation. The fit

variable coefficients from the analysis of variance produce the model summary regd, which generates the response regression equation. We obtain the values of minimum variances and response optimization as a result of our findings.

Assume that the response Y and the independent variables (x1, x2,.... xn) are in a general relationship.

Y = f(x1, x2 … .. xn) + s (1)

Where Y=predict response and s=statistical error, it is frequently assumed that s has a normal distribution with mean 0 and variance o2.

E(y) = Y = E[(x1, x2,..... xn] + E(s) = (x1, x2,..... xn) (2)

A reaction surface is what it's called. The equation above establishes a link between the mean value of a random variable and the values of one or more independent variables. i.e. a mathematical model created with RSM.

III. ANALYSIS OF ANOVA TABLE

TABLENO.4:RS Regression: S.R Vs %comp, Speed, FR, DC

SOURCE	Adj SS	Adj MS	F-Value	P-Value
Model	67.397	4.8141	1.31	0.321
Linear	22.581	5.6453	1.54	0.253
%comp	0.802	0.8022	0.22	0.648
Speed	1.508	1.5080	0.41	0.533
FR	3.354	3.3540	0.92	0.358
DC	16.917	16.9168	4.62	0.053
Square	20.439	5.1098	1.39	0.294
%comp*%comp	7.226	7.2256	1.97	0.186
speed*speed	2.565	2.5648	0.70	0.419
FR*FR	0.134	0.1345	0.04	0.851
DC*DC	3.349	3.3494	0.91	0.358
2-Way Interaction	24.376	4.0627	1.11	0.412
%comp*speed	0.033	0.0333	0.01	0.926
%comp*FR	9.907	9.9068	2.70	0.126
%comp*DC	9.719	9.7188	2.65	0.129
speed*FR	0.139	0.1388	0.04	0.849
speed*DC	0.284	0.2836	0.08	0.786
FR*DC	4.295	4.2953	1.17	0.300

TABLE NO.5:RS Regression: MRR Vs %comp, speed, FR, DC

SOURCE	Adj SS	Adj MS	F-Value	P-Value
Model	135736	9695	17.15	0.000
Linear	124976	31244	55.27	0.000
%comp	1013	1013	1.79	0.206
Speed	1013	1013	1.79	0.206
FR	21701	21701	38.39	0.000
DC	101250	101250	179.11	0.000
Square	1901	475	0.84	0.526
%comp*%comp	252	252	0.45	0.517
speed*speed	252	252	0.45	0.517
FR*FR	586	586	1.04	0.329
DC*DC	252	252	0.45	0.517
2-Way Interaction	8859	1477	2.61	0.074
%comp*speed	1139	1139	2.01	0.181
%comp*FR	1139	1139	2.01	0.181
%comp*DC	1139	1139	2.01	0.181
speed*FR	1139	1139	2.01	0.181
speed*DC	1139	1139	2.01	0.181
FR*DC	3164	3164	5.60	0.036

This model shows how response and process parameters are related. As a result, determining and optimising the machining process is simple. That model was created through milling trials with various process settings. Model equation derived in RSM is displayed below.

TABLE No.6: Model Summery

	R-sq	R-sq(adj)
SR	0.5851	0.1444
MRR	0.9524	0.8969

S R = 4.1 + 1.17 %comp - 0.0124 speed - 0.52 FR + 12.06 DC - 0.0671 %comp*%comp+ 0.000004 speed* speed + 0.0091 FR*FR - 2.03 DC*DC - 0.000018 %comp*speed+ 0.0315 %comp*FR - 0.208 %comp*DC + 0.000037 C speed*FR - 0.00035 speed*DC- 0.138 FR*DC

MRR = 122 - 16.2 %comp - 0.185 speed + 11.0 FR + 47.2 DC + 0.396 %comp*%comp+ 0.000040 speed* speed - 0.604 FR*FR + 17.6 DC*DC + 0.00338 %comp* speed+ 0.338 %comp*FR - 2.25 %comp*DC + 0.00338 speed*FR - 0.0225 speed*DC+ 3.75 FR*DC

TABLE NO.7: COMPARISONS BETWEEN EXPERIMENTAL AND PRIDICTED VALUE

	EXP N01	EXP NO2	EXP NO3	Avg value
SR	1.134	1.29	3.1	1.84
MRR	51.1335	203.293	553.77	269.3995

IV. RESULT AND DISSCUSSION
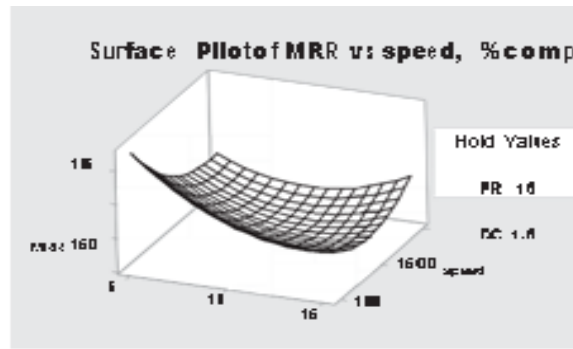
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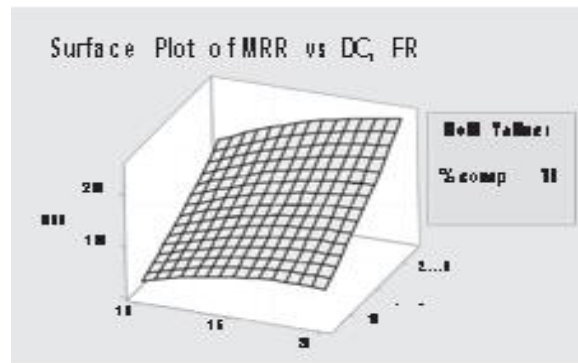
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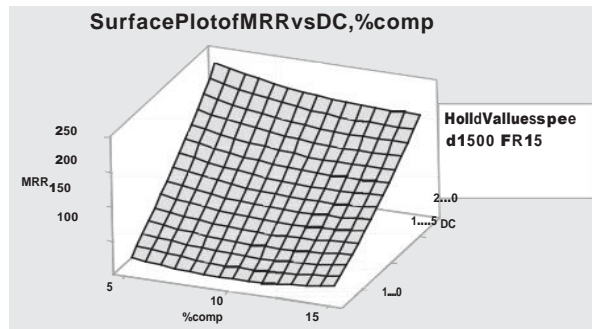
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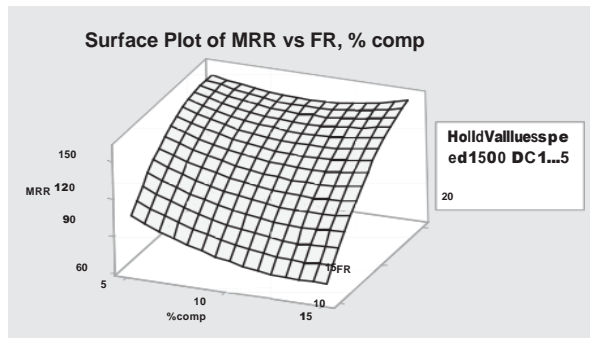
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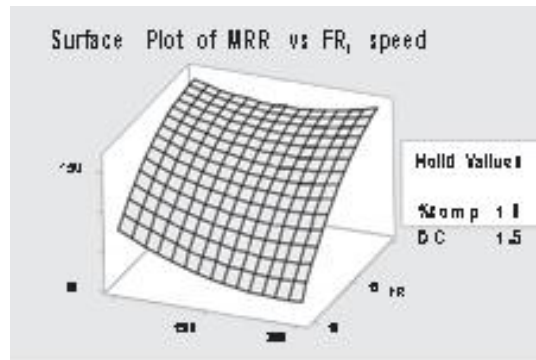
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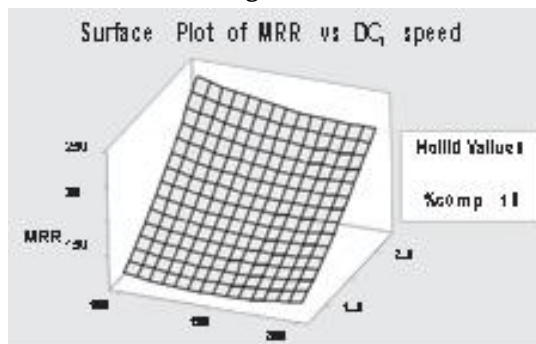
Figure 11

Three input factors and two outputs were used in the tests. In terms of the effect of cutting parameters on response factors, fig. 6 shows that the mrr is lower at low speeds and has a lower composition due to the specimen's ductility. However, due to the specimen's brittleness, mrr gradually increases as percent wc and speed increase. Mrr steadily increases as the depth of cut and feed rate increase, as seen in fig. 7. Mrr increases as the depth of cut increases, however due to the brittleness of the material, mrr increases as the composition of wc increases. Figure 9 illustrates the same concept. Mrr is heavily influenced by feed (fig. 10)
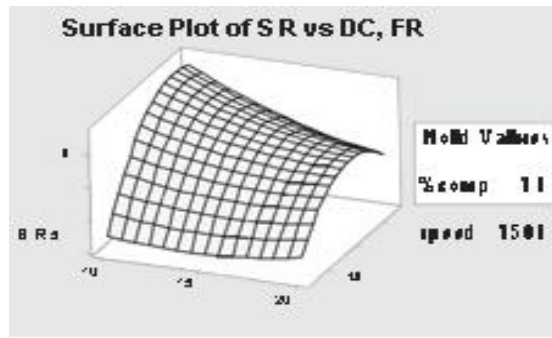
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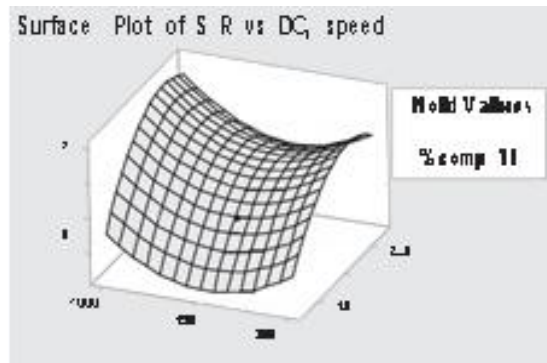
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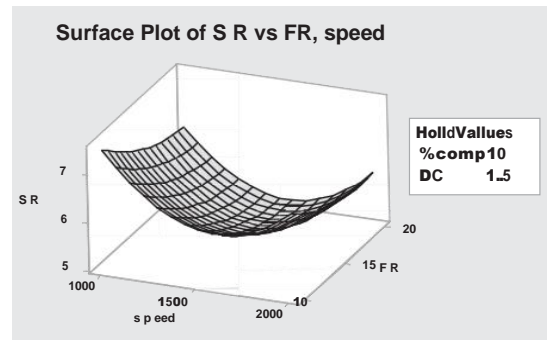
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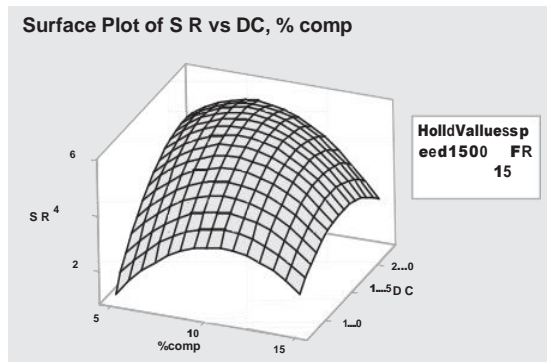
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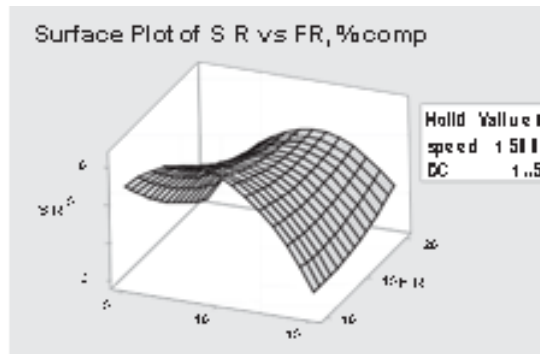
Figure 16
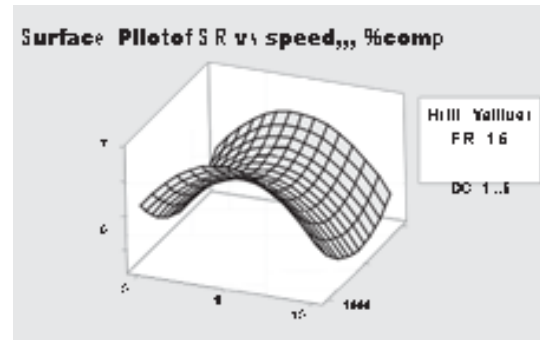
Figure 17

S.R. is also affected by input factors like as speed, feed, and cut depth. However, aside from the speed and depth of cut, the AL MMC-WC mix has a greater impact on S.R. However, as shown in the figures, S.R is influenced by two parameters, with depth of cut having a greater influence than feed rate. Figure 13 demonstrates that at an average speed of 1500, the S.R will be better than the others. In this case, the speed has a greater impact on S.R. Figure 14 shows that the preceding two figures once again demonstrate that a higher speed produces a superior surface quality and that speed is more important than feed rate. Figure 15 shows how the S.R rose in all compositions up to a particular point.

V. CONCLUSION

The goal of their study was to determine a set of optimum values for reducing surface roughness using RSM while taking into account the control parameters for AL7075 MMC-WC composite materials. The microstructure and mechanical properties demonstrate that as the reinforcing percentage increases, the hardness increases. At low percentages of tungsten carbide, the material is ductile, but at larger percentages of tungsten carbide, it becomes brittle, and chip formation demonstrates this feature. Surface roughness is influenced by feed, speed, and depth of cut to a certain extent, although it is mostly determined by speed and depth of cut. However, the impact of input factors on MRR is nearly linear under all circumstances. This paper will be extended by opmization and SEM analysis in the future.

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Solar Desalination Using Fresnel lens

G Sujaykumar[1], Harshith Ameen[1], Noor Mohammed[1], Mohammed Noushad[1], Abdul Rameen Nasir[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

The purpose of this research work is to develop a salt water desalination unit that could efficiently produce potable water by evaporation and condensation; integrated with a Fresnel lens solar concentrator. The experimental setup consists of a glass tray powered with a Fresnel lens concentrator for pre-heating the water and a desalination unit. And application of IOT to supply water to the desalination unit.

Keywords— solar energy, solar desalination, sensors, Fresnel lens

I. INTRODUCTION

Clean water is very important because the human body is composed principally of water which comprises about 60% of the body weight. Humans need to drink an average of 2.5 liters of potable water per day in order to prevent dehydration. Without fresh water, human life is not possible, but 97% of the water on the earth's surface is saline in nature. The remaining small percentage of freshwater is available in the ground water, lakes and rivers, which are used to satisfy the needs of living beings. Solar desalination is the process that involves evaporation of a saline solution utilizing solar power, either directly or indirectly, followed by condensation of the generated vapor .This process is a simple technique to produce fresh water from salt water. This process is described as similar to a naturally occurring hydrological cycle, where the formation of the vapors from surface of liquids gets transported by wind to buildup and precipitate, and in the case of solar stills, vapors condensate on the colder surfaces inside the still. Solar stills are basic devices that use the concept of a greenhouse by trapping heat during solar exposure and in turn, heats the stored feed water within the device and increases its evaporation rate. Solar irradiation enters the still through a transparent cover underneath which the feed water is stored. Upon striking the basin, the radiation is mostly absorbed by the basin. From the heated surface, infra-red electromagnetic waves are emitted and get trapped by the transparent cover, giving rise to the temperature within the system. However, the water quantity obtained from solar stills is not as high as its quality. The most affecting parameters on the still productivity and efficiency include the location, available solar intensity, ambient temperature, material and thickness of the glass cover, water depth in the basin, and the wind velocity. The geometrical dimension of a solar still plays an important role in the efficiency of the system. A direct correlation between still height, length, width, and distillate production was tested on conventional single slope solar still. The height of the basin wall was found to have a negative relationship with

production, In other words, lower water depth would give a higher yield of distillate. A linear decrement in productivity was found with increasing water depth. In the case of distillate production, glass cover gave the highest yield among other materials, compared to plastic sheet and Polyethylene terephthalate. An 18% reduction in yield was reported when plastic is used instead of glass.

WORKING PRINCIPLE OF THE SOLAR STILL

Solar still is among the simplest form of solar desalination process which consists of a basin containing salt water. The basin is covered with an inclined glass through which the heat enters and generates vapor from the salt water due to the partial pressure between the basin and the inclined glass lid. The generated vapor is collected as distillate. Bellow shows the process for a still with double slope. It is selected in the design to optimize the availability of solar irradiation throughout the day, without the rotation of glass lid according to sun's travel path. Fresnel lens is used on the top of the glass lid to get more evaporation than the normal glass.IOTs are used to verify the temperature and humidity according to time.

II. MATERIAL SELECTION

The aim of this study is to benefit people with resource scarcity in coastal regions where clean water is limited. Therefore, the selection of cheaper material and easy design have given priority during fabrication .the body of set up is made by glass because it provides higher condensation .aluminum frame is provided at the outer surface of glass to hold the glass .

In the selection between linear and radial Fresnel lens, the different focusing profile of both types of lenses is the key point. For the radial Fresnel lens, the ring shaped focusing surfaces slant to face a center point, with each ring placed concentric to each other. The radial Fresnel lens can achieve a sunlight concentration ratio 3.9 times higher than that of the linear lens with a much smaller receiving area. The Fresnel lenses used in this experiment were made of polymethyl methacrylate (PMMA).

III. EXPERIMENTAL SETUP

A double sloped solar still with a acrylic glass basin size of 80x60x50cm was constructed. This model has been tested with Fresnel lenses on the slope. A frame was constructed to hold the Fresnel lenses parallel to the the top covers, where the focal points of the lenses fall onto the saline water stored in the steel basin during solar irradiation. Saline solution was fed in to the model. The solar still was lifted from the ground by using bricks.
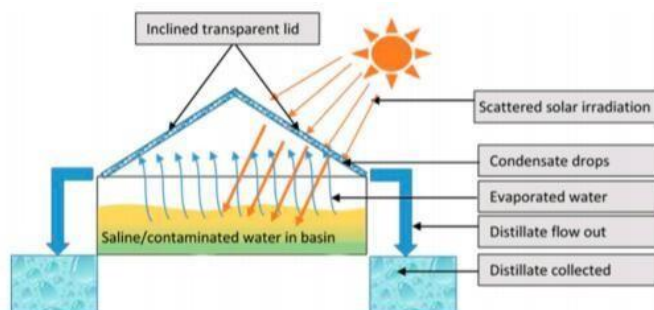
WORKING PRINCIPLE OF A DOUBLE-SLOPED SOLAR STILL[1].

IV. NEEDS FOR THE DESALINATION

Solar desalination consists of the evaporation of a saline solution using solar power, either directly or indirectly, followed by condensation of the vapor generated. In other words, solar distillation is a combination of humidification and dehumidification that is powered by solar energy According to the study, this process is similar to a naturally occurring hydrological cycle. The vapors form on the surface of liquids and are transported by wind to build up and precipitate, and in solar stills, vapors condense on the colder surfaces within the still A conventional solar still is a basic device that uses the principle of a greenhouse by trapping heat during solar exposure, which heats the stored feed water within the device, leading to increased evaporation. Solar radiation enters the still through a transparent cover underneath which the feed water is stored. The basin absorbs most of the radiation that strikes it [1].

Adequate quality and reliability of drinking water supply are fundamental needs. Without fresh water, human life is not possible. Water is one of the most abundant natural resources on earth, covering about three-fourths of its surface. Unfortunately, 97% of the water on the earth's surface is saline in nature. The remaining small percentage of freshwater is available in the ground water, lakes and rivers, which are used to satisfy the needs of living beings. Oceans are the infinite sources of saline water. Salinity can be eliminated by the process of desalination. The separation of salts from sea water requires a huge amount of energy by burning of fossil fuels and can cause harm to the environment. This pollution can be avoided to a large extent by the use of environmental friendly techniques for desalinating the seawater. In conventional process, desalination used fossil fuel as the thermal source for heating but due to rapid decrease in the fuel availability it is necessary to go with the renewable energy for desalination process [7]. a variety of technologies were inverted for desalination from time to time and it has been accepted by people without a thought to environmental consequences. Desalination is the oldest technology for purifying water in the world. The use of desalination for water purification is among the oldest technologies in the world. Different technologies have been devised for desalination and have been accepted by people without knowing possible consequences. people have been desalination water for hundreds of years. While various technologies for desalination were invented from time to time, most people have accepted them without knowing future environmental consequences[12].

V. CONCLUSION

In this paper, we have gone through solar energy in desalination process, it is one of the best applications of renewable energy. Fresnel lens offers a simpler and cheaper method for concentrating solar energy that can be used for pre- heating water. The experimental observations of the behavior of the Fresnel lens concentrator alone as pre-heater device can improve the performance of desalination system.

1.   Fresnel lens increases the total production from a solar still.

2.   Using multiple Fresnel lenses instead of a single one provides multiple hotspots and causes more evaporation of feedwater,thus leading to higher total production per total solar irradiation by 39%.

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Repetitive Corrugation and Straightening of Aluminium Alloy Sheet Metal

Deekshith B V[1], Dishanth[1], Nagaraj Bhat[1], Sudesh Prabhu[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

The repetitive corrugation and straightening process is a severe plastic deformation technique that is particularly suited to process metallic sheets. With this technique, it is possible to develop nano/ultrafine-grained structured materials, and therefore, to improve some mechanical properties such as the yield strength, ultimate tensile strength, and fatigue lifetime. In this study, aluminium alloy was subjected to the repetitive corrugation and straightening process. A new corrugation die design was proposed in order to promote a heterogeneous deformation into the metallic sheet. Uniaxial tensile tests showed a significant increase in yield strength as the number of repetitive corrugation and straightening passes increased.

Keywords— Yield strength, Tensile strength, Ultrafine-grained structure

I. INTRODUCTION

The 6xxx series alloys are mainly used in the aircraft and automotive industry due to the good balance between mechanical strength, corrosion properties, and density. The main mechanism for improving the strength of this alloy has been by precipitation hardening [1], but more recently, an alternative way of enhancing the mechanical properties is through the production of an ultrafine grain structure by severe plastic deformation (SPD). Currently, different SPD processes attain a considerable grain refinement, such as equal channel angular pressing (ECAP), high-pressure torsion (HPT), accumulative roll bonding (ARB), repetitive corrugation and straightening (RCS), and constrained groove pressing (CGP) [2–5]. The ARB, CGP, and RCS are designed for manufacturing sheet-shape ultrafine-grain materials. The CGP and RCS techniques consist in bending and straightening the workpiece without a significant change in the cross-section, the main difference between these techniques is that in the CGP, the dies are designed to constrain the elongation in the transversal or width directions during the pressing, while in the RCS any constraint is permitted. Several Cu and some Al alloys have been processed by RCS, showing an improvement on the mechanical properties due to the grain refinement [7].

II. METHODOLOGY

A. Material

Commercial Al-6083 sheets of 2mm in thickness were cut with the following dimensions: 120mm*20 mm.Aluminium alloy is most regularly known as auxiliary compound this aluminum alloy is most usually utilized for machining.

B. Die design

The material used to design the die is En9 steel of dimensions are 120mm*20mm thickness.Two dies were designed with the above dimension Two of the dyes are grooved, while the other two are defined as smooth. The grooved dye has a semi-circular dye that measures 6mm in diameter. This allows us to bend the material with the grooved dye and flatten it for several passes with the flat dye with the flat dye.
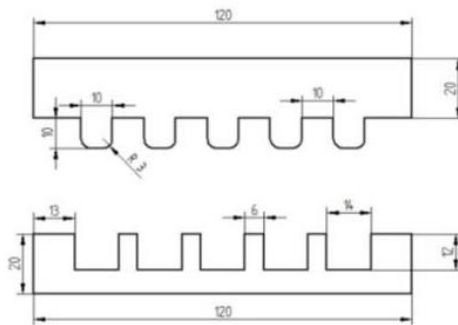
Fig 1. Die dimension

C. Repetitive corrugation and straightening process

The Al-6083 alloy was directly cut in the dimension and placed directly between the die and the die was placed in the UTM machine and load of 10KN was applied on the die.The corrugation was observed on the specimen.After this specimen was placed under the flat die and load of 50KN was applied to get the flat surface of the specimen.This corrugation and straightening is considered as one cycle.Above process for the specimen was repeated for 10 cycles.After each cycle specimen was rotated into 180.

D. Specimen preparation and testing

The specimen after the RCS process is cut into required ASTM E8 standard for the testing of tensile test.

Fig 2.Specimen prepared using ASTM standard

E. Tensile test

Tensile tests were performed using the UTM[Model-Tecsol- TSI-BDS-20KN]. Tensile tests are one of mechanical testing's most basic and commonly utilised kinds. Tensile tests include the application of the tensile force on a material and measurement of the reaction of the specimen to stress. Tensile tests show how powerful a material is and how far it can be stretched.

Fig 3.UTM machine of 20KN

F. Microhardness test

Al-6083 steel microstructural characterization with optical microscope. Vickers microhardness[VHN/KHN MODEL-Tecsol- HT 1000AD] maps were carried out with a load of 100 g and a holding time of 10s.The specimen were mechanically grounded and polished until mirror-finish prior to measurement.
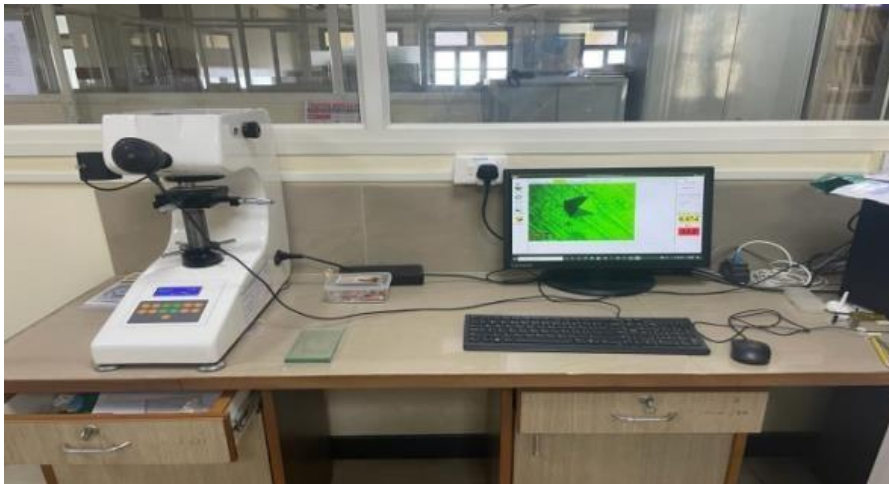
III. RESULTS AND DISCUSSION

Tensile test

Tensile tests were performed using the UTM[Model-Tecsol- TSI-BDS-20KN]. The gauge length and width of the given specimen is 32mm and 10mm respectively. The thickness of the material is 2mm.
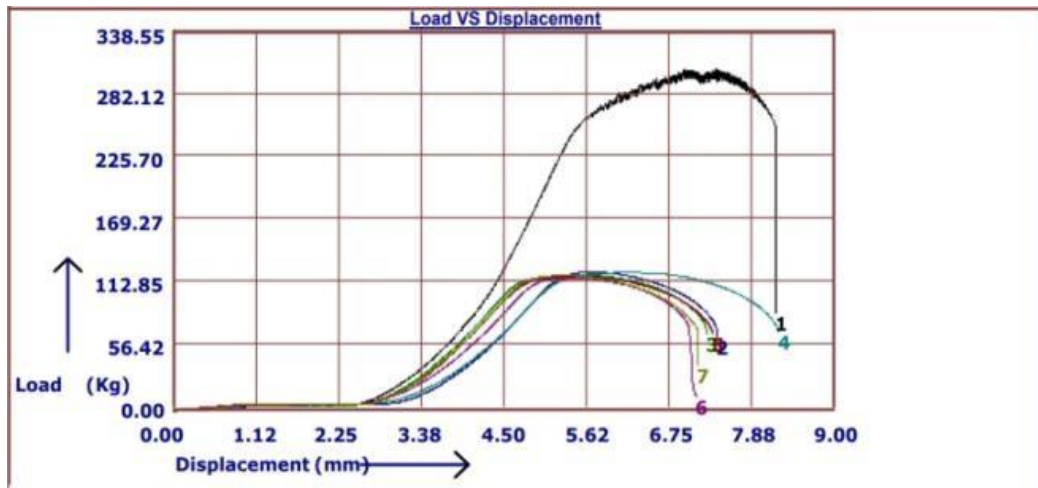
Fig 4. Load v/s displacement chart

Specimen	Diameter/ Width (mm)	Thickness (mm)	Length (mm)	Load (Kg)	Strength (Mpa)	Displacement (mm)	Deformation (%)
C2	6.00	2.00	32.00	307.43	251.24	8.19	25.59
1	6.00	2.00	32.00	125.28	102.38	7.39	23.09
2	6.00	2.00	32.00	122.68	100.26	7.25	22.66
3	6.00	2.00	32.00	124.70	101.91	8.22	25.69
5	6.00	2.00	32.00	121.36	99.18	7.33	22.91
7	6.00	2.00	32.00	119.98	98.05	7.11	22.22
10	6.00	2.00	32.00	122.12	99.80	7.13	22.28

Fig 5. Tensile strength Tabular column

From the above figure 4 the peak strength of the material before RCS process is 251 Mpa and the peak strength of the material after RCS process is 102 Mpa.This shows the decrease in strength of the material.The crosshead speed while doing tensile test was 1mm/s.

Microhardness Test

Vickers microhardness[VHN MODEL-Tecsol-HT 1000AD] maps were carried out with a load of 100 g and a holding time of 10s.

Fig 5. Vickers hardness indentation

Statistical Data Analysis :

Readings :

Indentation Diameter	Vickers Hardness number
0.0477	81.4
0.0484	79.1

Frequency Distribution Graph :

Variation Graph :

Minimum Reading : 79.1

Maximum Reading : 81.4

Arithmetic Median : 80.2

Standard Deviation : 1.2

Tested By :

tecsol
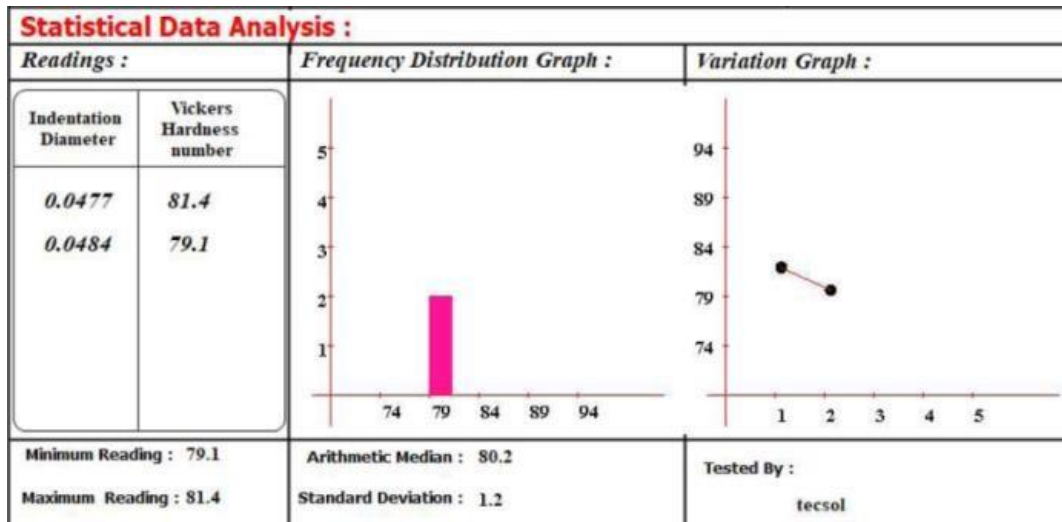
Fig 6.Hardness result of original sample material

Statistical Data Analysis :

Readings :

Indentation Diameter	Vickers Hardness number
0.0738	34

Frequency Distribution Graph :

Variation Graph :

Minimum Reading : 34

Maximum Reading : 34

Arithmetic Median : 34

Standard Deviation : 0

Tested By :

tecsol
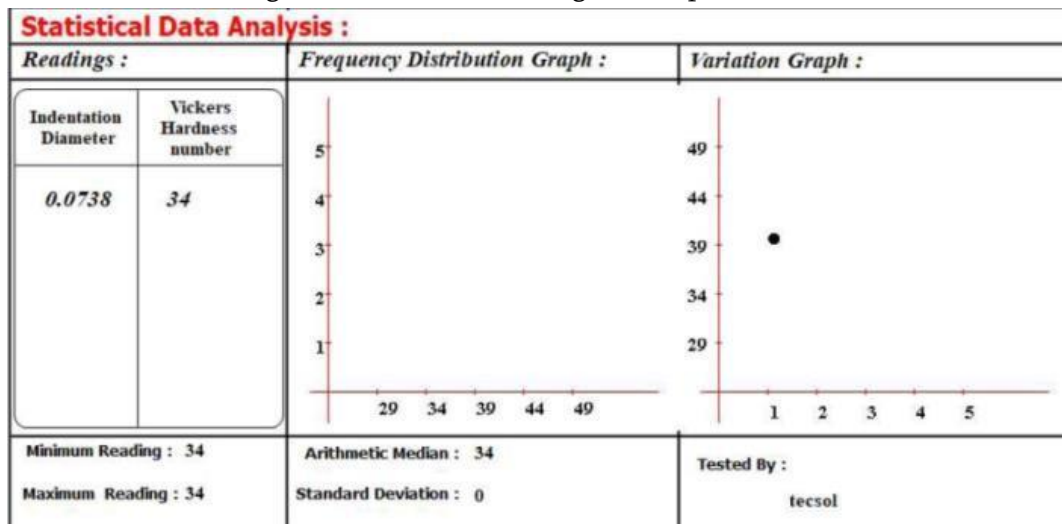
Fig 7.Hardness result of RCS processed sample after ten- cycles

The above figure 6 is the result of microhardness test which shows the Vickers hardness number of 81.4 HV in the material before RCS process and all other different cycle specimen hardness number is at a average of 32 HV. which shows the decrease in hardness of the material.

IV. CONCLUSION

Considering the new corrugation die design proposed in this work, and the resulting microstructure and mechanical properties, the following can be concluded:

The load applied on the die is 10KN hence no fracture occurred till ten cycles.

In the RCS process, the yield strength and hardness of the material should be greater than the original strength and hardness of the material.In this study as the number of cycle increased the yield strength and hardness of material decreased.

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Fabrication of Helical Blade Vertical Axis Wind Turbine

Jibin Thomas[1], Mebin P Thomas[1], Nethen[1], Sharon Herick[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

In an exertion to discover arrangements for worldwide vitality emergency, an examination on a helical vertical blade wind turbine was conducted with the thought of renewables and vitality effectiveness. This experiment was carried out in two steps: the realization of the explanatory calculation of a helical wind turbine control yield which at that point educated the plan and development of the rotor edges. The extend especially pointed to address its utilize as the power supply for private properties or any other places with less perfect economy conditions. The uncomplicated and profoundly open instrument utilizing fundamental materials is to allow individuals to have a reasonable alternative on their possess power production.

Keywords– Helical wind turbine, Blade design, Electricity supply

I. INTRODUCTION

Wind energy could be a clean and limitless energy source broadly utilized as a working liquid for wind ranches for centuries. Be that as it may, it is utilized as an impression of power supply starting in advanced time due to the rise of natural concerns and fuel assets issues. The worldwide request for feasible and renewable vitality has made the need to inquire about and the advancement of modern innovation. Thus, wind energy has been the centre of the industry and has impressively developed its utilization but fair in a large-scale generation. Later, for a long time, the critical build of more proficient, bigger and expensive horizontal hub wind turbines (HAWT) showed up to make inland and seaward wind-turbine fields. This thinking points to creating power on a lower scale by employing a little wind turbine in small arrange to produce a house-hold power supply and construct a cost-effective and open turbine for individuals who require an elective choice to cover their claim power request.This report presents the rotor edge plan, turbine development and the comes about of the experimentation of a helical vertical hub wind turbine These turbines come with a number of particular preferences over the flat ones, and those advantages make this kind of turbine distant better. [1].

II. ANALYTICAL CALCULATION

According to India's air density, d=1.225 kg/m3 and the turbine and generator efficiencies which are about 0.4 and 0.9 respectably, Wind velocity, v = $6.11 \; m/s$

Sweep area A = $2\pi r h + 2\pi r^2$

$$= 2\pi * 0.4 * 1 + 2\pi * 0.4^2$$

$$= 3.51 \; m^2$$

$$p = \frac{\frac{1}{2}(1.225 \; kg/m^3)(3.51 \; m^2)(6.11 \; m/s^3)(0.4)(0.9)}{1000}$$

$$= 0.177 \; kW/h$$

III. BLADE DESIGN

A 3D sketch of the blade design was done on a solid edge.First, the sketch was divided into five parts. Each part had a different twist angle from the top to the base, reaching 180°. The edge structure is based on semicircles which donate the distance across each segment. Such diameters alter as are inexact to edge centre. The structure is symmetrical from the centre to the close but with inverse heading. Once the structure was set up, the blade surface was made by the hurled surface apparatus utilizing splines to portray the edge border. The base has a 0.4 m diameter and a height of 1 m. The top and bottom are separated by one diameter with respect to the axis. The surface was elaborated by glass fibre. A light-weight, strong, and easy-to-work-with material. The turbine has two identical twist blades with a 180° torsion. Both blades are placed facing away from each other to have 360° of sweep area to then be assembled on a 1.5 m steel shaft. The blades collected were carried out by holding the close of each blade on the shaft, base and top of each edge at the same extremes as the other but in inverse headings.

IV. MANUFACTURE

Based on the 3D sketches, an carboard sheet mould for the blades was developed. The mould was used to make glass fibre reinforced plastic (GFRP) and make the blades. For 1 litre of polyester resin, add 15 ml of cobalt. Mix this material thoroughly, being careful to mix the bottom and sides, and not just the middle of the container, using a paint stick. Lay C. S. mat 300 E-B on and spread the resin mixture over it with a disposable paint brush. Work the mat and resin completely until it is covered uniformly. Repeat applying mat and resin until the finished project is as thick as we want.Fibre glass was rolled to make twisting on the shaft easier. Then the blades were set on the shaft, which has two arms where the extremes of each blade were introduced and clamped. The other side of each blade was turned around the shaft and riveted to it, giving the final twist to the rotor. The rotor was set on a bearing to reduce friction and bear high axial loads.
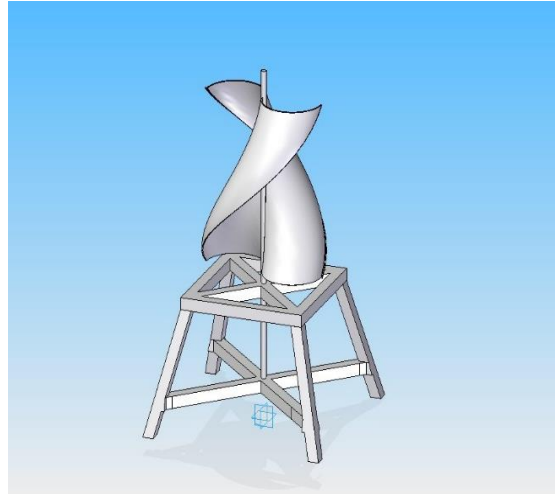
Fig: 3D image of Wind Mill

V. CONCLUSION

A helical vertical pivot wind turbine was built with the reason of covering the power supply for a family with a normal utilization of roughly 1550.52 kW/h per year. A helical vertical pivot wind turbine was built with the reason of covering the power supply for a house-hold with negligible utilization. It was decided that the helical wind turbine may well be a practical elective choice for its use to create cost-competitive vitality. Wind control could be a clean and limitless source of renewable vitality, which has experienced sensational development within the final decade. Considering the included benefits, such as the construction and upkeep costs, turbine estimate and operation necessities, this rotor instrument may be a versatile arrangement, which has a noteworthy extension potential to address the current renewable vitality requests.

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Pneumatic Power Compressed Air Engine with Automatic Air Filling Technique

Timon Abner Lobo[1], Vijith Shekha[1], Mohammed Ali Jawher[1], Sagar Rao[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Humans are continuously on the lookout for more efficient and pollutant-free ways to power their machines.Automobiles use a significant amount of fossil fuels. However, the use of fossil fuels has resulted in a slew of major environmental issues, including global warming, ozone depletion, and fine particulate matter.As a result, non-conventional fuels must be substituted for conventional fuels. Compressed air is one such alternate fuel. Compressed air is an environmentally friendly fuel. Its behaviour is straightforward and safe, and it has no negative impact on the environment. And also a cost free. The recent development of light and robust materials has benefited us in achieving those more straightforward methods. In this study, a four-stroke engine was converted to a two-stroke engine and run on compressed air technology. An inlet-exhaust air route in the engine's cylinder head. The engine is tested for variable timing and duration of valve opening when the cylinder head of the engine is adjusted. The converted compressed air engine is tested using three sets of valve timing. The air pressure employed in this study which was achieved with the use of a compressor. And the pressure of air flow resulting in linear motion of the piston. Finally the modification made in this model eliminate the limitation of limited air storage. The concept and results of the experimental tests described here can be used for further research and procedure modification.

Keywords: Automobiles, Pollution, Efficiency, Compressed air engine, Global warming, Limited air storage.

I. INTRODUCTION

Today fossil fuels are widely used as a source of energy in various fields like power plants, internal combustion engine, external combustion engines, as a heat source in manufacturing industries, etc. But due to limited stock and excessive use, fossil fuels aredepleting at rapid rate.[3] The current scenario of fossil fuel depletion and high gasoline prices has led researchers to look for alternative energy sources to replace fossil fuel. Some have proposed the use of electric motors, hybrid engines.[1] Energy saving and carbon reduction have become critical global challenges in recent decades. Scientists have been looking for ways to limit the use of traditional internal combustion engines (IC engines) and their carbon dioxide emissions.[8] Researchers have investigated different types of green energy engines to see if they can be installed in automobiles as an alternative for traditional IC engines. Electric engines, natural gas engines, and hydrogen engines are all examples. Electric vehicles have been developed and commercialised for decades and are the most popular green energy source.

Slow battery recharging and a hefty battery weight, on the other hand, are major concerns with electric vehicles. However, both hydrogen and natural gas engines can be employed in automobiles. A compressed air vehicle is one that has a compressed air-powered motor. Engineers are focusing their efforts on using air as a source of energy to power the light utility vehicle. It is a method that is not only effective and straightforward, but also cost-effective Compressed air is used to power the engine in a compressed air powered vehicle. Vehicles that run on compressed air have no emissions. Because air is used as a fuel and exhaust is also in the form of air, this is true. As a result, these vehicles emit no CO, NOx, hydrocarbons, soot, or other pollutants, and so do not harm the environment. As a result, a compressed air-powered vehicle might be the environmentally friendly transportation of the twenty-first century.[2]-[5] A compressed-air engine is a pneumatic actuator that expands compressed air and converts potential energy into motion to produce practical work. A pneumatic actuator is an energy-to-motion mechanism. Depending on the type of actuator, the motion can be rotary or linear. Compressed air is used to power compressed air engines, which is held at a high pressure of roughly 30 MPa in a tank. The difference between a compressed air engine and an internal combustion engine is that instead of combining gasoline with air and burning it to drive pistons with hot expanding gases, CAEs drive their pistons with the expansion of previously compressed air.[4]-[7]Compressed air technology can be tested and developed using the Vaned Type Novel Air Turbine as there are minimal losses and practically their efficiency varies from 72-97% which is very high when compared to a conventional IC engine. Future developments can be made by designing an ideal vehicle for this kind of engine. it is very necessary to develop such tank made of carbon fibers which can carry huge amount of pressure with least volume of space will meet the general acceptance with zero harmful emission. CAE is the realization of new technology in automobile field.it is also necessary to develop compressed air engine of multi-fuel engine that runs with either Air or Fuel.[9]-[10].

II. METHODOLOGY

A. Components used

1. Manually operated valve

Valves are mechanical devices designed to control the flow of liquid and gases. Many valves are manually operated. Here we are using manually operated valve.

2. Crank shaft

There is a two end , one is connected to pneumatic cylinder and another end connected to cam shaft. The crank shaft main function is to convert rotary to linear motion.

Fig 2. Crank shaft[6]

3. Pressure gauge

The working principle of pressure gauges is based on **Hooke's law**, which states that the force required expanding or compress a spring scales in a linear manner with regards to the distance of extension or compression. There is inner pressure and outer pressure.

Fig 3. Pressure gauge[6]

4. Flow control valve

This valve is used to control the speed of the piston movement and also it acts as a one – way restriction valve which means that the air can pass through only one way and it can't return back. This valve is using, the time consumption is reduced because of the faster movement of the piston .

Fig 4. Flow control valve[6]

5. Compressed air tank

A compressed air tank is a **pressure vessel that holds air compressed under pressure**. It releases this air on an on-demand basis through the use of a valve. Though some air tanks might be stationery, they can also be portable.

Fig 5. Compressed air tank[6]

6. Gear arrangement:

This consist of one driver gear and one driven gear. The driver gear is attached to the wheel shaft and it will drives the driven gear. The driven gear is then connected to the air pump followed by the rod .

7. Compressor:

Compressor is used to compress the air, so that the air can be stored in the air tank at a high pressure.

8. Pneumatic cylinder:

Pneumatic cylinders (sometimes known as air cylinders, actuators) are **mechanical devices which use the power of compressed air to produce a force in a reciprocating linear motion**. A compressor is used to compressor the air and the compressed air is then transferred to the barrel of the cylinder which hits the face of the piston and make it move.

9. Air pump:

It is used to fill the air to air tank by reciprocating motion of the rod.

B. Layout of model
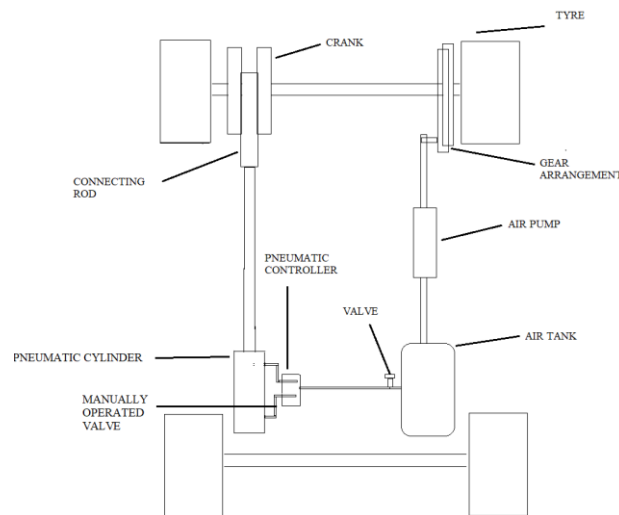
Fig 6. Design of compressed air engine with automatic air filling technique

C. Working

A compressed-air engine is a pneumatic actuator that expands compressed air and converts potential energy into motion to produce practical work. A pneumatic actuator is an energy-to-motion mechanism. Depending on the type of actuator, the motion can be rotary or linear.[4]The compressed air stored in the air tank is flows through the pipe and enters the reciprocating cylinder by the controlling of valves. Here the valve used is solenoid valve. The reciprocating action of the piston inside the reciprocating cylinder is resulting in the rotation of the wheel due to the linear motion of the crank shaft.

By considering the limited storage of the air tank as a major limitation, the modification in the design was done by adopting gear arrangement and air pump. The gear arrangement is done in a manner the rotary motion of the wheel is converted into linear motion of the rod. So that the air pump connected in this mechanism pumps the air into the air tank due to the linear motion.

This modification can eliminate one major limitation in compressed air engine vehicle.

III. RESULT

The pressurised air from the air tank causes the piston in the reciprocating cylinder to move linearly, causing the wheel to rotate. The air pump automatically fills the air tank in this variant, which is followed by the gear arrangement. This will eliminate the limitation of compressed air storage in a tank.

And while this engine will not be able to totally replace other IC engines, it can be employed for light-weight vehicles for light-duty and inside-industry transportation.

IV. CONCLUSION AND FUTURE SCOPE

The theoretical concept of designing an engine that can run on compressed air technology is presented in this study. The theoretical concept was shown experimentally by converting a 4-stroke engine to a 2-stroke engine and running it on compressed air. The experimental results were also given, demonstrating the benefits of using CAE. As a result, ACAE allows the engine to run on an infinite supply of air as a fuel. CAE's recommended concept design aids in the solution of the problem by utilising a renewable and cost-effective fuel.[1] The modification done in this model that the air will automatically fills the air tank by the linear motion of the air pump due to the rotation of the gear arrangement can attain a scope in future. The report also gives an overview of the engine's anticipated future development in order to improve its efficiency for public use.

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Fabrication of Pedal Operated Water Pump

K S Anandhu, Larin Philip Lagi, Arjun Biju, Abhimanyu K K

Department of Mechanical Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

The development of Fabrication of Pedal Operated Water Pumping system was undertaken with the intention of providing a simple cost solution to the problem of delivery of ground water with relatively less effort. This project analyses the development of an improved pedal operated water pump for rural use. This development was prompted due to the need for pumping systems that does not use electricity as its power source in under developed area. The system is composed of a powered water pump which drag water through a PVC pipe by while pedalling. The pedal power is being transmitted to the pump via a gear drive, and water is lifted from the well by belt drive.The construction of the pump is simple and easy to operate by anyone.

Keywords: - Pedal, bicycle, pump, Gear, PVC pipe, Pully

I. INTRODUCTION

Water resources are divided in to two distinct categories. The surface water resources and the ground water resources. Each of this categories is part of the earths water circulatory system called hydrological cycle.These two categories are interdependent and frequently the loss of one is gain of other. To collect underground water we are using different techniques and equipment. Pumps like reciprocating pump, centrifugal pump, self-prime regenerating pump, submersiblepump ,shallow well pump etc. are used for collecting underground water for running these pumps electricity or fuels are used. Using fuels like petrol, diesel, kerosene etc.causes atmospheric pollution, however it gives more efficiency. For electrically driven pumps continues electricity is required for running. In undeveloped areas electrically operated pumps cannot be used. Mainly in the time of load shedding. Developmentof Fabrication of pedal operated water pumps will help in such situations.it requires manpower and less costlier when compared to other pumps. Manufacturing of such pumps will help farmer for irrigation of small seed beds, vegetation , pumping water from reservoirs etc.Our project "Fabrication of Pedal operated water pump for pumping" will help such farmers.it can be used in water pumping, with less effort. It converts mechanical energy into fluid energy .It neither requires electricity nor fuels.so it is an eco-friendly pumping system.it can be manufactured with available materials and with some basic skills is not only free from pollution but also provide healthy exercise.

II. LITERATURE REVIEW

Parandhaman B et al. worked on a project water pumping using centrifugal pump, which can be used in the absence of electricity. In their work they chose centrifugal pump because of its higher flower rate and high head. The pump was able to lift water from 16 feet and deliver at 24 feet with a flow rate of 8 lit/min. pedal which was connected to the centrifugal pump had the output speed of 2725 rpm which is enough to obtain the required pump characteristics [1].

Maanyam Sairam et al. worked on a project Fabrication of Pedal Operated Water Pump, which used in small irrigation and garden irrigation. It works on the principle of compression and sudden release of a tube by creating negative pressure. Pump was able to deliver 2.5 gallons of water per minute [2].

N Tulasi Radha et al. worked on a project Fabrication of Bicycle driven Water pumping and power generation, the simple design can enhance day today household needs and can be used in power shut down scenarios. The discharge of water was 7811.4 lpm at bicycle speed 78rpm, pump shaft speed 928rpm [3].

M.Serazul Islam et al. worked on a project Design and fabrication of Pedal Pump for low lift irrigation.to construct a low lift pump for small irrigation project areas, he used different types of check valves and piston valves and tested at different suction heads. Which resulted in making a pump of having efficiency 46.53% along with a head 1.65m [4].

R.Karthick et al. worked on a project Design and fabrication of pedal operated water purification system. They made a pedal operated water purifying system with the help of a bicycle, reciprocating pump etc. this design reduced labour, cost and weariness caused by transportation and sanitizing drinking water for homes in village areas [5].

Mogaji p b et al. worked on a project development of an improved pedal powered water pump. This idea was proposed due to the need for pumping systems that does not use electricity as its power source in underdeveloped area using reciprocating pump powered by pedalling. The results of the test carried out showed that the pump discharge was 0.0016 m3 /s at a head of 20m using a driving torque of 29.5 Nm with estimated efficiency of 90% which is fairly a good enough result for a pedal operated pumping system [6].

Vishal Garg et al. worked on a project Design and Experimental Setup of Pedal Operated Water pump, which is used in small irrigation and garden irrigation. Is simple concept followed by the principle of compression and sudden release of a tube by creating negative pressure in the tube and this vacuum created draws water from the sump. Pump was able to deliver 2-3 gallons per minute from well and bore holes up to 23 feet depth [7]

Carlos Marroquin et al. worked on a project pedal powered water pumping also known as Maya Pedal, which can be used to lift water from wells, boreholes up to 30 in meters depth. This machine pumps water at 5-10 gallons per minute [8].

Dr P S V Ramana Rao et al. worked on a project pumping water from reservoir for small scale irrigation, garden irrigation. He used centrifugal pump which is connected by the bicycle pedal. This pump was able to pump water at 25-30 litres per minute from wells or boreholes up to 23 feet [9].

Semaraj M et al. worked on a reciprocating pump to pump water without the help of electricity. This pump was powered by pedal operated. Which can be used to draw water from wells, ponds and other water reservoirs [10].

Sachin Thorat et al. worked on a project Pedal Powered Centrifugal Pump (PPCP) The centrifugal pump was positioned on its stand in such a way that driven shaft of the centrifugal pump is butted to the bicycle wheel. By pedalling the bicycle, the bicycle wheel rotates, thereby rotating the centrifugal pump. Create a simple and efficient way of pumping water utilizing a human powered bicycle for communities where electricity is unavailable or impractical. The result was good result for a pedal operated pump.[11]

Sachin Thorat et al. worked on a project Pneumatic Dual Water pump using Pneumatic cylinders. The aim of the project was pneumatic operated water pumping system. Radial plunger Pneumatic Water pumping system are reciprocating pump in which the piston is provided for the pumping action. The piston is reciprocated with the help of a pneumatic cylinder and solenoid valve. [12]

Sachin throat et al. worked on a project Design and Development of Pendulum Operated Water Pump. Traditional hand water pump may take more efforts, the man who operates traditional hand water pump must apply his force continuously on the lever of pump, due to which man who are using this pump get tired immediately. As a use of pendulum-based water pumping system we can increase the efficiency of the plant and reduce the effort, cost of production, production time, and manpower requirement.[13]

M A Hossain et al. did a survey in different locations of Bangladesh to know the status of solar pumps. In that he found 1.71 million irrigation pumps were available. Among 83% where diesel engine operated and only 17% are operated using electricity. The use of solar pump help to reduce operating cost, maintenance cost and easy installation.it have long life when compared to other diesel engine operated pumps.[14]

Jamiu Idris et al. did worked on a project development and performance evaluation of a windmill for pumping water. The development of windmill for pumping water can be used in rural areas. A sixblade horizontal windmill was developed to convert wind energy of minimum speed of 3.75 rad/sec.He used displacement pump of 0.2m stroke. The slider crank mechanism was adopted for development of windmill. It result in an extraction efficiency of 18.5% and system efficiency 79.5% [15]

P Jagadeesh et al. worked on a project of water pumping using windmill. They converted rotary motion of windmill to linear motion. This reciprocating motion is given to the handle of the pumping system . The up and down motion of the handle is given to the piston, where water is sucked using pressure variation from low ground . [16]

III. WORKING

It consists of a rope and pulley mechanism which is operated by pedal power. Pump is operated by the use of pulley which is connected to the bicycle wheel with spiral bevel gear shaft drive mechanism. The rope consists of a number of bushes which is equally located. The bushes are placed inside a PVC pipe which is situated inside a well. The rope is connected to a pulley. The pulley is connected to the bicycle wheels. By pedaling the bicycle, the bicycle wheel rotates, there by rotating the shaft attached to the pulley and water from the well is drawn.

Fig. 1 construction model

IV. CONCLUTION

This modelling was centred towards the development of a Pedal operated water pump by operating it with help of Pedals that would conveniently alleviate the portable water supply problems of rural communities throughout the underdeveloped and developing countries of the world at minimum energy input. The requirement of Village Level Operation and Management (VLOM) of maintenance was considered in the course of this modelling. The model can be fabricated in the workshops as the design is made simple, while the standard parts like bearings, bolts and nuts, etc., are readily available locally. We have learnt alot from this project about types of tools, machines & how are they used in mechanical workplaces in Industry, some basic techniques like cutting, Surface finishing, planning, grinding are introduced very nicely. In addition to this we have also learnt about painting and welding. Moreover this project gave us a good experience of purchasing material from market and increased our surveying capabilities In the end I would like to thanks my teacher who guided us throughout the project especially Ms.Professor Vani R. It has been argued that current models of fabricated pedal pumps are inadequate in respect of the complex interactions which take place between the pump and attached pipelines. This approach circumvents the computationally intensive demands associated with the use of the method of characteristics.

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Utilization of Waste Plastic and Waste Paper in Manufacturing of Roof Tiles

Rakshith Kumar Shetty[1], Venkatesh Rao[2], L. S Prasad[2], Jaganesh G C[2]

[1]Assistant Professor, Department of Basic Science, YIT, Moodabidri, Karnataka, India
[2]Assistant Professor, Department of Mechanical Engineering, YIT, Moodabidri, Karnataka, India

ABSTRACT

The main objective here is to save our environment from the plastics. The plastic disposal is the biggest crisis for mankind all over the world The 'SWACH BHARATH' mission is almost incomplete till we find a way for the disposal of waste plastic. Generally, when we talk about waste, it's always 90% plastic by keeping this as the main motto, we must look into reuse of plastics instead of their disposal. Since plastic is not digestible in nature for prolonged years, reuse is the only solution. In this project we are going to develop plastic - paper-epoxy roof tiles. This will effectively utilize waste plastics and convert them into useful products. The tensile compression, bending and water absorption test will be conducted to check its compatibility and their properties will be compared with that of present clay tiles.

Keywords— Paper-epoxy roof tiles, waste paper, waste plastic

I. INTRODUCTION

Roofing is one of man's most practical and innovative creations. Throughout history, roofing materials and techniques have significantly developed; as architecture has progressed, so has the design and production of roof and the architectural influences of each era can be clearly identified. Tile roofing has long been considered a prevalent technique when installing a new roof to your home because of its aesthetic appeal. Growth of population, increasing urbanization, and rising standards of living due to technological innovations have contributed to the increase in the quantity of a variety of solid wastes generated by industries, mining, domestic and agricultural activities. Annual global waste production will increase by 70% if current conditions persist, according to "What a Waste 2.ET a newly published report from the World Bank that was multiple years in the making.

Currently, about 2.01 billion metric tons of Municipal Solid Waste (MSW) are produced annually worldwide. The World Bank estimates overall waste generation will increase to 3.40 billion metric tons by 2050. An estimated 13.5% of today's waste is recycled and 5.5% is composted. The report estimates that between one-third and 40% of waste generated worldwide is not managed properly and instead dumped or openly burned.

Managing waste properly is essential for building sustainable and livable cities, but it remains a challenge for many developing countries and cities. Effective waste management is expensive, often comprising 20%-50% of

municipal budgets. Operating this essential municipal service requires integrated systems that are efficient, sustainable, and socially supported. This project aims to eliminate solid plastic and paper wastes by turning them into roof tiles.

II. LITERATURE REVIEW

Archit Hardikar et al. In this study the density of the LDPE tile was observed to be 843 kg/mm. For conventional tiles, it is near to 2400, proving a greater weight reduction.

The total weight reduction was observed to be 57.7322% as comparatively. The compressive strength of 17.26 MPa was observed. According to IS 15622:2006, a minimum of 1500 N breaking force is required to pass the test. The manufactured LDPE component showed 2175.6 N breaking force hence, these tiles can be used in places where there is no high weight bearing requirement. Burning rate was observed to be 52mm/min which was lesser than the standard lOOmm/min required.

Kanchan Basalt. et al. This project studied that plastic is harmful for environment and very much amount of plastic waste is discarded in the surroundings in daily routing, so to minimize as well as utilize this plastic waste in civil construction field by production of plastic tiles with waste plastic material. They tried to make efficient tiles from these materials by crushing plastic material using crushing machinery and then binding the material together by binding materials like epoxy hardener with a small amount of accelerator and hardener.

Rabindra Kumar Padhan. This study aims to develop a novel method to recycle waste PET bottles and incorporate them into pavement mixtures containing Reclaimed Asphalt Pavement. The PET additive used was shown to be suitable to be incorporated in aged binders containing RAP. providing better or equivalent performance to conventional virgin binder. Overall, this study has successfully demonstrated an innovative approach to deal with two waste difficulties: Waste plastic and RAP, and provides a competitive technology to meet this locally relevant recycling challenge.

A. Ananthi, et al. They have conducted comprehensive study based on experiments on concrete cubes with 0.3%. 0.6% and 0.9% of plastic fiber which was prepared by. Plastic cups with two different thickness 80 microns and 480 microns, the plastic cups were hand cut to a mean length 12.7mm and mean breadth 2.8mm. Tests like compressive strength test and split tensile strength test were conducted to conclude that the compressive strength and split tensile strength increases to maximum when 0.9% of plastic fiber are added to conventional concrete, and noted that the compressive strength increases to 40.3% than conventional concrete al 7days, 28.5% at 28 days, the split tensile strength increases to 54.8% than conventional concrete and 54.4% al 28 days.

III. OBJECTIVES

All Maximize utilization of waste bi-products used as components which in-tum increase the advantageous properties of the roof tiles to normalize the optimum method of waste management. The attainment of a lighter and economical roof tile. Minimize the stagnant plastic pollution presiding around us. Enhance the appearance of the commercial roof tile expanding the domain of its usage to creative sites.

IV. METHODOLOGY

The process from the procurement of the materials individually to the accomplishment of obtaining the final product is the manufacturing process. The manufacturing process of the Waste plastic and paper epoxy roof tiles are separated into various steps like

1. Collection of waste plastic suitable for the end product
2. Selection of Epoxy and Hardener to be used and Material of mould to be used.
3. Segregation of LDPE and HDPE and other various types of plastic and other waste products.
4. Cutting/ shredding the plastic into small pieces to fill the mould with a suitable matrix.
5. After calculations, the aggregate is mixed with the calculated amount of epoxy binder and hardener
6. A mould is prepared with suitable material with suitable dimensions
7. The mixture is poured into the mould uniformly
8. A weight is applied on top of the mould
9. The weight is removed and the roof tile is removed from the mould.
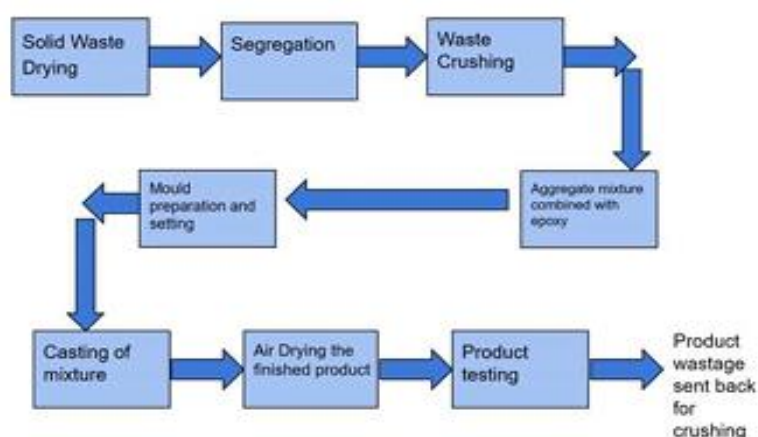
Fig.1 Methodology

V. CALCULATIONS

For **45% Plastic, 10% Paper, 45%Epoxy,**
Volume of Composite Material,
VC = Length x Width x Thickness
VC= 150 x 150x4 mm
VC = 90x 10^3 mm^3
Volume Fraction of Plastic: VFP = 0.45
Volume of Plastic VP1 = Volume Fraction of Plastic x Volume of Composite Material
VP1 = 0.45 x 90 x 10^3
VPl = 40.5 x 10^3 mm^3
Volume Fraction of Paper: VFP = 0.10

Volume of Paper VP - Volume Fraction of Paper x Volume of Composite Material

VP = 0.10x90x 10^3

VP = 9x 10^3 mm^3

Volume Fraction of Epoxy: VFE = 0.45

Volume of Epoxy VE = Volume Fraction of Epoxy x Volume of Composite Material

VE = 0.45 x 90 x 10^3

VE = 40.5 x 10^3 mm^3

Mass of Plastic: MP1 = Density of Plastic x Volume of Plastic MP1 = 0.916 x 10^3 x 40.5 x 10^3

MP1 = 37.1 grams

Mass of Paper: MP = Density of Paper x Volume of Paper

MP = 1.201 x 10^3 x 9 x 10^3

MP = 10.81 grams

Mass of Epoxy: ME = Density of Epoxy x Volume of Epoxy ME = 1.63 x 10^3 x 40.5 x 10^3

ME = 66.015 grams

In conclusion to calculation the values obtained were:

For 45% Plastic, 10% Paper, 45% Epoxy

Mass of Plastic: 37.1 grams

Mass of Paper: 10.81 grams

Mass of Epoxy: 66.015 grams

For 40% Plastic, 15% Paper, 45% Epoxy

Mass of Plastic: 32.9 grams

Mass of Paper: 16.21 grams

Mass of Epoxy: 66.015 grams

For 35% Plastic, 20% Paper, 45% Epoxy

Mass of Plastic: 28.8 grams

Mass of Paper: 21 .6 grams

Mass of Epoxy: 66.015 grams

VI. TESTING DETAILS

Tensile strength, flexural strength, water absorption lest for this study are discussed in this chapter to further investigate the physical and the mechanical properties of the roofing tile.

A. Water Absorption:

The water absorption test was carried out in accordance with ASTM C373. Water absorption test is the measurement of moisture quantity that roofing tile may absorb. If water absorption is too high, the tile may suffer from cracking which is not desirable. So, this test reflects the suitability of the tile for application: roofing tile need to have substantially low absorption capacity, especially in environments subjected to rainfall, freezing, and thawing cycles. Water absorption is expressed as a percent by weight of water against the dry weight of the individual tiles. The tiles are dried till they attain a constant weight and then cooled and weighed

(Ml). When cooled, the dry specimen was immersed completely in clean water at 27±2°C for 24 hours. After the completion of 24 hours each specimen was removed, wiped off the surface water carefully with a damp cloth and weighed the specimen nearest to a gram (M2) within 3 minutes after removing the specimen from the tank. Water absorption is expressed as increase in weight per cent. Per cent (%) of water absorption = (wet weight - dry weight)/ dry weight X I00

B. Tensile Test:

Tensile properties often are used to predict the behaviour of a material under forms of loading other than uni-axial tension. The strength of a material often is the primary concern. The strength of interest may be measured in terms of either the stress necessary to cause appreciable plastic deformation or the maximum stress that the material can withstand. The typical tensile specimen has enlarged ends or shoulders for gripping. The important pctrl of the specimen is the gage section. The cross-sectional area of the gage section is reduced relative to that of the remainder of the specimen so that deformation and failure will be localized in this region. The gage length is the region over which measurements are made and is centered within the reduced section. The distances between the ends of the gage section and the shoulders should be great enough so that the larger ends do not constrain deformation within the gage section, and the gage length should be great relative to its diameter. Otherwise, the stress state will be more complex than simple tension. The test for tensile strength was carried out in accordance to ASTM D638. The rate al which a sample was pulled apart in die test was ranged to be from 0.5 mm per minute. Three specimens were tested for all the varying ratios of plastic waste. From the data obtained from the testing, we can see the brittle nature of the specimens as the curve is more inclined towards left. Here, The test result shows that the 1 st test specimen has higher tensile strength than the other two but has a slightly lower Young's modulus than the 2nd test specimen. 3rd test specimen has the lowest tensile strength.

Test results:

Legends	Specimen	Fmax N	Tensile Modulus MPa	Tensile Strength MPa	Strain@Break %	WIDTH mm	THICKNESS mm
(red)	1	322	422	10.1	3.6	6.28	5.09
(green)	2	317	652	8.93	1.3	7.24	4.90
(blue)	3	305	266	8.61	2.5	7.25	4.90

Series graph:
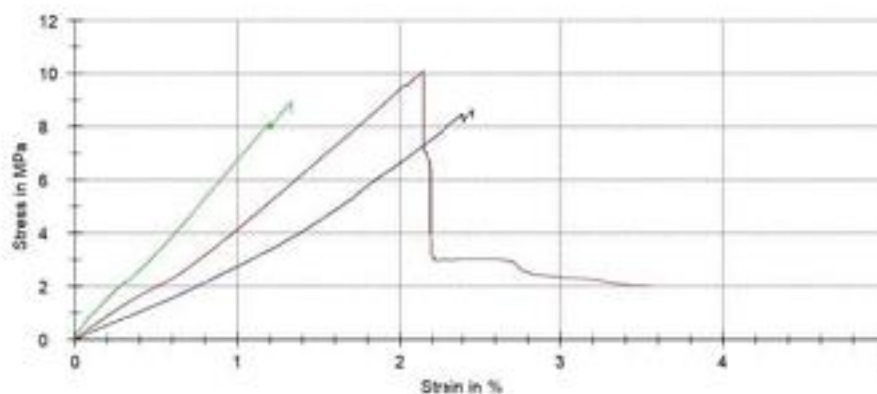
Fig. 2 Tesile Test Curve

Statistics:

SERIES n = 3	Fmax N	Tensile Modulus MPa	Tensile Strength MPa	Strain@Break %	WIDTH mm	THICKNESS mm
x̄	315	447	9.20	2.4	6.923	4.96
s	8	195	0.769	1.1	0.5572	0.11
v	2.62	43.56	8.35	45.29	8.05	2.21

Fig. 3 Result Statistics for three specimens

C. Flexural Strength:

Flexural test evaluates the tensile strength of concrete indirectly. It tests the ability of unreinforced concrete beam or slab to withstand failure in bending. The results of which is expressed as a modulus of rupture which denotes as (MR) in MPa or psi. A test sample bar rests on two supports and is loaded by means of a loading nose midway between the supports. A support span-to-depth ratio of 16 to 1 is generally used. The specimen is deflected until a breaking point occurs in the outer surface of the test specimen or until a maximum strain of 5 per cent is reached. This test was carried out in accordance with ASTM D790. The specimen was placed on two supports and a load was applied at the centre. Three specimens were tested for all the varying plastic waste. The flexural modulus is inversely related to deflection - a lower deflection would result in a higher modulus. So a higher flexural modulus material is 'stiffer' than a lower flexural modulus material, it is Resistance to the bending.

Test results:

Legends	Specimen	FLEX MODULUS MPa	FLEX STRENGTH MPa	THICKNESS mm	WIDTH mm	L mm
(red)	1	1200	22.3	5.2	10.85	64
(green)	2	2080	25.6	4.99	11.14	64
(blue)	3	1430	25.7	4.97	10.45	64

Series graph:
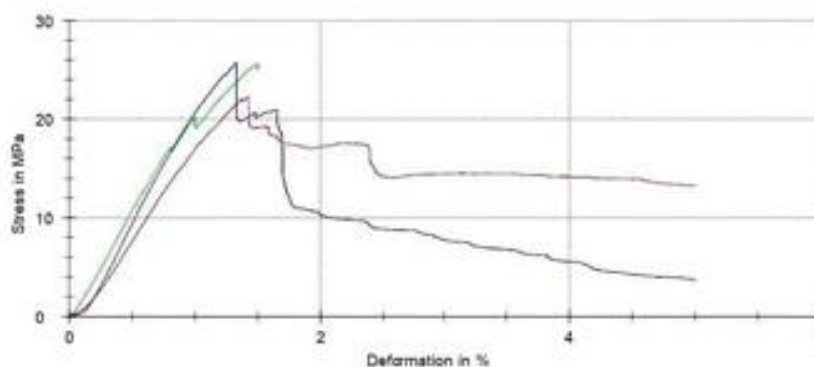
Fig.4 Flexural test Result

Statistics:

Series n = 3	FLEX MODULUS MPa	FLEX STRENGTH MPa	THICKNESS mm	WIDTH mm	L mm
x̄	1570	24.5	5.053	10.81	64
s	456	1.96	0.1274	0.3465	0.000
v	29.05	7.98	2.52	3.20	0.00

Fig.5 Result Statistics of the three test specimens

From the results obtained, although the 1st test specimen shows better tensile strength the flexural strength is comparatively lower. The 2nd specimen has belter flexural modulus as well as flexural strength. 3rd specimen here has better strength and modulus compared to the 1st but is lower in modulus and almost equal in strength to the 2nd specimen.

D. Conclusion on selection of optimum proportion

The conclusion we draw form the following test are as follows, More the value of young's modulus, more force is required to deform it. Hence a material with higher young's modulus is more elastic than a material with lower young's modulus and so, 2nd specimen is ideal in this case though the resistance of a material to breaking under tension is slightly lower than 1st. The 2nd specimen also exhibits higher flexural modulus that is the the resistance to bending. Which concludes the material is stiffer than a lower flexural modulus material and higher value of flexural strength, the more impacting forces the material is able to withstand. On closer inspection, the curve of the test results tends to incline towards left showing its brittle nature. With the reference of the graphs from of both the tests, result obtained from water absorption, and on comparison with the properties of a traditional roofing tile, we look for the tile more brittle in nature and the specimen 2 in both the test exhibits more of this property comparatively. Hence, the 2nd proportion was considered to be tire optimum ratio of this project that is 35/20/45.

VII. ADVANTAGES AND APPLICATIONS

Advantages

- The maximum utilization of waste bi-products are used as components which in-turn increase the advantageous properties of the roof tiles to normalize the optimum method of waste management.
- The attainment of a lighter and economical roof tile
- Minimize the stagnant plastic pollution presiding around us.
- Enhance the appearance of the commercial roof tile expanding the domain of its usage from to creative sites.

Applications

- Can be used for roofing in rural setting due to its economical advantage over other commercial rooftiles.
- Can be used in exhibitions to portray attractive roofing.

VIII. CONCLUSIONS

This project achieved the completion of a roof tile consisting of mainly waste products. Attainment of a more affordable roof tile than commercial roof tiles. Attainment of a roof tile with better properties than the commercial roof tiles. Adopting an Eco-friendly method to obtain the main goal of the project. No wastage during production makes it extremely Eco friendly.

IX. SCOPE FOR THE FUTURE

1. Production of the tile in various mould designs to offer the consumers a wide variety to choose from.
2. Further improvisation of the rooftile may be essential to support the society. It is the time to make India **ATMA NIRBHARB ILA RATH,** become **Vocal for Local.**
3. New roof tiles can be made by testing out different types of components keeping the mission of reducing plastic pollution still at large.

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CFD Simulation of Flow in a Lid Driven Cavity with Ribs

Abdul Rahiman, Dhanush Kumar, Sachin Naik, M Aameer, M Shareef B U

Department of Mechanical Engineering, YIT, Moodbidri, Karnataka, India

ABSTRACT

Simulations of laminar incompressible fluid flow in a lid-driven cavity (10 Re 1000) are carried out using computational fluid dynamics (CFD). The height to width ratio of the cavity is varied between H/L = 1:1. The nature of the flow inside the cavity with ribs of varying Reynolds numbers was analysed and visualised using the commercial finite volume programme FLUENT. The simulation results are shown as a velocity profile, a pressure coefficient, and stream contours. The Reynolds number is shown to have a considerable influence on the pressure coefficient inside the cavity. The velocity profile for a square cavity special case was found to accord well with earlier experimental results. The results of this investigation show that commercially available software such as FLUENT can help.

Keywords— CFD, Reynolds number, fluent, pressure coefficient, velocity profile

I. INTRODUCTION

Computational Fluid Dynamics, or CFD, is the computer-based simulation of fluid movement, heat transport, and associated phenomena such as chemical reactions. CFD (Computational fluid dynamics) is a simulation technology used in engineering. CFD's application is not restricted to fluid dynamics; it can be used in any process that involves transport phenomena. Various methods, such as analytical methods and experimental methods employing prototypes, can be used to address an engineering problem. The analytical procedure is quite demanding and complicated. The experimental procedures are extremely expensive. If any design flaws were discovered during prototype testing, another prototype with all of the flaws must be created and tested. This is a time- and money-consuming process.

If we examine 3 dimensional flows, a lid-driven cavity is a rectangular or cubic container, or a square cavity in the case of 2 dimensional flows, which are among the most basic constrained geometries within which fluid motion can be studied. The tangential motion of the binding wall allows essential elements of incompressible flows in limited volumes to be studied. It is made up of four walls, three of which are fixed or non-slip. The three fixed walls are the left wall, also known as the upstream wall, the bottom wall, and the right wall, also known as the downstream wall. The velocity of these walls is zero since they have no slip, i.e. u=v=0. The top wall, commonly known as the lid, is tangentially driven.
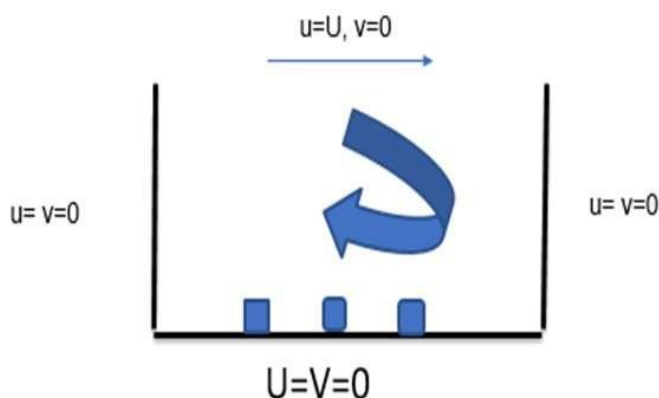
Fig 1.1 boundary condition of lid

There have been some work is devoted on issue of ribs Studied the effect of triangular, rectangular and trapezoidal ribs on the laminar heat transfer of water-Ag Nano fluid in a ribbed triangular channel under a constant heat flux was numerically studied using finite volume method. Height and width of ribs have been assumed to be fixed in order to study the effect of different rib forms. Modelling were performed for laminar flow (Re=1, 50 and 100) and Nano fluid volume fractions of 0, 2% and 4%. The results indicated that an increase in volume fraction of solid nanoparticle leads to convectional heat transfer coefficient enhancement of the cooling fluid, whereas increasing the Nusselt number results in a loss of friction coefficient and pressure [1].

Studied found that in the simulation of the turbulent forced convection in this two dimensional channel with a ribbed surface, the standard k–e model had superiority over the Reynolds stress model. An anticlockwise vortex was found in the downstream region of a rib by using either of the two models; however, the length and relative strength of the vortex predicted by these two models were significantly different. Recirculating flow pattern was formed in the cavity between two adjacent ribs [2]. Further make Steady Incompressible Navier-Stokes equation with continuity equation will be studied at various Reynolds number. The main aim is to obtain the velocity field in steady state using the finite difference formulation on momentum equations and continuity equation. Reynold number is the pertinent parameter of the present study. Taylor's series expansion has been used to convert the governing equations in the algebraic form using finite difference schemes [4].
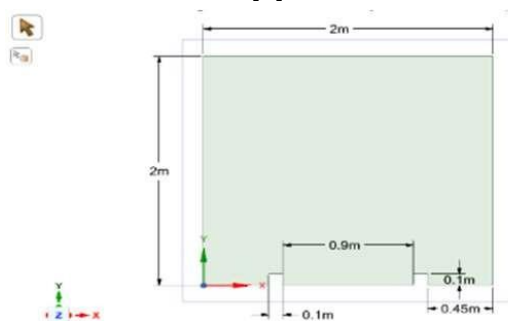
Fig 1 Dimension of lid with ribs

II. METHODOLOGY

Validation:-

Work of Ghia-et-al [3] is been considered as a revolutionizing study in the field lid-driven-cavity in which Navier stokes equation and multigrid method was employed tofind solutions for incompressible flow for Reynolds number as high as 10000.

Modelling and meshing:-

Modelling of lid-driven square-cavity similar that of Ghia-et-al is performed.   Commercially used design software like ANSYS WORKBENCH   and TECPLOT FOCUS are made use of throughout the study. Under ANSYS WORKBENCH, fluid flow analysis system, which helps in analysis of fluid flow in confined volume as of lid-driven cavity isselected. Grid generation and other steps involved in CFD analysis are also performed with comparable deviation in various entities like size, density, viscosity etc... Results of his study are used to validate the result obtained from the present study. Above figure (fig: 1.2) is the 2-D model of lid- driven square cavity with aspect ratio=1 in which incompressible fluid is bounded by three stationary walls and a moving wall.
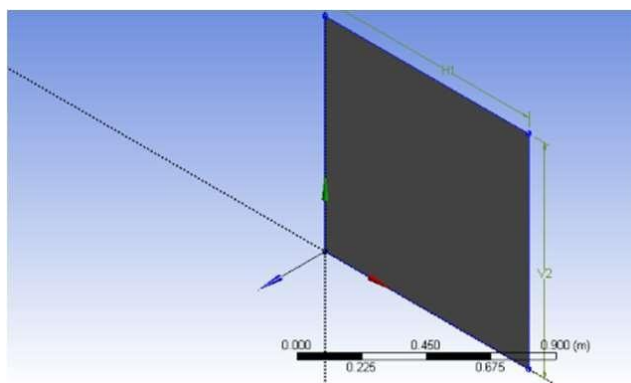
Fig1.2 square cavity with incompressible flow

High smoothing combined with fine relevance centre is incorporated for the generation of uniform mesh under global mesh setting. It is made sure that mesh formed along the walls is fine as the fluid will be in contact with them throughout the movement and coarse in themiddle of cavity [Fig: 1.3]. Edge sizing is carried out for this purpose with 0.008m element size. Grid generated   for this model comprises of 9409 numbers of node and 9216 numbers of element respectively.
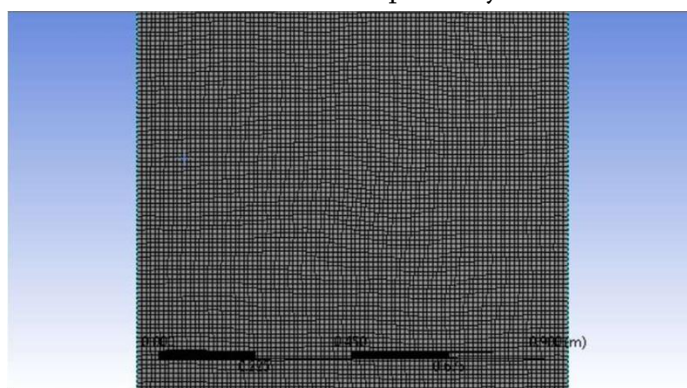
Fig 1.3 Grid formation

Setup solver and Governing equations:-

While launching fluent launcher it is made sure that double precision is turned on and alsothat parallel processing option is enabled for obtaining high precision results. Firstly the check for mesh quality is done to ensure reduced error in mesh. Later on, strategy for performing the simulation is established which involves determining such things as the use of space- marching or time-marching, the choice of laminar or chemistry model, and the choice of algorithms. Along with the strategy establishing, the density and viscosity of fluid is specified [Fig: 1.5] as they are the important entities for formulating Reynolds' numbers. Equation for finding Reynolds number is given as follows.

$Re=(\rho VL)/\mu$

Where,

V – Average velocity, m/s

L=H – length or height of walls, m p- Liquid density, kg/m3

u- Absolute viscosity kg/m-s

Re – Reynolds' number, dimensionless value
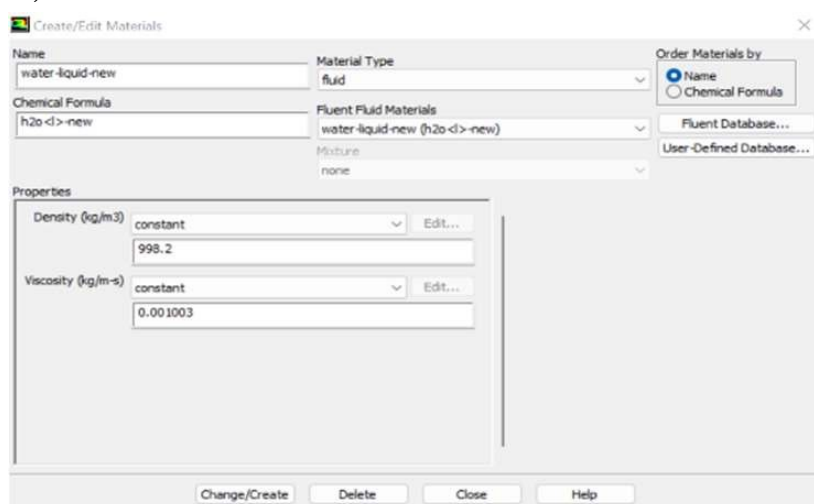
Fig 1.5 assigning density and viscosity of fluid

Above picture represents density and viscosity for fluid of Re=2000. Additionally, for varying Reynolds' number viscosity value is varied accordingly. The furnishing of boundary condition to the walls is accompanied by the SIMPLEC pressure- velocity coupling solution method. Furthermore, solution initialization is carried out using standard initialization method and reference frame being relative to cell zone. Finally, iteration is carried out until convergence of solution is quoted [Fig 1.6]. Here mathematical calculation is carried out for each element of the grid i.e. for 15625 elements and convergence of above solution occurs after 1656 iterations. Due to the complex nature of the Navier-Stokes equations, analytical solutions range fromdifficult to practically impossible, so the most common way to make use of the Navier- Stokes equations is through simulation and approximation. Ansys fluent is one. Among them The Navier-Stokes equation as used in fluent programming is given by

$\rho\, D\vec{v}/Dt = -\nabla p + \nabla \cdot T + \vec{f}$

Where, $\rho D\vec{v}/Dt$ is the force on each fluid particle. The equation states that the force iscomposed of three terms:

- ∇p: A pressure term (also known as the volumetric stress tensor) which prevents motion due to normal stresses. The fluid presses against itself and keeps it from shrinking in volume.
- ∇·T : A stress term (known as the stress deviator tensor) which causes motion   due to horizontal friction and shear stresses. The shear stress causes turbulence and viscous flows - if you drag your hand through a liquid, you will note that the moving liquid also causes nearby liquid to start moving in the same direction. Turbulence is the result of the shear stress.
- f⃗ : The force term which is acting on every single fluid particle.
  The above equation cannot be used in practice as it is the general form of Navier-stokes equation and has number of unspecified element. For Newtonian   fluid, the divergence
- ∇·Tis replaced by a vector Laplacian $\mu \nabla 2v$.

  Without making any assumptions about the form of the body force f, the final equation   for an incompressible Newtonian fluid would be $\rho Dv/Dt$ $=-\nabla p+\mu \nabla 2v+f$
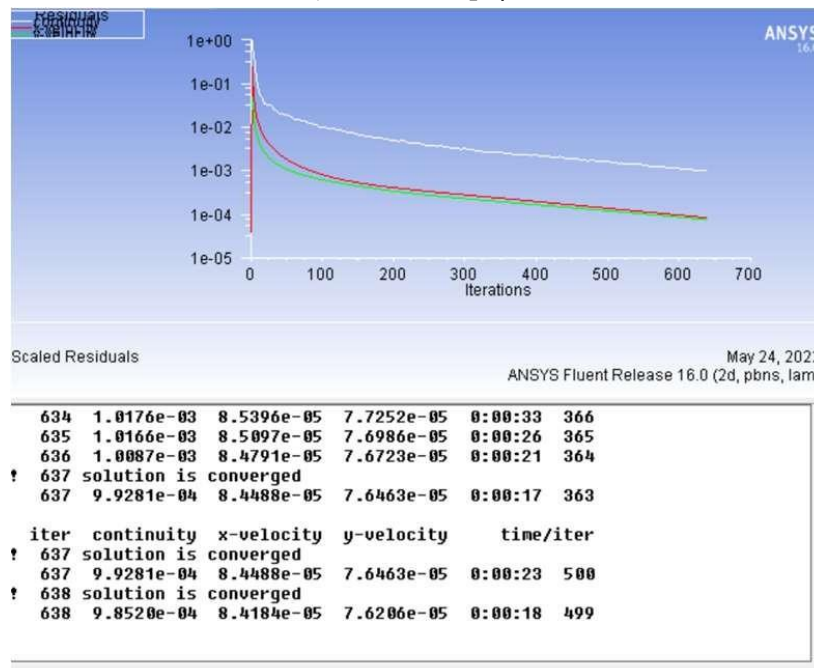
Fig 1.6 Panel displaying convergence of solution

Result and validation:-

Post-Processing involves extracting the desired flow properties (thrust, lift, drag, etc…) from the computed flow field. The calculated result is exported to a specific destination file in the form of readable   TECPLOT file. TECPLOT software is used to obtain enhanced solutions in the form of contours and streamlines   which are later exported in the form of jpg extensions helping the free flow of study. In this study U velocity contours and streamlines are considered together whereas V velocity contour is separately extracted.

Exported u velocity contours and stream lines are as shown in Fig 2.1. From abovefigures it is apparent that as the Reynolds' number of fluid increases, along with primary eddies corner eddies are also formed at the bottom and a secondary eddy is set to form when Reynolds number reaches as high as Re=2000.
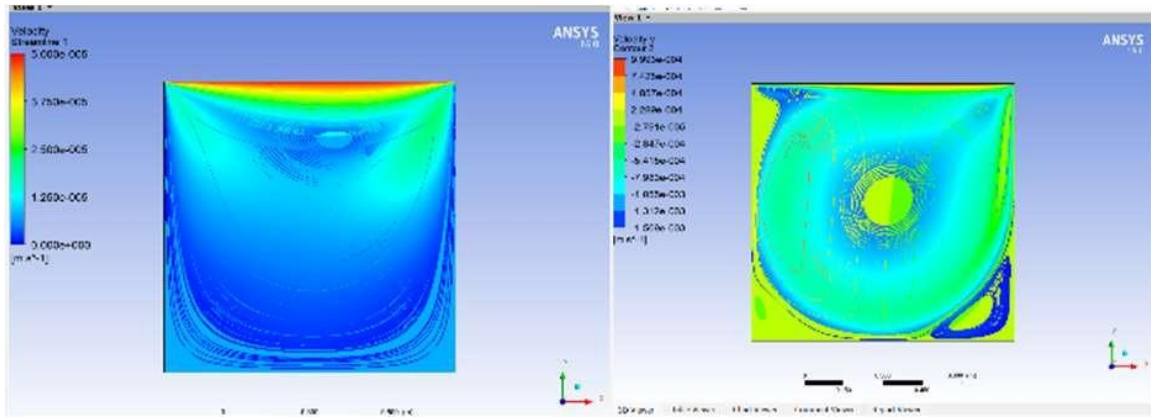
Re=100   Re=500
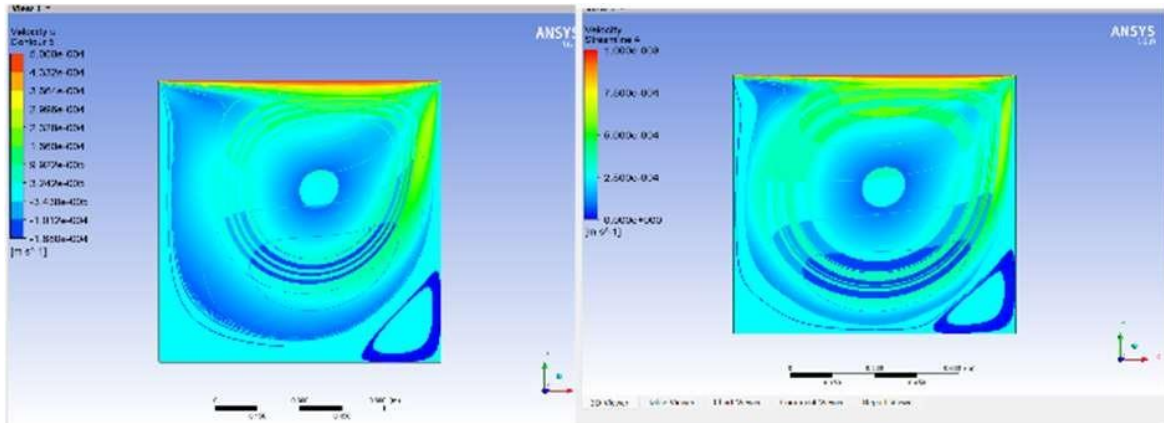
Re=1000   Re=2000

Fig 2.1 U velocity streamline and contour
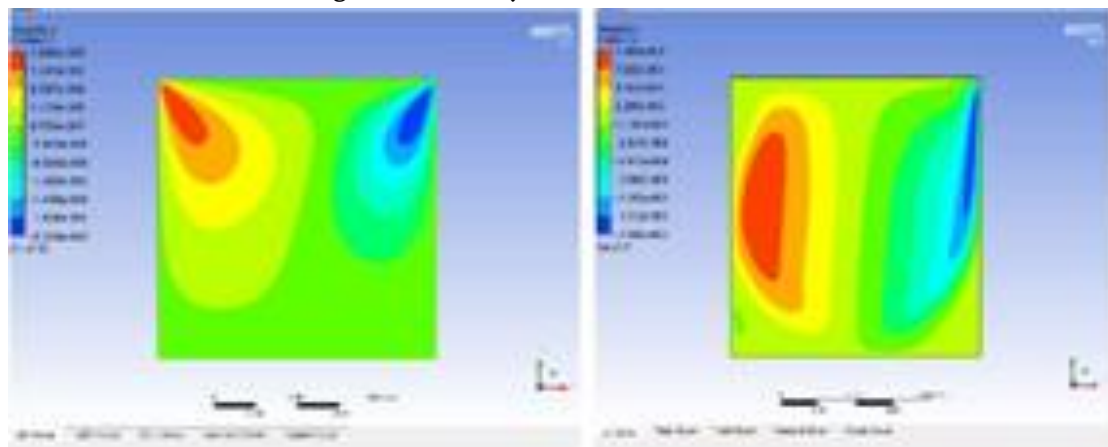
Re=100   Re=500

Re=1000   Re=2000
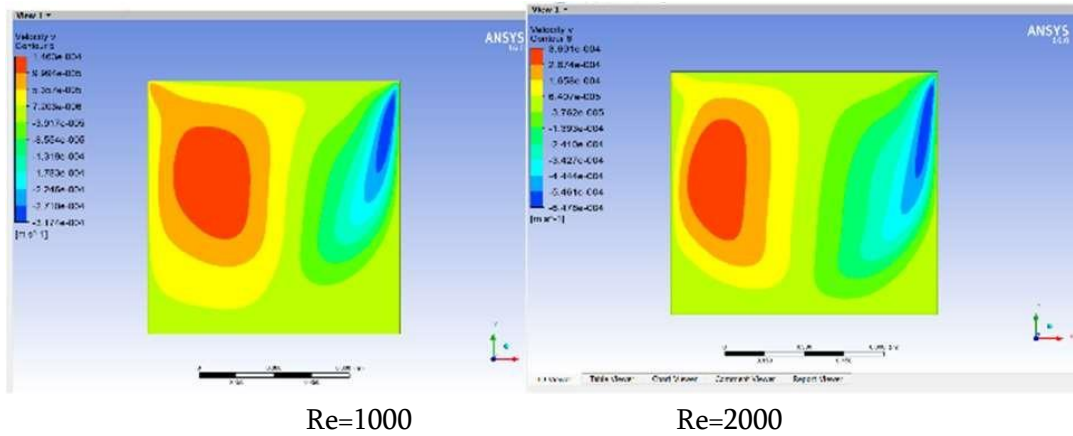
Fig 2.2 Velocity contour of flow

Finally, the value of U and V velocities obtained is compared with velocities of Ghia-et-al in the form of graph. Above plot represents variation of U and V velocities with that of Ghia-et-al for Re=1000 where it can be noted that both the results accords with each other. Here solid lines represent the study made by Ghia-et-al and symbols represent present study.
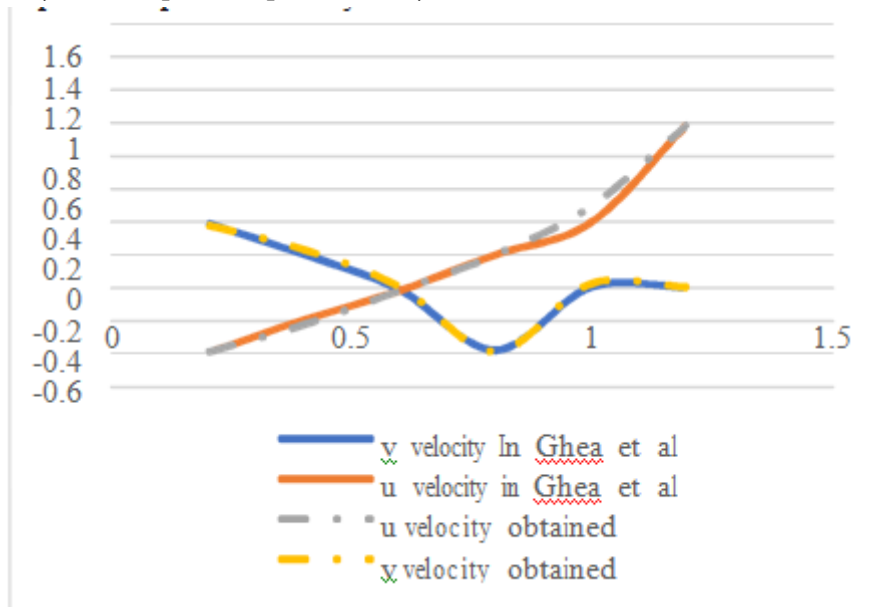
Fig 4.1 U and V velocity plot for validation

Construction and result of lid cavity with ribs:-

Initially the construction are made by the software of ANSYS so, here we are create the well dimensioned 2m square lids with the 0.1 meter 2 square ribs are placed the bottom of stationary wall and moving wall with 0.002m/s2 are sho wn in Fig 1 and creating a fine mesh of the 1186 nodes and 996 elements are shown in the Fig 2 . Then we are taking the viscous model as the laminar flow and taking a material of fluid as the water with density 999.2kg/m3 then then identifying the stationary wall and moving wall of the square lid. After that we are start the calculation part of the 1000 iteration are shown in the figure 3 Next start the pressure contour of the Reynolds number Re=200 here its show the red part of the region will shows the higher pressure counter, we click the velocity streamlines of the lid driven cavity with ribs so,

here observe that each lines are shows the every streamline of the velocity at the centre of the cavity will increase the speed of flows are shown in the Fig. 5. Then study about velocity contour of lid with Re=200 t0 1200 also increase the Reynolds number according to the number the flow of the contour and streamlines are changes So here we are observed that at a range of Reynolds number 800 the maximum number of stream line are visible at the centre of the cavity have the maximum velocity are achieved. The fig 9 show the velocity contour of the flow (400>Re1200) also Fig 10 are shows the velocity streamlines of (400>Re1000) literally Fig 8 are shows the pressure contour of the flow(400>Re<1200).
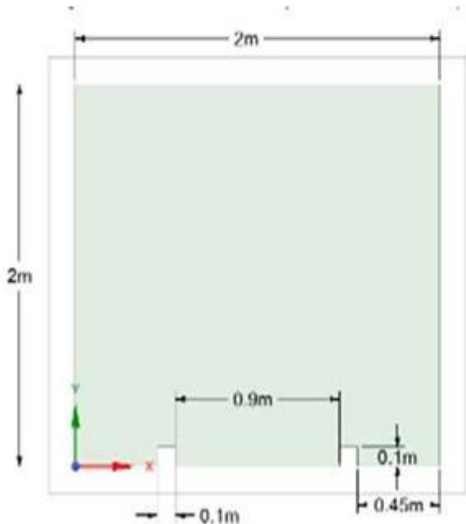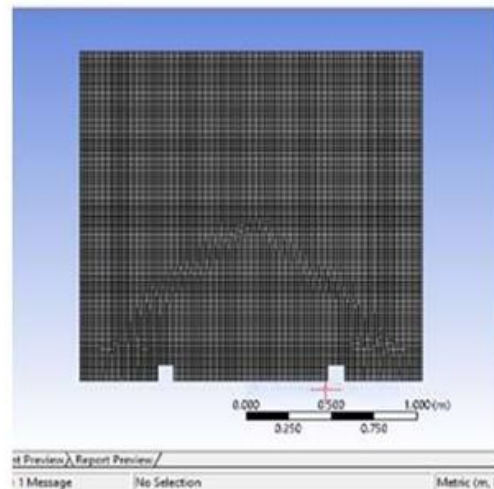
Fig 1   Dimension   Fig 2 Grid formation of lid

Fig 3 panel display

Re=200   18 Re=1000

Re=600   Re=400

Re=1200

Fig 8 Pressure contour

Re=200   Re=400

Re=600   Re=1000

Re=1200

Fig 9 Velocity contour

Re=400   Re=600

Re= 1000   Re=200

Re=800
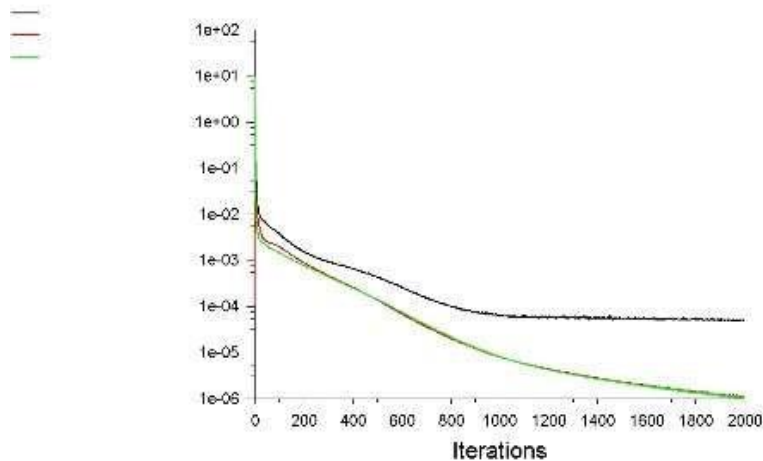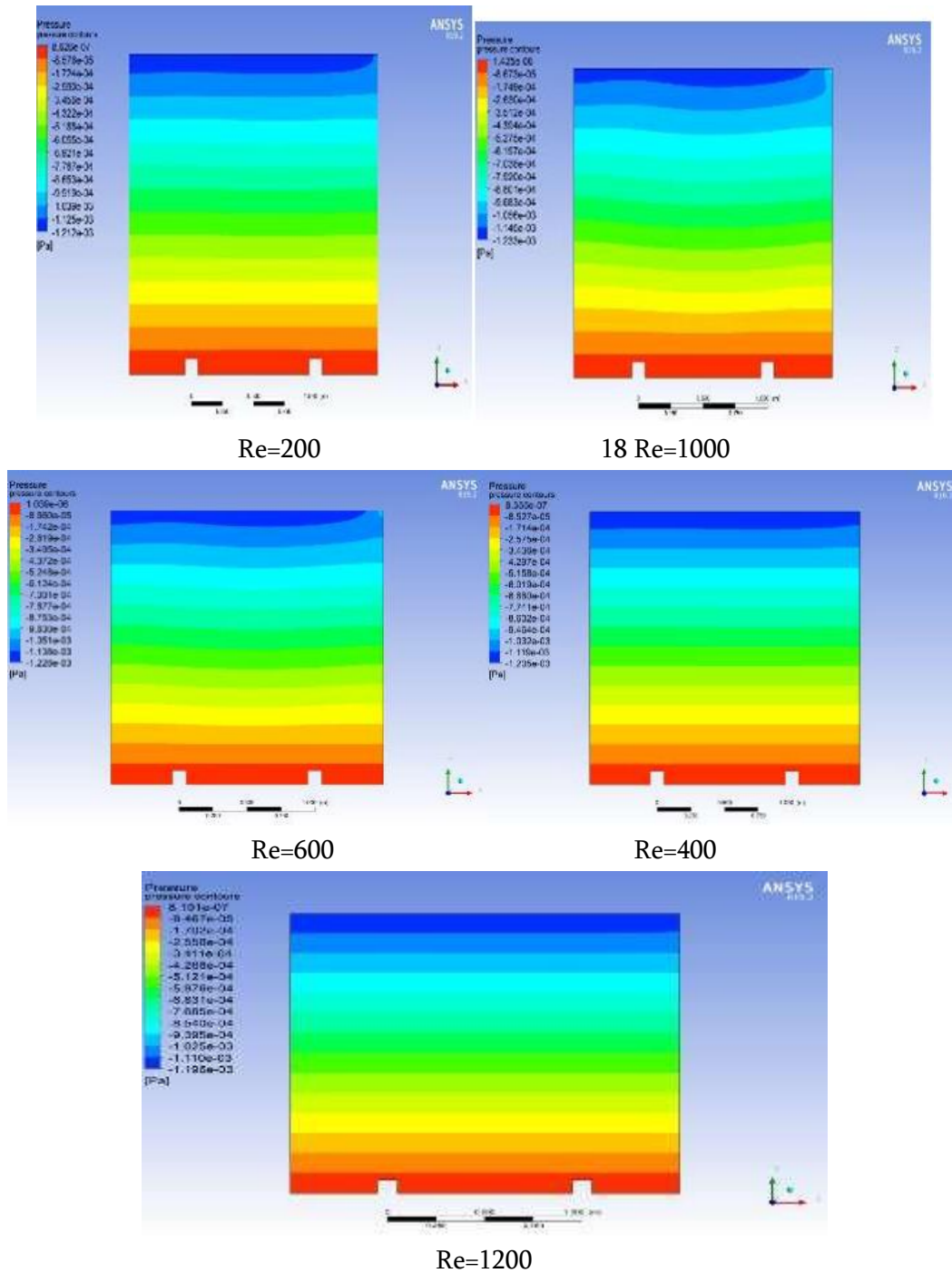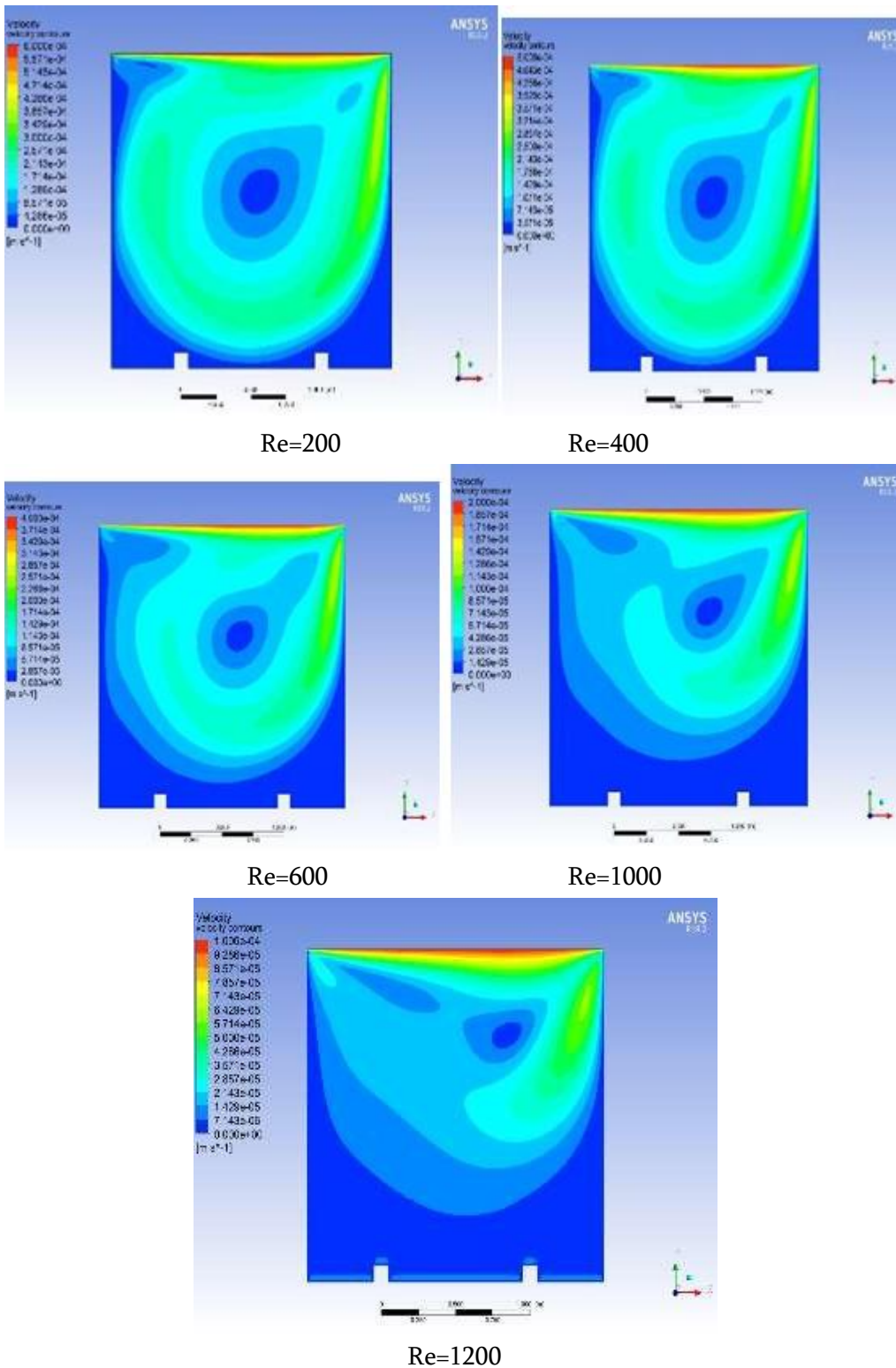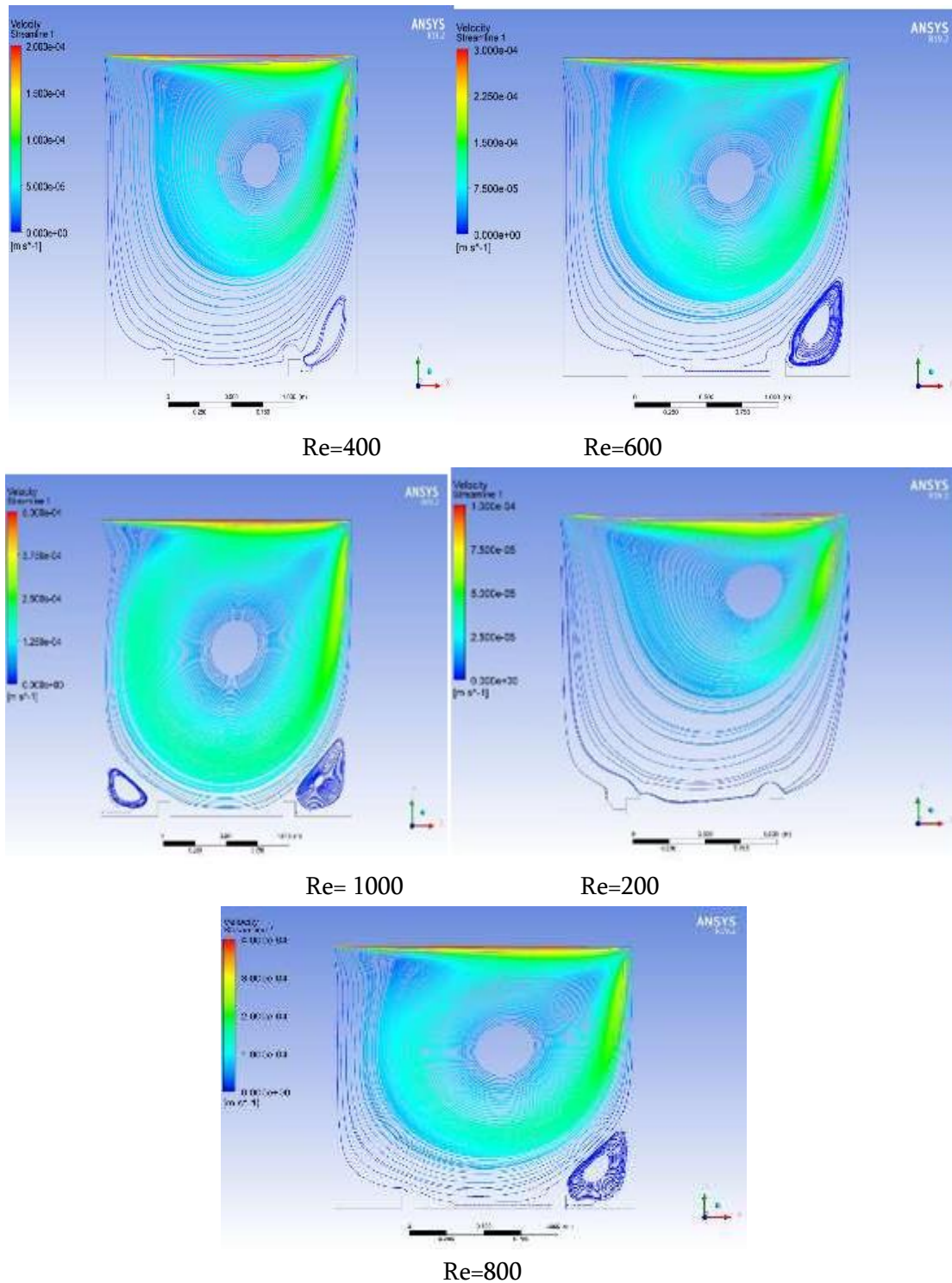
Fig 10 Velocity streamlines

III. CONCLUSIONS

Computational fluid dynamics (CFD) simulations are carried out for laminar incompressible fluid flow in lid driven cavity for different Reynolds number. The nature of the flow inside lid driven cavity of different Re was

visualized. It was found that the dynamics and structure of primary vortex are strongly affected by the Reynolds number cavity with ribs. It was noted that the pressure drop coefficient is a strong function of the position, aspect ratio and Reynolds number. Comparison the simulation results with the experimental data validate the commercially-available software FLUENT in ANSYS in providing a reasonable good solution of complicated flow structures, including flow.

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Experimental Investigation of Thermal Performance of EG/W Based Graphene- ZincOxide Nanofluid for Automotive Cooling Application

Mohammed Hussain Razi, Mohammed Naseef, Mohammed Naufal, Mohammed Shaheer Anas

Department of Mechanical Engineering, Yenepoya Institute of Technology, Thodar, Moodbidri-574236, Karnataka, India

ABSTRACT

The ethylene glycol (EG) based reduced graphene nano fluids exhibit remarkable thermal performance as coolant in automobile radiators. The present study investigates the heat transfer potential of EG based nano fluid as coolant for automobile radiator. Due to improved heat transfer rate of reduced graphene nano fluid, the overall size of radiator can be reduced.The heat transfer characteristics of reduced graphene/EG- deionized water nano fluid will be analyzed experimentally compared with conventional coolants. Thermophysical properties such as thermal conductivity, specific heat capacity, and density of EG based nanofluid will be experimentally determined. The concentrations of nanofluid were varied from 0.05 to 0.15wt%. Magnetic stirring and ultra-sonication process will be performed for the better stability, Tween-80 is used as a surfactant. The effect of tween-80 surfactant on stability of 0.1wt% nanoparticle will be experimentally investigated. The experiments were conducted by varying the coolant flow rate between 3 to 7 lit/min for various coolant temperatures (70°C to 90°C) to know about the effect of coolant flow rate on heat transfer rate.

Keywords—EG, graphene, stability, tween-80, nanofluid, magnetic stirring.

I. INTRODUCTION

In the current automotive, electrical, and manufacturing sectors, cooling is one of the most technical challenges faced by existing industries. Conventional coolants such as water, engine oils, mineral oils, and ethylene glycol used in these industrial sectors, including power generation, chemical production, air-conditioning, transportation,and micro-electronicsThese convective coolants have very low thermal conductivity and heat transfer rate. Improvisation and optimization of nanofluid necessary due to an increase in fuel consumption, evaporation of fuel, increase pollution and irretrievable damages to the vehicle engine components, this forced researchers to think about various ways to enhance heat transfer rate and cooling performance in the engine. A fluid consisting of solid nanoparticles with size less than 100nm suspended on it with solid volume fractions typically less than 4% and are synthesized by suspending nanoparticles of metals and metal oxides.[1,2]In 1990, Nanofluids were introduced by Choi in 1995 and they have been proven to efficient heat transfer compared to conventional fluids. A nanofluid can be produced by dispersing a typical size of less than 100 nm of metallic or

non-metallic nanoparticles or nano fibers in a base liquid. The presence of nanoparticles in the base fluids contributes better flow of mixing and higher thermal conductivity compared to pure fluid. Radiator system plays a vital role in preventing the vehicle engine from overheating due to friction. Conventionally, a car radiator pumps water as the heat transfer medium through the chambers within the engine block to absorb the heat and spread it away from other important parts [5,7].The improved cooling rates for automotive and truck engines can be used to remove more heat from higher horsepower engines with the same size of cooling system. Alternatively, it is beneficial to design more compact cooling system with smaller andlighter radiators. It is in turn benefit the high performance and high fuel economy of car and truck.Ethylene glycol or water based nanofluids have attracted much attentionin the application as engine coolant, due to the low-pressure operation compared with a 50/50 mixture of ethylene glycol and water, which is universally used automotive coolant.The nanofluids has a high boiling point, and it can be used to increase the normal coolant operating temperature and then reject more heat through the existing coolant system. These novel and advanced concepts of coolants offer better heat transfer characteristics compared to conventional coolants[3,8]. Nanofluids exhibit superior heattransfer characteristics to conventional heat transfer fluids.One of the reasons is that the suspended particles remarkably increase thermal conductivity of nanofluids. The thermal conductivity of nanofluid is strongly dependent on the nanoparticle volume fraction. So far it has been an unsolved problem to develop a sophisticated theory to predict thermal conductivity of nanofluids.Nanofluids seem to be potential replacement of conventionalcoolants in engine cooling system. Recently there have beenconsiderable research findings highlighting superior heat transferperformances of nanofluids.About15 to 40% of heat transfer enhancement can be achieved by using various types of nanofluids. With these superior characteristics, the size and weight of an automotive car radiator can be reduced without affecting its heat transfer performance[4,9].

II. EXPERIMENTAL WORK

In current section, it has clearly explained about how to prepare the stabilized nanofluid using Ultrasonicator.Using state of art radiator test rig available at KLE University, the performance of prepared nanofluid is evaluated. Experiment is carried out for various concentrated nanofluid and test cases.

2.1 Nanofluid Preparation

In general, there are two ways of producing the nanofluids. Namely one-step and two-step method. In One-step method for preparation of nanofluids physical vapour condensation technique was adopted. In this method the processes of drying, storage, transportation, and dispersion of nanoparticles were avoided, there by simultaneously making and dispersing the particles in the fluid. Agglomeration of nanoparticles is minimized, and the stability of fluids is increased.Two-step method is extensively used technique for preparing the nanofluids. In this process, the nanoparticles were produced by physical or chemical methods as dry powders (<100nm). The prepared nanoparticles were dispersed in the base fluid with the help of intensive magnetic force agitation or high-shearmixing as the second step then followed by ultrasonication. Fig. 1 shows the ultrasonic devices, both bath and probe type.

Nomenclatures	
Q	Heat transfer rate (W)
T	Temperature (oC)
Nu	Nusselt number
Cp	Specific heat capacity (kJ/kg K)
H	Convective heat transfer coefficient (W/m²K)
K	Thermal conductivity (W/m K)
L	Length (m)
$\dot{m}$	Mass flow rate (kg/s)
Dh	hydraulic diameter (m)
Greek Symbols	
φ	Weight concentration
Subscript	
Bf	Base fluid
Nf	Nanofluid
Hnf	Hybrid nanofluid

(a) Bath type

(b) probe type

2.2 Experimental Procedure

The radiator test rig facility available at KLE University. Once the stabilized nanofluid is prepared, the next step is to study the performance of radiator using nanofluid by varying several parameters like inlet temperature, mass flow rate of both fluids and volume concentration. The main components of the test rig consist of are cross flow type staggered fin radiator, high temperature water booster, Rotameter, U-Tube manometer, K-type thermocouples, Stainless Steel [SS] tank fitted with water heater. First the experiment is carried out on the base fluid to compare the results of nanofluid later.

The experiment consists of following steps:

1. The SS tank will be filled with 10-12 liters of test fluid.
2. Inlet fluid temperature is pre-set to 700C or 900C using thermostat.
3. Once the test fluid attains the pre-set temperature, pump is switched on and the required fluid flow rate is controlled using Rotameter.
4. When the test fluid starts to flow in the radiator, set the initial air flow rate by adjusting the knob in main electrical unit and note down the air velocity by using anemometer.
5. Note the readings of thermocouples, Rotameter, Anemometer and U-tube manometer for further calculations.

Radiator Test Rig

Stability evaluation of nanofluid

The addition of dispersants or surfactants is generally preferred to stabilize the nanofluid. Addition of dispersive agent lowers the surface tension of host fluid and increases the immersion capability of the nanofluid. In this work, initial focus was on the effect of weight concentration of tween-80 as surfactant for stable dispersion of Graphene-ZnOin deionized water. Hybrid nanofluid sample of Graphene-ZnO/Deionized water at 0.1 %wt and different weight concentration (0.05 %wt – 0.15 %wt) of tween-80 were prepared. Table 1 shows optimization of the surfactant used.

Table 1. Optimization of the surfactant

% weightconcentration (Surfactan)	Surfactant (Tween-80)gms	Nanoparticles (graphene+ZnO) (grams)	Remarks
0.05	0.125	0.25	Settlement of nanoparticles observed
0.075	0.1875	0.25	Partial settlement of nanoparticles observed
0.1	0.2500	0.25	No agglomeration, no settlement of nanoparticles observed (Stable fluid)
0.15	0.3750	0.25	No agglomeration, no settlement of nanoparticles observed (Stable fluid)

2.3 Thermo-physical properties

2.3.1   Density

Heat transfer through nano coolant depends on its density, Density of nanofluid and hybrid nanofluid were mathematically found by the below equations, [4, 6]

$$\rho_{hnf} = \varphi_{np1} \rho_{np1} + \varphi_{np2} \rho_{np2} + (1 - \varphi_{np1} - \varphi_{np2})\rho_{bf} \quad (1)$$

$$\rho_{nf} = \varphi_{np} \rho_{np} + (1 - \varphi_{np})\rho_{bf} \quad (2)$$

Where φ is the percentage of weight fraction, np1 and np2 are two different nanoparticles used in the study (ZnO and Graphene nanoparticles), ρ is the density of nanoparticle (kg/m3). The suffixes p is for particle, bf is for the base fluid, hnf is for the hybrid nanofluid and nf for the nanofluid.

2.3.2   Specific heat of nanofluids [4, 6]

$$\rho_{hnf} C_{(p,hnf)} = \varphi_{np1} \rho_{np1} C_{(p,np1)} + \varphi_{np2} \rho_{np2} C_{(p,np2)} + (1 - \varphi_{np1} - \varphi_{np2})\rho_{bf} C_{(p,bf)} \quad (3)$$

$$\rho_{nf} C_{(p,nf)} = \varphi_{np} \rho_{np} C_{(p,np)} + (1 - \varphi_{np})\rho_{bf} C_{(p,bf)} \quad (4)$$

np1 and np2 are two different nanoparticles used in the study (ZnO and Graphene nanoparticles), ρ is the density of nanoparticle (kg/m3), Cp is the specific heat (J/kg K). The suffixes np, hnf and bf are related to nano particle, hybrid nanofluids and base fluid, respectively.

Eq. (3) is used to find the specific heat of Graphene/ZnO nanoparticles theoretically. The Eq. (4) is used to find the specific heat of the Graphene nanofluid. Table2 shows the physical properties of Graphene-ZnO/Deionized water at 800C, weight concentration of Graphene-ZnO/Deionized water is varied from 0.050-0.150%wt. Table 3 shows the physical properties of Graphene/Deionized water at 800C

2.4 Experimental calculation [8,10,13]

The convective heat transfer coefficient (h) and Nusselt number (Nu) for the automotive heat transfer application is given by According to Newton's law of cooling, $Q = hA(T_b - T_w)$, (5)

where A is the surface area, Tb is the average bulk temperature, and Tw is the average wall temperature.

$$T_w = (T_1 + T_2 + \cdots + T_6)/6, \quad (6)$$

where T1 to T12 are the temperatures of radiator tubes at different locations measured by using 12 thermocouples situated on the radiator.

$T\_b=(T\_in+T\_out)/2,$ (7)

Here Tin and Tout are radiator inlet and outlet temperatures respectively

   Now, the heat transfer rate can be also calculated as

$Q=mC\_p (T\_in-T\_out).$ (8)

With the use of Eqs. (5) and (8), we can calculate the convective heat transfer coefficient of the nanofluid.

$h\_exp_{fo}t =(mC\_p (T\_in-T\_out))/(A(T\_b-T\_w))\cdot$ (9)

Now, the average Nusselt number Nu can be evaluated by using following equation:

$Nu\_exp_{fo}t =(h\_exp_{fo}t \times D\_hy)/k,$ (10)

Where CP is the specific heat capacity of the nanofluid, kis the thermal conductivity of the fluid, Nuexpt is the actual Nusselt number from the experimental calculation and Dhyis the hydraulic diameter of the tube.

III. RESULTS AND DISCUSSION

In the present work, the convective heat transfer coefficient, Nusselt number and heat transfer rate of an automobile radiator using EG/deionized water and Graphene-ZnO/deionized water as coolant for various weight concentrations (φ = 0.05-0.15 %wt) were investigatedexperimentally. The experiments were conducted for various nanofluid volume flow rate and inlet temperature. The heat transfer rate, convective heat transfer coefficient and Nusselt number for Eg/deionized water (Nanocoolant) at 0.1% wt for various volume flow rate (3 to 7 L/min) at 80°C is tabulated in Table 6.

Table 6. Graphene/ZnOat 0.1% wt.

Sl. No	Nano-coolant Temperatue	Volume flow rate (L/min)	Nu	h (W/m²K)	Q (W)
1	80°C	3	5.80	740	4440
2		4	8.70	1110	5106
3		5	14.10	1809	6512
4		6	20.50	2619	7334
5		7	29	3708	8158.50

The heat transfer rate, convective heat transfer coefficient and Nusselt number for deionized water for various mass flow rate (3 to 7 L/min) at 80°C is tabulated in Table 7.

Table7. Deionized water

Sl. No	Deionized water Temperature	Volume flow rate (L/min)	Nu	h (W/m²K)	Q (W)
1		3	2.33	350	2940
2		4	3	464	3528

3	80˚ C	5	4.4	658	3750
4		6	6.2	930	4091
5		7	9.55	1432	4295

The maximum value of Nusselt number was observed in Graphehe+ZuO/ Deionized water hybrid nanofluid (0.1% wt concentration) at 65 as compared with the deionized water, Eg/deionized water nanofluid (0.1% wt concentration). The maximum enhancement in the Nusselt number was observed to be 295% for Graphene-ZnO/Deionized water hybrid nanofluid (0.1% wt concentration) as compared with the deionized water at 65 , 7 L/min volume flow rate. Nusselt number for nanocoolant increases with increase in coolant volume flow rate is observed. The maximum Nusselt number enhancement was found to be 30% for Graphene-ZnO/Deionizedwater hybrid nanofluid (0.1%wt concentration) compared with Graphene/deionized water based nano coolant at 65

IV. CONCLUSIONS

In the present study the performance of aqueous based hybrid nanofluid Graphene-ZnO and graphene as a automobile radiator coolant has been experimentally investigated at different inlet temperatures. The weight fraction of nanoparticle is varied from 0.05-.15 %wt. The experiment was conducted with the variation of nanocoolant flow rates from 3 L/min to 7 L/min and at the temperature range of 55oC to 65oCwith regular increments of 5oC.

From this study following conclusions can be drawn:

➢ Significant increase in the heat transfer rate was observed with increase in hybrid nano coolant flow rate.

➢ Increase in the hybrid nano coolant flow rate enhances the Nusselt number and convective heat transfer coefficient.

➢ With the increase in the nano-coolant flow rates, the heat transfer rate, Nusselt number and the convective heat transfer coefficient enhances for all values of nano particle weight concentration.

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Design and Analysis of Four Stroke Petrol Engine with Hydrogen Rich as Fuel

Ajith Shetty[1], Ramraj N C[2], M Darshan[2], Mohammed Alfas Moosa Jamal[2], Mohammed Fameez[2]

[1]Assistant Professor, [2]Student

Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri-574236, Karnataka, India

ABSTRACT

The internal combustion engine has played an important role in the transport industry with outstanding advantages in power generation, although the increasing pressures of fuel use and environmental pollution from these engines are big problem. Moreover, increasingly stringent emissions targets and the rapid depletion of oil resources have prompted researchers to study the use of alternative fuels for IC engines. Hydrogen is one of the best alternatives to traditional fuels. Hydrogen has its benefits and limitations in its use as an alternative fuel in transportation engines. Hydrogen is the most abundant element in the universe and exists mainly as a compound with other elements. Hydrogen has long been viewed as a desirable fuel for internal combustion engines. Unlike fossil fuels, these are non-polluting fuels, renewable and can be produced from endless water. On the other hand, one of the most effective ways to improve combustion efficiency on existing engines without much change in engine structure is to add a small amount of hydrogen gas or hydrogen-rich gas to the engine. This paper briefly presents the outstanding properties of hydrogen fuels that affirm their applicability in internal combustion engines. Furthermore, the evaluation of hydrogen fuel using solutions on IC engines is also presented to clarify the engine characteristics and emissions when using this fuel

Keywords—Hydrogen chamber, Electrolysis, IC Engine, Battery

I. INTRODUCTION

Much of the world's energy comes from material formed hundreds of millions of years ago, and there are environmental consequences for it. Decomposing plants and other organisms, buried beneath layers of sediment and rock, have taken millennia to become the carbon rich deposits we now call fossil fuels. These non-renewable fuels, which include coal, oil, and natural gas, supply about 80 percent of the world's energy. They provide electricity, heat, and transportation, while also feeding the processes that make a huge range of products, from steel to plastics. When fossil fuels are burned, they release carbon dioxide and other greenhouse gases, which in turn trap heat in our atmosphere, making them the primary contributors to global warming and climate change. The two main problem of the internal combustion (IC) engine which contribute negatively in our life. These two problems are emissions, which is related to the environment, and mechanical problems,

which are related to the IC engines themselves. In this project the focus will be on some solutions for these two problems. The exhausts of vehicles, IC engines, are a main source of emissions. Self-ignition can be defined as the situations in which the fuel in a combustion chamber burned automatically without external cause such as a spark plug, and this is caused due to extremely high temperature and pressure inside the chamber. But the fuel inside the combustion chamber will not burn in the proper time, and the combustion cannot be as efficient as if it burns in a proper time. Consequently, this problem will have negative effects from both economic and environmental perspectives. This will cause to more emissions with poisonous gas, to reduce it we have come across this idea. As we already know that the fossil fuel on planet earth is coming to an end, everyone is looking for an alternate fuel. Hydrogen is a clean fuel that, when consumed in a fuel cell, produces only water. Hydrogen can be produced from a variety of domestic resources, such as natural gas, nuclear power, biomass, and renewable power like solar and wind. These qualities make it an attractive fuel option for transportation and electricity generation applications. It can be used in cars, in houses, for portable power, and in many more applications.

Hydrogen is an energy carrier that can be used to store, move, and deliver energy produced from other sources. Today, hydrogen fuel can be produced through several methods. The most common methods today are natural gas reforming (a thermal process), and electrolysis. Other methods include solar-driven and biological processes. Thermal processes for hydrogen production typically involve steam reforming, a high-temperature process in which steam reacts with a hydrocarbon fuel to produce hydrogen. Many hydrocarbon fuels can be reformed to produce hydrogen, including natural gas, diesel, renewable liquid fuels, gasified coal, or gasified biomass. Today, about 95% of all hydrogen is produced from steam reforming of natural gas.

The vehicle produces lots of pollution in our environment which is one of the main issues faced by us. To overcome this problem we have selected hydrogen, which reduces the smoke, and even if the unburnt hydrogen comes out it's not a problem for humans or to the environment, Hydrogen will help to increase the efficiency of the engine. Now a day's raise in the rate of fuel is also a main problem faced by people so by reducing the fuel consumption we can save money and also the fuel.

II. LITERATURE SURVEY

R.Sharavanan, et.al [1] In this paper they discussed about how to obtain the high-efficiency petrol engine by modifying the engine. He has focused on the compression ratio of the petrol engine. By increasing the compression ratio by 9 to 9.58 to achieve high thermal efficiency. The possibility of detonation is minimized by mixing around 5% of anti-knock additives called toluene with the petrol and it has been found that the air standard efficiency of an engine is increased from 58.36% to 59.47% and decrease in pollutants.

H R Reitz et.al[2]In this paper he discusses about affordable energy has been instrumental in raising the standard of living in the world dramatically, particularly in poor countries, and the fact that so far in the history of humanity, the burning of fossil or bio-derived fuels has been the only reliable source of energy, The entire planet is linked by massive transportation which is based on the IC engine so it may take decades to replace it, The advancement in IC engine technology have decreased pollutant level down, The obstacles still faced by proposed alternatives, such as EV powered by batteries, which have tremendous cost, weight and

other limitations and the concerns about the impact of IC engines on climate change have become politically charged.

Zaid Karjikar [3] In this paper discusses the various beneficial properties of hydrogen, its use as a fuel in internal combustion engines, fuel cells, its performance and compares FCEVs with electrical vehicles and the challenges faced in making hydrogen- based vehicles available for the masses thereby giving the reader a thorough idea about the scope of hydrogen-based vehicles.

Stefan Sterlepper et.al [4] In his experiment he used and said hydrogen as carbon-free fuel is a very promising candidate for climate-neutral internal combustion engine operation. In comparison to other renewable fuels, hydrogen does obviously not produce CO2 emissions. In this work, two concepts of hydrogen internal combustion engines (H2 -ICEs) are investigated experimentally, while H2 -ICEs present new challenges for the development of the exhaust gas after treatment systems, they are capable to realize zero-impact tailpipe emission operation.

ZbigniewStepien [5]This paper provides a comprehensive review and critical analysis of the latest research results in addition to an overview of the future challenges and opportunities regarding the use of hydrogen to power internal combustion engines (ICEs).

M. Faizal, et.al [6]In this paper they discussed about the non- renewable sources of energy are being depleted at an exponential rate. Thus, alternative sources of fuel have become more important to prevent the occurrence of an energy crisis. Seeing that hydrogen is not a source of energy but rather, a carrier of energy, Various methods of producing, storing and transporting hydrogen have been discovered to accommodate the demands for hydrogen, making it as easily accessible as petroleum but not as environmentally harmful. The hydrogen market is a nice market that is slowly gaining popularity, proving that hydrogen fuels will be the next big wave.

Ho Lung Yip, et.al [7] In this paper they discussed about a paradigm shift towards the utilization of carbon-neutral and low emission in the internal combustion engine industry to fulfil the carbon emission goals .Hydrogen as an energy carrier and main fuel is a promising option due to its carbon-free content, wide flammability limits and fast flame speeds. For spark-ignited internal combustion engines, utilizing hydrogen direct injection has been proven to achieve high engine power output and efficiency with low emissions.

Frantisek Synak, et.al [8]In this paper they discussed about road transport has a significant effect on air pollution. So in this they focuses on the impact of addition of "oxyhydrogen", known as HHO, on selected vehicle features. These features, on which this study is focused, include the engine power and torque, composition of the exhaust gases and fuel consumption. There was also an impact of HHO on the value of pre-ignition as well as engine cleaning observed.

FuratDawood et.al [9] In this paper they discussed about Power to hydrogen is a promising solution for storing variable Renewable Energy (RE) to achieve a 100% renewable and sustainable hydrogen economy. The hydrogen-based energy system comprises four main stages. The hydrogen production pathway and specific technology selection are dependent on the type of energy and feedstock available as well as the end-use purity required. Hence, purification technologies are included in the production pathways. Despite hydrogen being zero-carbon-emission energy at the end-use point, it depends on the cleanness of the production pathway and the energy used to produce it.

Shan Wang, et.al [10]In this paper they discussed about water splitting electrolysis is a promising pathway to achieve the efficient hydrogen production in terms of energy conversion and storage in which catalysis or electro catalysis plays a critical role.

Akal D, et.al [11]In this paper they said hydrogen is an alternative fuel with high efficiency and superior properties. The development of hydrogen-powered vehicles in the transport sector is expected to reduce fuel consumption and air pollution from exhaust emissions. In this study, the use of hydrogen as a fuel in vehicles and the current experimental studies in the literature are examined and the results of using hydrogen as an additional fuel are investigated.

Van Tam Bui, et.al [12]In this paper they discussed about the internal combustion engine has played an important role in the transport and industry. Hydrogen is one of the best alternatives to traditional fuels, Hydrogen has its benefits and limitations in its use as an alternative fuel in transportation engines. Hydrogen is the most abundant element in the universe and exists mainly as a compound with other elements. Unlike fossil fuels, these are non-polluting fuels, renewable and can be produced from endless water.

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ShahramAmiri, et.al [15] In this paper they discussed about hydrogen is an important and environmentally friendly energy source and the need for its usage is growing across the world. Water-Gas Shift (WGS) reaction is the key approach for hydrogen production which uses different catalysts with respect to conditions at which the reaction occurs. This research examines the applicability of a machine learning technique called Least Square Support Vector Machine (LSSVM) to predict the conversion of carbon monoxide in WGS reactions according to various compositions for active phase and different kinds of support compounds for catalysts. The implemented method considers the intrinsic catalyst variables to predict the performance of the reaction by using variables such as surface area, calcinations time and temperature

III. METHODOLOGY

In this work we use four stroke petrol engines as our working engine, and supply a renewable energy source to the engine. The main goal of this project is to reduce the fuel consumption and reduce the emission and to

make eco-friendly and economic. In this project we use certain process to produce hydraulics process to produce the hydrogen. Here we use water as a base source to produce hydrogen by electrolyses process; after we produce hydrogen, we then directly supply hydrogen to the carburettor of the engine. The hydrogen then passes with the fuel to the combustion chamber of the engine, with the help of hydrogen the combustion process in the combustion chamber will take place very smoothly and it will also reduce the emission of the engine. It will also reduce the fuel consumption of the engine.
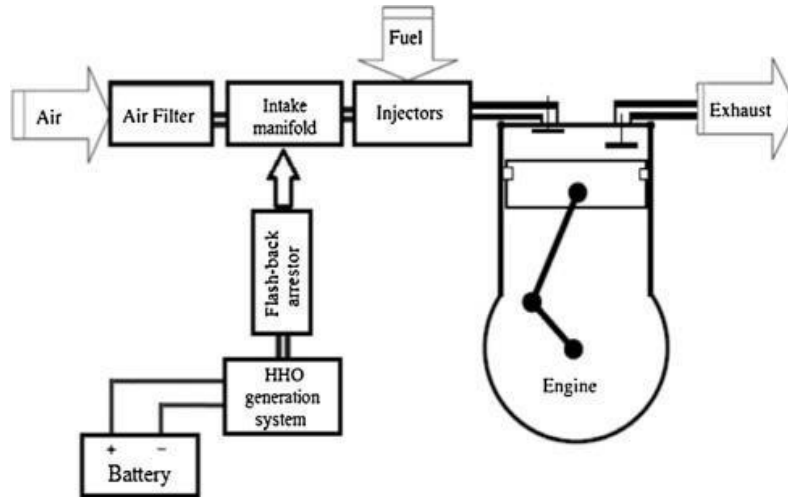
FIG : BLOCK DIAGRAM

IV. COMPONENTS USED

The various components used for the construction of our model is shown below.
➢ BATTERY
➢ CARBURETOR
➢ IC ENGINE
➢ FUEL TANK
➢ HYDROGEN CHAMBER
➢ ELECTROLYSIS

V. APPLICATION

Automobile vehicles such as bike, car, scooter, also this can be used in various industries for efficiency purpose and pollute free nature.

VI. RESULTS

The overall result of hydrogen in IC Engine can create more efficient efficiency engine and pollute free tail pipe, by using this hydrogen engine we can create a eco friendly nature which can result a better tomorrow in automobile field.

TABLE : POLLUTION TEST RESULT

INTIAL	PRES STD	MEASURED LEVEL
CO	3.5	01.854
HC	4500	3892
CO2		00.80
O2		14.37

FINAL	PRES STD	MEASURED LEVEL
CO	3.5	01.545
HC	4500	3243
CO2		00.69
O2		13.85

VII.   CONCLUSION AND FUTURE SCOPE

Hydrogen gas has a very small density, the energy density per unit volume is very small, so it is used in an internal combustion engine, it is necessary to compress to very high pressure or be liquefied. One simple solution to use hydrogen gas or a mixture of hydrogen-rich gas for an internal combustion engine is to supply a small amount of hydrogen gas or a mixture of hydrogen-rich gas into the engine intake manifold or the engine cylinder. Hydrogen in this case acts as a fuel additive or a catalyst to promote combustion more thoroughly. The effect of adding hydrogen to the intake manifold of a compressed combustion engine is significantly reduced in the emission components of HC, CO, CO2, PM and soot. However, the NOx content increases with the addition of hydrogen, but this problem can be controlled with solutions such as spray strategy, using EGR systems, spraying water vapour onto cylinder walls as well as using post-generation remedies. The efficiency of diesel-hydrogen dual-fuel engines with different hydrogen injection systems found that the solution of hydrogen injection into the intake manifold was better and reduced emissions components compared to the technology that provides hydrogen by the carburettor and sprayed into the intake manifold.1) for big scale implementation, RO and UV water filter may be used for manufacturing such water that meets the standard of WHO and BIS simply. 2) Peltier device has many varieties of models that are much efficient than TEC1. Those may be used. 3) The conception of this project can even be used as a far better alternative in refrigeration science against typical systems. It can even be determined during this method i.e. the usage of such low power semiconductor devices are indicating towards additional outstanding evolution of cooling engineering that's attending to alter the entire situation and myths regarding the ability consumption of refrigeration science. therefore, in close to future we'll be able to use such devices that are currently restricted inside the project works.

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Design and Implementation of Solar-Powered Charging Infrastructure for Electric Vehicles

Srihari P V Raj, Akshay Pradeep, Jinil Saju, Vyshnav Jayachandran

UG Scholars, Department of Mechanical Engineering, Yenepoya Institute of Technology, Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

Charging time basically depends on the battery's capacity, power density, and charging power. The larger the capacity, the more charge the battery can hold (analogous to the size of a fuel tank). Higher power density allows the battery to accept more charge/unit time (the size of the tank opening). Higher charging power supplies more energy per unit time (analogous to a pump's flow rate). An important downside of charging at fast speeds is that it also stresses the mains electricity grid more. Charging stations are typically connected to the grid, which in most jurisdictions relies on fossil-fuel power stations. However, renewable energy may be used to reduce the use of grid energy. Growing concern of carbon dioxide emissions, greenhouse effects and rapid depletion of fossil fuels raise the necessity to produce and adopt new eco-friendly sustainable alternatives to the internal combustion engine (ICE) driven vehicles. For this reason, in the last decade, EVs have become in some way widespread, principally because of their negligible flue gas emissions and lesser reliance on oil. It is estimated that by 2022, EVs will be over 35 million in the World. However, a critical problem associated with EVs is that their high penetration causes significant issues on the power distribution grid such as: power quality deterioration, enhanced damaged of line, downturn of distribution transformers, increased distortion and higher fault current. One efficient approach to relieve the effect is to integrate local power generation such as renewable energy sources (RESs) into the EV charging infrastructure. Hence Design and Implementation of Solar Powered charging Infrastructure for Electric Vehicles.

I. INTRODUCTION

Over the past few years, electric vehicles (EV) have gained significant traction because of their appeal as a credible alternative to gas-powered vehicles. Since 2008, more than 4,10,000 EVs have been sold in the US alone by December 2015, representing 33% of the global sales. With EVs expected to be a major source of transportation in the future, there has been meaningful discussion around their adoption including those for policymakers. However, EVs require a charging station that enables them to "fuel up" its batteries similar to gasoline powered cars. While EVs are inherently pollution free, the electricity used to charge their batteries may be drawn from traditional fossil-fuelled power plants, diminishing their appeal as an environment-friendly mode of transport. Recently, there is a move towards designing solar-powered EV charging stations that

provide clean electricity. With the reduction in solar costs and improvement in solar efficiency, building solarpowered EV charging station presents an excellent opportunity to greenify our transportation needs, making EVs end-to-end environmentally positive. While PV systems may be installed on rooftops to build such charging stations, solar canopies installed on parking lots make an excellent choice for solar-powered EV charging stations as it not only generates clean electricity but also provide shade to the vehicle. Electric vehicles appeared in the mid-19th century. An electric vehicle held the vehicular land speed record until around 1900. The high cost, low top speed, and short range of battery electric vehicles, compared to 20th-century internal combustion engine vehicles, led to a worldwide decline in their use as private motor vehicles; although electric vehicles have continued to be used in the form of loading and freight equipment and public transport–especially rail vehicles. At the beginning of the 21st century, interest in electric and alternative fuel vehicles in private motor vehicles has increased due to growing concern over the problems associated with hydrocarbon-fuelled vehicles, including damage to the environment caused by their emissions, and the sustainability of the current hydrocarbon-based transportation infrastructure as well as improvements in electric vehicle technology. Since 2010, combined sales of all-electric cars and utility vans achieved 1 million units delivered globally in September 2016, 4.8 million electric cars in use at the end of 2019, and cumulative sales of light-duty plug-in electric cars reached the 10 million unit milestone by the end of 2020. A charging station, also called an EV charger or electric vehicle supply equipment (EVSE), is a piece of equipment that supplies electrical power for charging plug-in electric vehicles. Although batteries can only be charged with DC power, most electric vehicles have an onboard AC-to-DC converter that allows them to be plugged into a standard household AC electrical receptacle. Inexpensive low-power public charging stations will also provide AC power, known as "AC charging stations". To facilitate higher power charging, which requires much larger AC-to- DC converters, the converter is built into the charging station instead of the vehicle and the station supplies already-converted DC power directly to the vehicle, bypassing the vehicle's onboard converter. These are known as "DC charging stations". Most fully electric car models can accept both AC and DC power.

Charging stations provide connectors that conform to a variety of standards. DC charging stations are commonly equipped with multiple connectors to be able to supply a wide variety of vehicles.

II. METHEDOLOGY

The detailed methodology for the development of a fully solar EV charging infrastructure is given below.

1. Select a suitable location for solar panel installation by conducting a survey for radiation intensity and the availability of solar energy.
2. Calculate the amount of panelling area and storage required for the charging station.
3. Create a self-contained, all-solar charging infrastructure.
4. Collect the components as per the requirements. 5. Install the setup and conduct the testing

III. COMPONENTS USED

Comprehensive over view of all basic components required for implementation of solar powered electric vehicle charging station.

Power supply unit
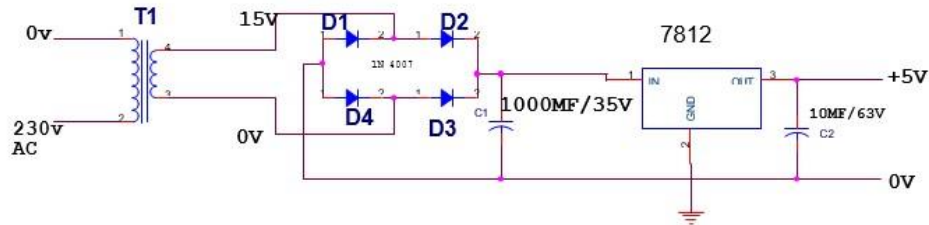
Battery

The lead acid cell type is a secondary cell or storage cell, which can be recharged.   The charge and discharge cycle can be repeated many times to restore the output voltage, as long as the cell is in good physical condition. However, heat with excessive charge and discharge currents shortends the useful life to about 3 to 5 years for an automobile battery. Of the different types of secondary cells, the lead-acid type has the highest output voltage, which allows fewer cells for a specified battery voltage.
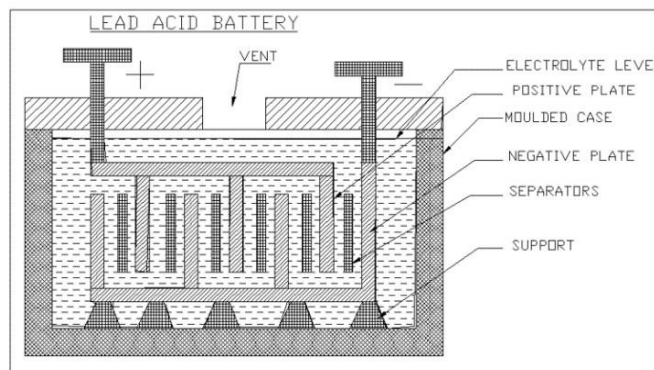
LCD display

The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. In this project document, we will discuss about character-based LCDs, their interfacing with various microcontrollers, various interfaces (8-bit/4-bit), programming, special stuff and tricks you can do with these simple looking LCDs which can give a new look to your application.

Relay

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts. It was invented by Joseph Henry in 1835. Because a relay is able to control an output circuit of higher power than the input circuit, it can be considered to be, in a broad sense, a form of an electrical amplifier.

Charge controller
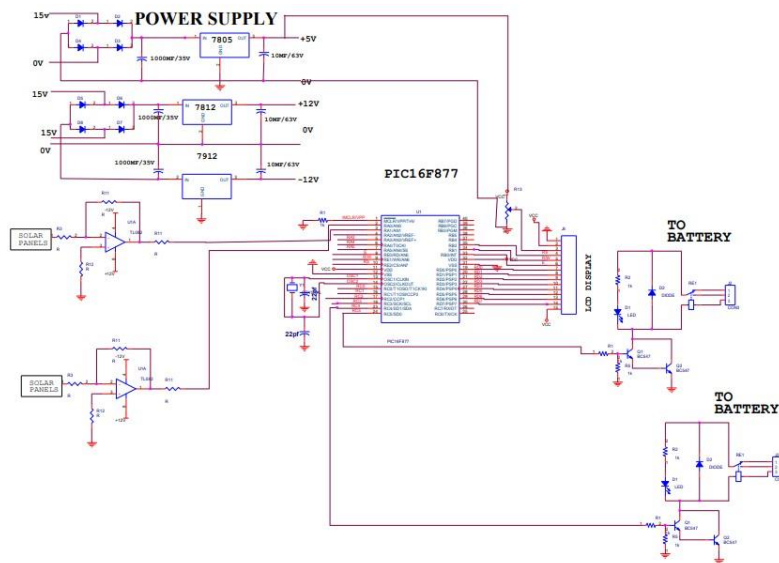
Solar panel

The most useful way of harnessing solar energy is by directly converting it into electricity by means of solar photo-voltaic cells. Sunshine is incident on Solar cells, in this system of energy Conversion that is direct conversion of solar radiation into electricity.

IV. CONCLUSION AND FUTURE SCOPE

By implementing this system, it reduces carbon emission and cost of charging electric vehicles reduces. As the electric vehicles are increasing there will be a load on the grid system. This off-grid system helps to reduce the dependency on grid. India will reduce its dependency on fossil fuels for driving electric vehicles.

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Novel Methods To Increase the Productivity of Solar Still – A Review

Ayan Ahmed Shiek[1], Swasthik[1], Tabish Tabarak Sheikh[1], Veekshith[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology, Yenepoya Institute of Technology, Thodar, Moodbidri-574236, Karnataka, India

ABSTRACT

In today's existing scenario of achieving and competing with other developed countries, the developing and underdeveloped nations are facing severe problems to provide adequate and safe drinking water. Various methods are employed by researchers for improving the productivity of solar still. This paper is a thorough review of recent developments in productivity enhancement. Solar interfacial evaporation is found to be an effective desalination method, and its success depends on the evaporation rate and wick structure.

Keywords—wick, interfacial, evaporation, desalination.

I. INTRODUCTION

In today's existing scenario of achieving and competing with other developed countries, the developing and underdeveloped nations are facing severe problems to provide adequate and safe drinking water. With the rapid increase in population and to meet its needs, the usage of fossil fuels has increased at an unprecedented rate leading to environmental issues like greenhouse gas emissions and climate change. In a conventional process, desalination used fossil fuel as the thermal source for heating but due to the rapid decrease in the fuel availability, it is necessary to go with the renewable energy for the desalination process.

During emergency and crisis conditions, access to electricity becomes very difficult, leading to the need for developing an efficient and portable technique to obtain a clean source of water.

The input energy of the passive solar stills, but the efficiency of the system is low. Attempts have been made to increase efficiency and productivity by preheating the saline water in solar stills. This method is called active solar distillation. In the case of active solar distillation, an additional source of thermal energy is required for faster evaporation inside the same passive solar still. The additional source may be a solar-energy-based system or thermal energy contained in hot water which is discharged by other industries.

There is a great need to find ways to supply water for the earth's population. Many countries are facing water shortages and or have residents who use and drink contaminated water. Finding different ways to use our renewable resources has become an interest. Solar water distillation is the process of using energy from the sunlight to separate freshwater from salts or other contaminants. The untreated water absorbs heat, slowly

reaching high temperatures. The heat causes the water to evaporate, cool, and condense into vapour, leaving the contaminants behind. Solar stills can be used for low capacity and self-reliant water supplying systems. Solar stills are usually used in remote areas where there is limited access to fresh water. The basic principles of solar water distillation are simple, yet effective, as distillation replicates the way nature makes rain. A solar still works on two scientific principles: evaporation and condensation. The salts and minerals do not evaporate with the water. Most stills are simple black bottomed vessels filled with water and topped with clear glass or plastic. Sunlight that is absorbed by the black material speeds the rate of evaporation. The evaporation is then trapped by the clear topping and funneled away. Most pollutants do not evaporate, so they are left behind. Most stills need to be about six square meters in size to produce enough water for a single person for a day.
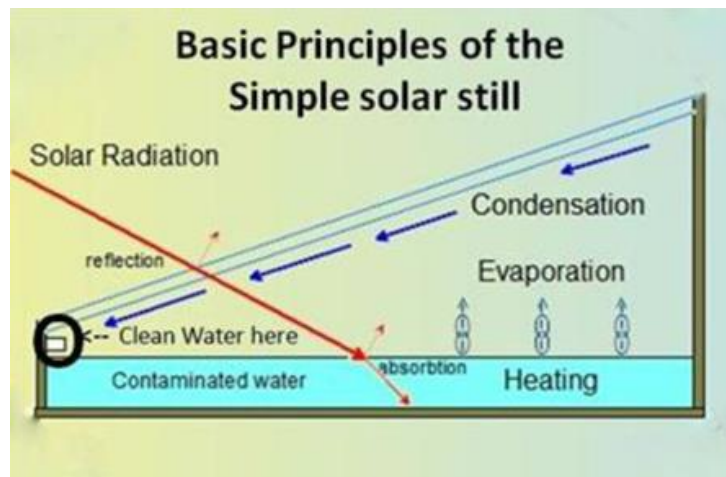
Fig1.1 Basic principles of simple solar still

II. LITERATURE REVIEW

Caturwati Ni Ketut et.al [1] used phase change material as a heat storage system in solar distillation and determine the effectiveness of phase change material (PCM). This paper evaluates the effectiveness of using sodium thiosalphatepenta-hydrate as PCMs for double slope solar distillation in Indonesia. It results at night generally condensate production in a system with PCM high than without PCMs due to the release of energy from energy stored during the day. Use of this hydrate as PCM increases condensate product by 38% without PCM.

Atia E khalifa et.al [2] experimentally evaluated the performance of solar-heated multistage direct contact membrane distillation for sustainable water production. Parallel and series connection 3 DCMD (direct contact membrane distillation) stages for feed and permeate stream were tested and compared. Feed and permeate flow plays a very important role. In parallel flow, it has a high permeate flux compared to series. It is more sensitive also.

Fayadh M Abed et.al [3] mathematically modeled and experimented investigation conducted on solar desalination in Tilent, Iraq. They used Thimble blue and orange methyl was dozed in saline water to make a comparative evaluation of distillation efficiency using undoped saline water. Using these chemical dyes

improves the output and efficiency of solar still. The amount of produced water also increased by 40%. Thimble blue using at February 49%, June 53% orange methyl has second place in February 42% and June 44%.

Mariem Jobrane et.al [4] designed conceptual improvements to the design and distillation process of a wick-type solar still are presented for the purpose of overcoming the low efficiency of the classic system. The results inferred that the advanced system produces significantly high distillate outputs of about 4.03 L.m^{-2}.d^{-1} for an average of 380W.m^{-2}.Thereafter, the numerical results were experimentally validated, and it was proven that the efficiency of the advanced solar still was enhanced by 32% in comparison to the conventional solar still. The physic-chemical and bacterial analysis of the produced water revealed that the improved solar still can supply good quality of drinking.

Bo Ge a et.al [5] assembled 3 D photo thermal devices inspired by plant transpiration in nature, mainly including a floating layer composed of hydrophobic Co_3O_4 and compound photo-catalyst, a hydrophilic layer, and a Co_3O_4 photo thermal conversion layer. Non-wetting fabrics not only realize the photo-thermal device floating on the water surface, but also obtains the ability to remove the organic solvent and water-soluble pollutants. The fabric surface remained non-wettable, proving its mechanical and temperature stability after blade scraping, surface adhesion, sandpaper grinding, and treatment at 300 °C. The photo-response ability and degradation of pollutants are improved by forming a hetero junction between composite catalyst, and the O_2- is verified as the main active species. A vapour production rate of 2.34 kg/m²hr under 2 sun illumination is achieved through the 3 photo thermal device. The modular design guides the flexible application of 3-D photo thermal devices.

Xiuqiang Li et.al [6] in this review he aims to introduce interfacial solar steam/vapour principles to realize heating and cooling and the recent progress in materials, structures, devices, and applications. Meanwhile, some unsolved scientific and technical problems with outlook will also be discussed, hoping to promote further the rapid development and application of interfacial solar steam/vapour technology in heating and cooling to alleviate energy and environmental problems.

Kamran Mahboob et.al [7] in this research, a solar still based on clean technology using solar energy to drive the system is used. It can be operated easily and with an approximately negligible maintenance cost. A pyramid solar water desalination unit with modification of the solar electric water heater used to increase water temperature is developed to increase the water yield per day. A theoretical model of the solar still unit with and without an electric water heater is developed and performance is compared. Based on this, fabrication is carried out and experiments are performed to predict the overall output. It is observed that the output distilled water has a TDS (total dissolved salts) value much lower than the TDS of groundwater. Additionally, the average output of a solar water desalination unit with an electric water heater is found to be enhanced compared with the unit without an electric water heater.

Mohammad Mustafa Ghafurian et.al [8] by pressing micro-scale sawdust into a polystyrene mould using a manual hydraulic press and enclosing it in an aluminium grid (S/Al), a substrate for SSG was made. Adjusting the porosity of the SSG device has a significant effect on the evaporation performance due to its potential in regulating the transfer of bulk water to the evaporation surface and controlling the thermal conductivity of the substrate. The optimal sawdust-based photo absorber with a 62% porosity represented 59% evaporation efficiency under 2.2 kW/m². In addition, to improve the photo thermal performance for the first time,

vanadium dioxide nanoparticles doped by tungsten (W_3-VO_2) as a photo thermal layer on the sawdust-based substrate were used. The results were compared with those of carbonized sawdust-based substrate supported by black aluminium grid (S/C/AleB). The excellent performance belonged to S/Al/W_3-VO_2 device with 90% evaporation efficiency under 2.2 kW/m² which was 3.3 and 1.2 times greater than pure water and S/C/AleB, respectively. Due to the high performance, environmentally friendly, cost-effectiveness, and availability of the proposed device, the S/Al/W_3-VO_2 photo absorber can be used in remote areas for large-scale applications.

Mohammad Al-Harahsheh et.al [9] there were three modifications on a solar still studied experimentally in this work. These included a double glass cooled solar still (SS), a SS connected to an external solar collector (SSC), and an SSC incorporating phase change material (PCM) filled in a nest of steel pipes immersed in the water basin. The addition of an external solar collector and stainless steel pipes to the solar still increased the productivity by 3.2 folds. The addition of PCM to the basin improved the daily productivity. A further enhancement is possible if efficient cooling of the glass cover is provided.

Akshadeep Negi et.al [10] in this Experiment the conventional still has been modified for two cases horizontal wick solar still and solar still with a tilted wick at 30° coupled with a flat plate collector (FPC). The inclination of glass cover glass was taken as 45°with the horizontal surface and 3 cm water depth was taken inside the basin. The temperature of various components was found to be more for solar still with the tilted wick at 30° coupled with FPC as compared with normal horizontal wick solar still with FPC. The overall cumulative and day efficiency of the horizontal wick was found to be 16.6% and 12.1% higher than the CSS. The performance of solar with a tilted wick at 30° coupled with FPC was found better as compared to horizontal wick solar still with FPC and CSS because the basin water of tilted wick still gains more heat from flat plate collector.

Shahin Shoeibi et.al [11] studied the modified and conventional solar still have been experimentally using porous media, PCM, and NEPCM. The CuO nanoparticles at a concentration of 0.2% dispersed in the paraffin enhance the thermal characteristic of PCM and also assists to increase the time speed of receiving and removing the heat from phase change material. The hot water production for district heating in solar still with NEPCM and porous surface absorber is 41.94% more than conventional still. The slope of rising energy efficiency in the solar desalination with PCM/NEPCM is higher than the system without PCM. The use of CuO nanoparticles decreased the melting point of PCM by about 2.5 ℃.

Alejandro Espejo Sanchez et.al [12] here it was experimentally demonstrated for the first time that a hybrid direct contact membrane desalination plus photovoltaic device. It used partially transparent photovoltaic cells to produce electricity and pass. Thermal energy to nanoparticles doped membrane to produce thermal energy to the membrane surface. It results in a doped membrane exhibiting 15-32% increase in desalination performance composed of an undoped membrane. Water production costs demonstrate a reduction of roughly 5% when the photovoltaic system is integrated directly.

S.S. KishK et.al [13] used three simple basin-type solar stills each having a similar basin area to be constructed and tested. The geometric characteristics of each still are as follows: width 0.8 m, length 1.3m, basin depth 0.1 m, basin surface area 1.04m². The still basin shape is rectangular and handmade of galvanized iron sheet. It is painted with matt-type black to maximize the absorbed solar radiation. A clear glass cover of 3mm thick was placed and inclined by a tilt angle of 31° to transmit the maximum possible solar radiation flux incident on it. Daily average production of fresh water under the three different solar stills (S1, S2, and S3 stills) respectively

were 244, 303, and 329 ml/hr. This means that the cooling cellulose pad and spray water increased the average production by 24.5 and 34.9% as compared with the solar stills respectively. This method was found to be the best option to increase solar still productivity during daylight time.

Anal George et.al [14] in this project work, single basin solar still was fabricated and tested in two conditions. The first one is tested with normal solar still and the second one is with PCM attached to the basin. So many experiments have been conducted to increase the discharge of solar still with and without PCM are compared. It was observed that at night time, the daily productivity of the solar still with PCM will increase to 2.6%. The results show higher temperature difference between the water and plain glass temperature is due to the storage energy of PCM. It is recommended to integrate latent heat energy storage systems in solar stills to further enhance productivity.

Anfas Mukram T et.al [15] Experimental setup consists of single basin type solar still with inverted v type roof made up of plain glass. The basin of the still is made of mild steel and the side walls are made of galvanized iron sheets and all the parts are painted black for better solar radiation absorption. The experimental analysis of the passive-active solar stills with and without boosting mirrors is done in the climatic conditions of Kerala in February. The various temperatures like basin water temperature, inside and outside temperature of the glass cover, and inside vapor temperature of the stills are recorded by using thermocouples and the data is plotted. The inside vapors temperature for the stills with boosting mirrors shows a high value compared to values without mirrors. This causes a reduction in efficiency for the stills with boosting mirrors.

Zahid Fayaz et.al [16] in this study, conventional solar still was modified by adding variable slope tilted wick in the basin so that day and night productivity of still can be enhanced. The tilted wick was constructed in such a way that the tilt angle can vary according to the incident angle of solar radiation. The depth of basin water still was taken 3cm for all sets of experiments. The range of flow rate was taken based on the trial experiment so that the wick doesn't get dry throughout the day. The overall distillate of modified still with 30° tilted wick at 0.10 g/m²/s, 0.20 g/m²/s and 0.30 g/m²/s flow rate was found to be 3.51 kg/m², 3.60 kg/m² and 3.41 kg/m² respectively. It has been observed that the overall distillate at 0°, 15°, 30°, and 45° angle of tilt of wick was found to be 3.1 kg/m², 3.51 kg/m², 3.60, kg/m², and 3.41 kg/m² respectively. The maximum distillate was observed at 30° which is almost equivalent to the latitude of the location and sun rays fall directly on the wick surface. It has been found that day and night distillate of modified still with 30° remains 37.17 % higher than that of conventional still. The maximum cumulative efficiency was found to be 43.16% for the modified still with a tilted wick at 30°.

Kalpesh V Modi et.al [17] the prime objective of this study is to investigate the effectiveness of hollow-fins and wick-fins on the performance of dual-basin single-slope solar still. The performance of solar still with hollow fins, wick-fins, and without fins has been compared in two sets of experiments for partially and fully submerged cases. The wick-fins improve the performance of the solar still by increasing the evaporation surface and rate of evaporation through capillary action. The reason for the higher performance of still without fins are the highest temperature of the lower basin; reduced heat loss due to increased heat storage capacity of brackish water; the highest temperature difference between saline water and the upper basin glass cover that enhances the condensation rate of water vapour in the upper basin. The still with wick fins proved to be the most

efficient from the performance and economic point of view for partially submerged fins, while the still without fins proved to be the most efficient for fully submerged fins.

Bijan Darbari et.al 18] in this study, the performance of the single-slope solar still is improved by floating the porous wick material with different geometries in the basin. The jute cloth is used as the porous wick absorber, which is floated in the basin by the thermal material. Three modified solar stills with three absorber's geometries are considered. The porous wick layers with flat, triangular-shaped, and semi-circular-shaped teeth are used as the absorber surface. The productivity and performance of these modified solar stills are compared to the conventional single slop (CSS) solar still. The results showed that all three MSS devices produce more than 0.6 kg.m^{-2}.hr^{-1} of freshwater during most of their operating hours, while the CSS device produces this amount of freshwater in only the last few hours of its operation. MSS-3 device produces the most daily yield among the other modified stills, which produces 65% more daily yield in comparison with the CSS device.

III. CONCLUSION

Solar stills have been proven to be highly effective in filtering water supplies to provide safe drinking water. The effectiveness of distillation for producing safe drinking water is well established and recognized. Most of the commercial distillation and water purification systems require either fossil fuels or electrically powered sources. Using solar distillation technology safe quality drinking water like other distillation technologies can be retrieved, the only difference is the energy source. Various advances can be made in solar distillers to enhance their efficiency depending upon the requirement. Classified into active or passive type solar stills. The most efficiency can be observed while using the interfacial technique.

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Water Purification Using Corncob as an Absorbent

Sharafuddin[1], Hussain Shabeeb[1], Mohammed Thousif[1], Mohammed Wasim[1]

[1]Department of Mechanical Engineering, Yenepoya Institute of Technology Thodar, Moodbidri, 574236, Karnataka, India

ABSTRACT

The history of water purification includes a wide variety of methods. The methods used are usually slow and costlier. Corncobs are agricultural wastes obtained in maize cultivation. It is also available in large quantity and remains underutilized Due to rigidity and their porous structure they can be used as an absorbent; it may be burnt or given as food for animals. But if corncobs are burnt it causes air pollution and corncobs are given as food to animals. So, it is a good idea to use corncobs agricultural waste to treat wastewater. In this study, the corncob is used as absorbent in membrane sometimes they are thrown away but naturally, they take too much time to biodegrade. The wastewater can be treated naturally using corn cobs as an absorbent in this treatment no need for chemicals and electricity. As corn cobs are cheap, this is more economical treatment. It is also easy and simple to operate. So, it can be adopted in villages also. Then its potentiality for portable water purification is investigated.

Keywords— absorbent, corncob, water purifier, no electricity

I. INTRODUCTION

The world population has increased three times in the 20th century, increasing the need of renewable water resources. This population progression coupled with industrialization and urbanisation has led to increased demand for clean water leading to its shortage worldwide. Contamination of water is highly pronounced currently due to inappropriate waste management in most of part of our country. At present, 1.1 billion people don't have access to safe drinking water and 2.6 billion people lack suitable and proper sanitation while 3900 children lose their lives daily from water borne diseases. More than a quarter of the world's population will be living in regions that are experiencing severe clean waters scarcity as we approach the next century. A good clean water supply and adequate sanitation system are considered to be the most important factors in ensuring good health in a community. Water purification means the process of removing undesirable chemicals, biological contaminants, suspended solids, and gases from water. The goal is to produce water that is fit for specific purposes. Most water is purified and disinfected for human consumption, but water purification may also be carried out for a variety of other purposes, including medical, pharmacological, chemical, and industrial applications. Water purification means the process of removing undesirable chemicals, biological contaminants, suspended solids, and gases from water. The goal is to produce water that is fit for specific purposes. Most water

is purified and disinfected for human consumption, but water purification may also be carried out for a variety of other purposes, including medical, pharmacological, chemical, and industrial applications. Water purification may reduce the concentration of particulate matter including suspended particles, parasites, bacteria, algae, viruses, and fungi as well as reduce the concentration of a range of dissolved and particulate matter. Clean drinking water is one of the basic needs of survival.

II.   OBJECTIVES OF WORK

- To make the water safe and attractive for drinking and domestic purposes.
- To remove heavy metal ions, bacteria, and organic chemicals in water.
- To design & fabricate of low-cost water purifier using corncob waste as material.

III. LITERATURE REVIEW

In this particular study, corn cobs are to be used as adsorbing agent. There are some effects shown in the people through drinking water which have the fluoride content. This is the truth that there is the presence of fluoride in every single unit of natural water.[1]

The utilization of all such materials as low-cost adsorbents for the treatment of sewage wastewater may make them of some useful value. A work has to be done to give an excellent idea about by using low-cost adsorbent as a filter for the treatment of wastewater, not only utilization of those waste done but also the water can be treated.[2]

The main objective of our project is to search for a cheap method of cleaning wastewater from domestic and industrial sources by utilizing one of the most under-utilized agricultural wastes. In this project, the non-utilized part is utilized for a better cause treatment of wastewater.[3]

The primary aim of this study was to investigate the ability of maize cobs derived products to adsorb both lead and cadmium ions and remove methylene blue and turbidity from contaminated water. Corn cob charcoal was prepared by heating cob in the furnace in the presence of air.[4]

IV. MATERIALS AND METHODS

Preparation of corncob

Corncobs were collected, washed and sundried, further cut into different sections such as longitudinal sections, small pieces and powdered form for the treatment of wastewater.

Fig a. Corn cob

Preparation of activated corncob

Corncobs were collected, washed and sundried. The dried corncobs were cut into sections and converted into activated corncobfor the treatment of wastewater.

Fig b. Activated Corn cob

Preparation of membrane

The powerdered particles of corncob and activated charcoal are inserted in the membrane and made into two sections. The corncob and activated corncob is arranged in a layer.

Fig c. Corncob membrane

V. CONCLUSIONS

The water can be easily reused in this process and can easily operate this treatment system for his home or commodity Since Activated Corncob. The papillae present at the surface area of the activated charcoal absorbs the maximum impurities. Greater the surface area more of the porous structure. Also, there is no need of electricity, so the transmission of power is not necessary. It is totally natural. Again, the agricultural waste can be useful without any pollution. Now this treated water can be easily drained out in the river or else one can use it for the farming or gardening purpose. If we can treat it again in an effective manner, then it can be used for different purposes.

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Experimental Verification of MAC/PHY Layers of IEEE 802.15.4 Standard for WBAN

Mrs. Nirupama K, Mrs. Nisha G R

Assistant Professor, Department of Electronics and Communication, Vivekananda College of Engineering and Technology, Puttur, 574203, Karnataka, India

ABSTRACT

Recent advances in wireless communication and low-power sensors have allowed the realization of a Wireless Body Area Network (WBAN). A WBAN is a collection of low-power, miniaturized, invasive/non-invasive lightweight wireless sensor nodes that monitor the human body functions and the surrounding environment. In addition, it supports a number of innovative and interesting applications such as ubiquitous healthcare, entertainment, interactive gaming, and military applications. In this, the fundamental mechanisms of WBAN including architecture and topology, wireless implant communication, low-power Medium Access Control (MAC) are reviewed.

Keywords—WBAN, MAC layer, ZigBee

I. INTRODUCTION

Wireless Body Area Network (WBAN) is network formed by a biomedical sensor nodes associated remotely to the correspondence on, in and close to the zone of the body, which are tracking the genuine information of the body to enhance medicinal services. The system is made out of hubs biomedical little and low-control. Body Area Network (BAN) is having correspondence amongst people and Personal Computer (PC) through wearable body sensor nodes. The components of wearable body sensor nodes are body worn PC, which dependably on, prepared, and available [1]. These body sensor nodes give human services observing and criticism to the client or restorative work force. The data of wellbeing can be recorded over a more extended timeframe to enhance the quality of usage of WBAN systems.

II. LITERATURE SERVEY

A considerable measure of Medium Access Control (MAC) conventions have been concentrated on as of late and could be sorted into two classes: schedule-based MAC protocols including Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA) and contention-based such as SMAC [2]. Compared with schedule-based MAC protocols, contention-based MAC protocols require more energy because they waste energy in collisions and idle listening. In addition, they don't give delay ensures. In schedule-based MAC

protocol, TDMA is more power efficient that is inalienably avoids collisions and unnecessary idle listening, which are two noteworthy sources of energy consumption.

A. Time Division Multiple Access (TDMA)

For the naturally property of vitality moderating, TDMA protocols have been as of attracted in noteworthy consideration for some applications. The primary assignment in TDMA planning is to allot time slots relying upon the system topology and the hub packet generation rates. An appropriate schedule not just stays away from collisions by quieting the interferers of each collector hub in every time space additionally minimizes the quantity of time openings thus the idleness. We consequently attempt to discover a TDMA plan that minimizes the quantity of time spaces.

TDMA turns out to be ineffectively versatile. Be that as it may, TDMA plan coordinated with clustering procedure, which called cluster based TDMA. In cluster based TDMA convention, sensor hubs are composed into a few bunch and cluster heads are in charge of scheduling their individuals in a TDMA way. Cluster based TDMA schedule enhances the versatility of the system and is appropriate for huge scale remote sensor systems. Not withstanding, either conventional TDMA or cluster based TDMA applies for consistent observing applications, i.e. consistent gathering of temperature of the conditions. They could accomplish high channel utility since sensor hubs dependably have information to send in constant information gathering applications. Yet, when applying for another regular application in WSNs occasion driven applications, for example, quake checking and target following, in which sensor hubs just have information to send when a particular occasion happens, they will waste more vitality and accomplish lower channel utility for that sensor hubs, still should be dynamic when the occasion doesn't happen.

B. Traditional TDMA

The operation of clustering and customary TDMA schedule is separated into rounds. As appeared in Figure 2.1, each round starts with a set-up stage, followed by a TDMA schedule stage and a few TDMA frames. In the set-up stage, sensor hubs are sorted out into a few members. And after that the cluster heads show a TDMA calendar to their individuals, designating a space to the individuals. In the accompanying TDMA outlines, the individuals send the information to their separate group heads amid the allotted space. There is just 1 TDMA schedule in each round and the length of TDMA edge is equivalent.
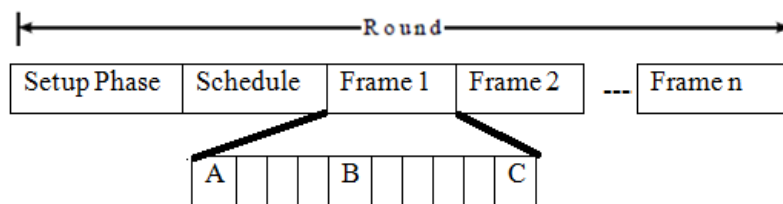

Figure 2.1: Frame structure of conventional TDMA

Clearly, this traditional TDMA schedule is effective for continuous observing application while hubs have the information to send constantly. Be that as it may, for event driven application, it has some inconveniences, for

example, lower channel utility and pointless vitality wastage of the cluster heads. In addition, cluster heads don't know which individuals will send their information in the current TDMA frame with the goal that cluster heads must be dynamic the round regardless of the fact that there have no information to transmit, which prompts superfluous vitality wastage of cluster heads.

C. ED-TDMA

Like BMA, the operation of ED (Event Driven) - TDMA is separated into rounds. Each round starts with a set-up stage, next by a steady stage. Set-up stage incorporates grouping and time synchronization. The steady stage comprises of n variable-length TDMA outlines. As appeared in Figure 2.2, every frame starts with a reservation stage, trailed by a TDMA schedule and information transmission. The reservation stage comprises of m mini-slot. Where m is the quantity of individuals in the cluster. The individuals possess the mini-slot opening as indicated by their ID. Hub has the most extreme ID involves the main smaller than normal opening while hub has the base ID possesses the last scaled down space. A member sends a 1-bit Reservation frame (RSV) message to the cluster head in the event that it has information to send in the present frame.
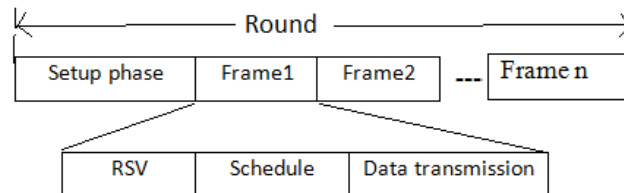
Figure 2.2: Frame structure of ED-TDMA

D. CSMA and CSMA/CD Protocols

Carrier Sense Multiple Access protocols are used in IEEE 802.15.4 based MAC protocols. As the throughput loss of the ALOHA protocol is because of the way that slots are wasted because of collisions or stay unmoving while there are terminals having packets prepared for transmission. Let us take a chance to see whether it can enhance this circumstance while keeping up the attractive components of the ALOHA framework. The throughput of the framework can be enhanced if

1.   The probability of a collision is minimized
2.   The time wasted transmitting jumbled information when an impact happens is lessened.

Let us assume that a terminal can listen to the channel and distinguish conceivable progressing transmissions - occupied channel. The convention simply depicted is called Carrier Sense Multiple Access Protocol. The expression "Carrier Sense" means the ability of the node to hear the channel and see if it is occupied or not.

At first sight it appears that as if CSMA/CA is succeeded in avoiding collisions inside and outside network. Without a doubt, in the event that all terminals transmit their packets just when the channel is not occupied and pick an irregular retransmission time in the event that they discover the channel occupied, then it appears that a collision will happen just when two or more terminals start transmission at the same time.

Carrier Sense Multiple Access/Collision Detection (CSMA/CD) characterizes what happens when two devices sense an idle station, and then endeavor to transmit in the meantime. A collision happens, and both body sensor nodes stop transmission, wait for an arbitrary measure of time, and after that retransmit. This is the

system used to get in to the Ethernet system channel. This technique handles collisions as they happen, yet in the event that the transport is always occupied, collisions can happen so frequently that execution drops radically. It is evaluated that system activity must be under 40 percent of the transport limit for the system to work effectively. In the event that separations are long, time lags happen that may bring about improper bearer detecting, and consequently collisions. Figure 2.3 shows the example for CSMA/CD.
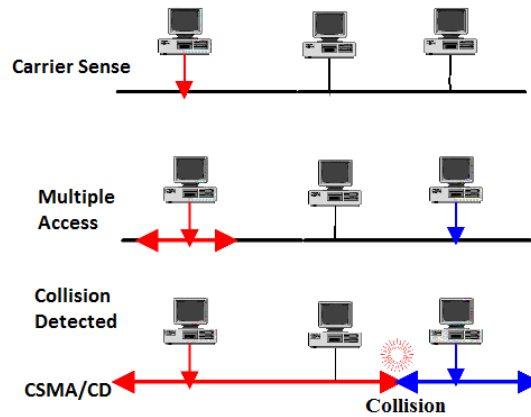

Figure 2.3: CSMA/CD collision detection

Collision detection principle is shown in Figure 2.5. To reduce the possibility of a collision, prior to sending the frame, initially, the source station determines whether a frame is currently being transmitted on the bus or not. If the channel is sensed to be busy, the station defers its own transmission until the current frame transmission is complete. A station detects that a collision has occurred by simultaneously monitoring the signal present on the cable. Then if transmitted and monitored signals are different, a collision has occurred and hence collision detection is preformed in the CSMA/CD algorithm.

III. SUPPORTING TECHNOLOGIES

Wireless Body Area Network (WBAN) is framed in the middle of made system of embedded medicinal sensors. One of the vital variables with implantation is the battery life. Battery cannot be supplanted or energized without utilizing a genuine restorative strategy so it is normal that battery controlled medical body sensor nodes put inside the body ought to keep going for long. Information movement of medical services applications are irregular and interest based. These information sorts are influenced by the phase measurements, for example, end-to-end delay which ranges up to 1s for physiological information and in range of 100 ms - 400 ms for sound/video transmission. Different measurements, for example, packet delivery ratio and throughput are significant for an instructive generation of therapeutic information over a system. Subsequently routing mechanism play a vital role in conveying data packets over system. This technique decides the life span of the body sensor nodes. The routes might be predefined as if there should arise an occurrence of proactive routing or in light of onset of interest. In later case routing table stores just the most ideal courses while link state or topological databases may store all other data [7] [8].

1.   IEEE 802.15.4

IEEE 802.15.4 standard was particularly intended for low power utilization, low information rate, ease, simple advancement and to encourage different system topologies [10].This innovation defines PHY and MAC layers for Wireless Personal Area (WPAN) innovation. In timing basic conditions, ZigBee systems are intended for fast reaction. A near study on execution of routing conventions has been done in present study, considering Ad-hoc on demand distance vector (AODV), Dynamic MANET On-demand (DYMO), and The Landmark Ad-hoc (LANMAR) routing conventions are convenient for WPAN systems.

2.   IEEE 802.15.4 PHY Layer

PHY layer serves as an interface between the MAC layer and the physical radio channel. These two administrations are given through administration access focuses: (1) PHY information administration and (2) PHY administration. Utilization of various adjustment plans and also spread spectrum techniques guarantees information transmission with various information rates and diverse chip rates. There is a single channel in 868 MHz band, 10 directs in 915 MHz recurrence band and 16 diverts in 2.4 GHz recurrence band. There are three regulation sorts in IEEE. 802.15.4 standard making use of Binary Phase Shift Keying (BPSK), Amplitude Shift Keying (ASK) and Offset-Quadrature Phase Shift Keying (OQPSK).The favorable position of utilizing Direct Sequence Spread Spectrum (DSSS) is to enhance the execution of collector in multi way environment.

3.   IEEE 802.15.4 MAC Layer

ZigBee and IEEE 802.15.4 as of now are the most generally utilized radio and MAC standard as a part of BANs IEEE 802.15.4 (ZigBee) that backings low power utilization, which is a practical innovation. MAC layer obligations of IEEE 802.15.4 [8] are creating network beacons (coordinator), synchronizing to network signals, supporting MAC affiliation and disassociation, supporting MAC encryption, utilizing un slotted / slotted CSMA/CA instrument for channel get to, and taking care of Guaranteed Time Slots (GTS). IEEE 802.15.4 characterizes four casing structures: beacon frame, data frame, acknowledgement frame and MAC command frame. For information exchange, three sorts of exchanges exist: from a facilitator to a device, from a device to an organizer, and between two companion devices. Information exchanges are totally controlled by the devices instead of by the organizer. A device either exchanges information to the facilitator, or surveys the organizer to get information, both as per the application-characterized rate. This gives the vitality preservation highlight of the ZigBee/IEEE 802.15.4 system, since the device can rest at whatever point conceivable, instead of keeping its recipient constantly dynamic.

IEEE 802.15.4 MAC sub layer has two operational modes are given below,

1. Beacon-enabled mode: Beacon is a message with particular configuration that is utilized to synchronize the hubs in the system. The correspondence is controlled by system organizer, which transmits regular reference points for device synchronization and system association control. The system organizer begins and finishes the super edge by transmitting an occasional reference point.

2. Non Beacon enabled mode: A system in which the organizer does not transmit reference points is known as a non beacon system [12]. The Superframe structure is characterized between two beacon frames and

has an active period and an inactive period. The dynamic bit of the Superframe structure is partitioned into taking after three sections:

a. Contention Access Period (CAP): CAP begins instantly after the beacon frame and finishes before the start of the CFP in contention access period as appeared in Figure 3.1. Every one of the body sensor nodes that need to transmit in the same recurrence channel utilizing the Slotted CSMA/CA scheme and the first that finds the direct clear begins transmitting in the CAP.

b. Contention Free Period (CFP): In the contention free strategy, the organizer gives a particular time space to specific body sensor nodes. This is known as a Guaranteed Time Slot (GTS). In this way, body sensor nodes with, a allocated GTS will begin transmitting during GTS without utilizing the CSMA-CA component. CFP begins quickly after GTS without utilizing the CSMA-CA system. To give a GTS, the facilitator needs to guarantee that every one of the nodes in the system is synchronized. The CFP begins quickly after the end of the CAP and should finish before they begin of the following signal casing (if Beacon Order BO measures up to Superframe Order SO) or the end of the superframe.

c. Beacon Interval (BI): It characterizes the time between two back to back signal frames. The Superframe term (SD) it characterizes the dynamic bit in the BI, and is separated into 16 equally measured time slots.
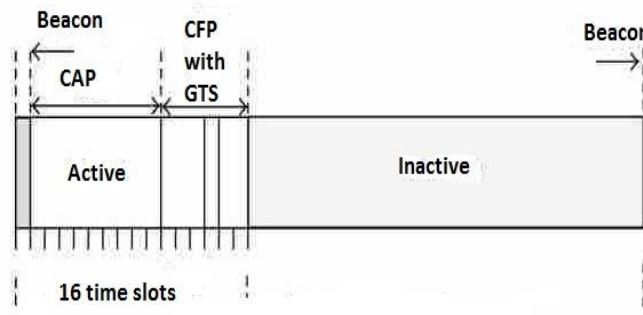
Figure 3.1: IEEE 802.15.4 Superframe Structures[8]

There will be 16 time slots in the contention based super frame and rest of the slots is inactive. GTS is provided upon request by the body sensor node with coordinator. It acts as a Time Division Multiple Access mechanism with each user provided with a time slot.

IV. SIMULATION RESULTS

1. Throughput

Throughput is the quantity of effectively received packets in a unit time and it is represented in bits per second (bps).The throughput of a communication framework might be influenced by different variables, including the limitations of basic simple physical medium, accessible handling force of the framework segments and end-client behavior. At the point when different convention overheads are considered, helpful rate of the exchanged information can be altogether lower than the most extreme achievable throughput; the valuable part is normally referred to as throughput. Throughput can be expressed using equation (1)

$$Throughput = \frac{N \; x \; Ps \; x \; 8}{Ts} \quad \text{----------(1)}$$

where,   N = Number of delivered packets, Ps =Packet size, Ts =Total duration of simulation.

2.   Packet Delivery Ratio (PDR)

The proportion of the quantity of conveyed information packets to the destination. This represents the level of conveyed information to the destination. PDR can be expressed by using the equation (2).

$$PDR = \frac{\sum(Number\ of\ packet\ receive)}{\sum(Number\ of\ packet\ sent)} \quad ----------(2)$$

3.   End-to-End Delay

The average time taken by data packets to arrive in the destination. It also includes the delay caused by route discovery process and the queue in data packet transmission. Only the data packets that successfully delivered to destinations are counted. End-to-End Delay can be expressed by using the equation (3).

$$End-to-End\ Delay = \frac{\sum(Arrive\ time - Send\ time)}{\sum(Number\ of\ connections)} --(3)$$
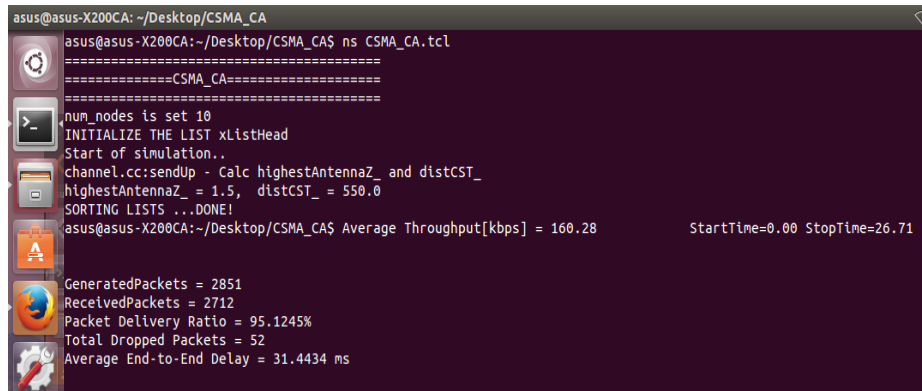
The lower value of end to end delay means the better performance of the protocol.

4.   Packet loss

The total number of packets dropped during the simulation. The lower value of packet lost means the better performance of the protocol. Packet loss can be expressed as using equation (4)

$$Packet\ loss = packets\ sent - packets\ received \quad -----(4)$$

The below Figure 4.1 shows the performance analysis of CSMA/CA at user input terminal. The result is shown for throughput, PDR, End-to-End delay and packet loss with 10 nodes involved in WBAN system.

Figure 4.1: Performance analysis of CSMA/CA at user's input terminal

Figure 4.2 shows the performance analysis of CSMA/CD at user's input terminal. The result is shown for throughput, PDR, End-to-End delay and packet lost.

Figure 4.3 shows the performance analysis of TDMA at user's input terminal. The result is shown for throughput, Packet Delivery Ratio, End-to-End delay and packet lost.

Figure 4.2: Performance analysis of CSMA/CD at user's input terminal

Figure 4.3: Performance analysis of TDMA at user's input terminal

It shows from the user's terminal that there is a Packet Delivery Ratio of 98.3018% for CSMA/CD and 97.4044% for TDMA. But the number of total number of packets dropped reduced from 605 to 18in two accessing schemes. However End-to-End delay is found to be more in the case of TDMA 265.237 ms, where as it is found to be less 5.5249 ms in CSMA/CD schemes.

5.   Performance Analysis

The X-graph can be used to plot throughput versus time. Similarly Packet Delivery Ratio and End-to-End delay curves can be obtained from X-graph.
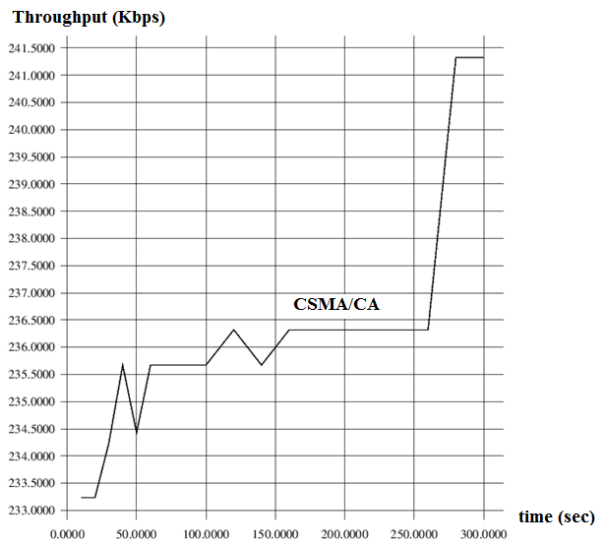
Figure 4.4: Throughput of CSMA/CA

Figure 4.4 shows the graph of Throughput (Kbps) vs time (sec) for CSMA/CA. It is observed that the graph is incremented by 0.5 Kbps for every increment in 50 sec. Throughput remains at a constant value from 160 sec to 260 sec at a value of 236.3 Kbps. Even from 50 sec up to 150 sec average Throughput remains constant ($\approx$236 Kbps). Figure 4.5 shows the comparison between CSMA/CA, CSMA/CD and TDMA. CSMA/CD provides highest throughput but it varies only at the middle part of the graph but compared to the other types later fluctuates with the variation in collision rate. TDMA provides least throughput. But CSMA/CA provides constant throughput around 235 Kbps to 240kbps irrespective of offered load of channel condition.
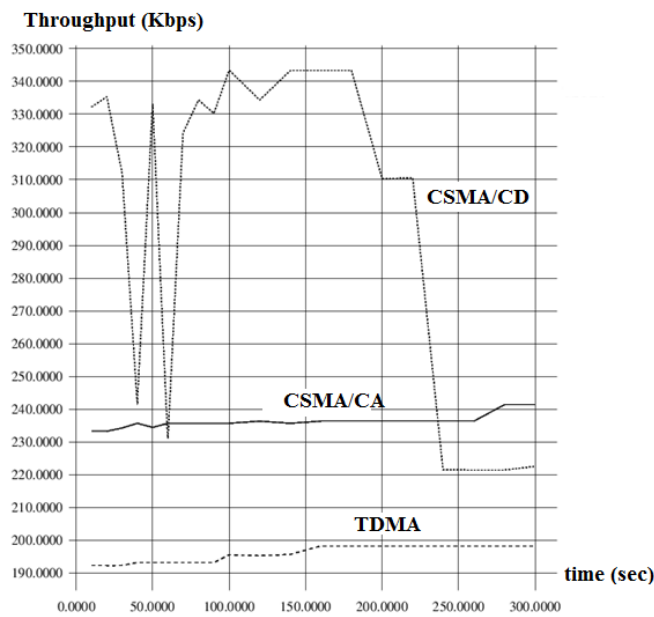
Figure 4.5: Throughput comparison between protocols
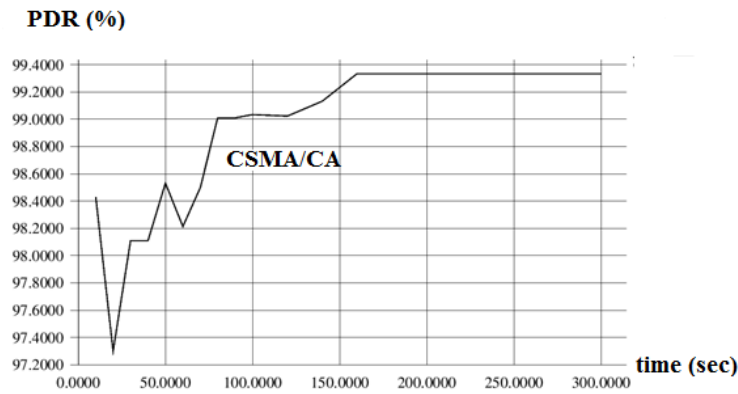
Figure 4.6: PDR for CSMA/CA

Figure 4.6 shows the graph for CSMA/CA channel access method. PDR is in terms of percentage. It is observed that the graph is incremented by 0.2% for every 50 sec increment in time. Figure 4.7 shows the PDR comparison between CSMA/CA, CSMA/CD and TDMA. From the graph we can observe that CSMA/CA provides better PDR percentage compared to the other two protocols after 160 sec time taken by the protocol to stabilize with data traffic. In comparison with CSMA/CD, TDMA has better PDR percentage as it maintains the constant average throughout the simulation; whereas PDR for CSMA/CD fluctuates with offered traffic. Figure 4.8 shows the graph for variation of End-to-End delay (ms). The End-to-End delay is measured in millisecond. It is observed that the graph is decremented by 1ms for every increment in 50 sec.

Figure 4.9 shows the End-to-End delay comparison between CSMA/CA, CSMA/CD and TDMA. From the graph we can conclude that CSMA/CA provides least delay compared to the other two protocols. However, TDMA scheme provides higher End-to-End delay for the transmission of packets. Hence CSMA/CA protocol may be useful for fruitful communication between various sensor nodes.
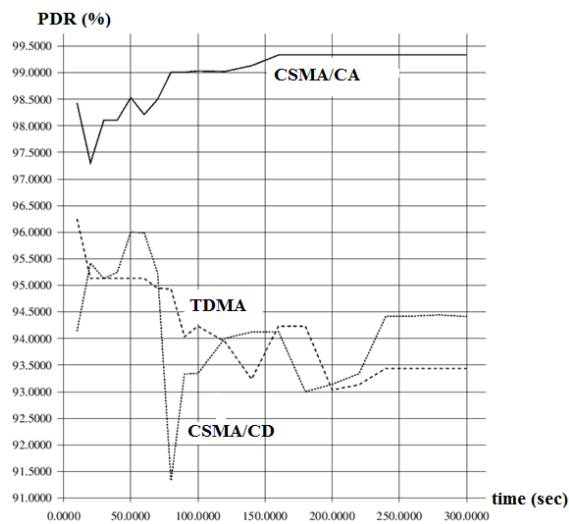
Figure 4.7: PDR comparison between protocols
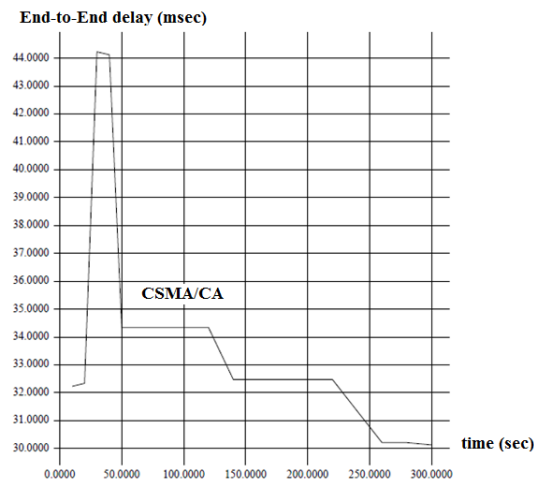
Figure 4.8: End-to-End delay for CSMA/CA
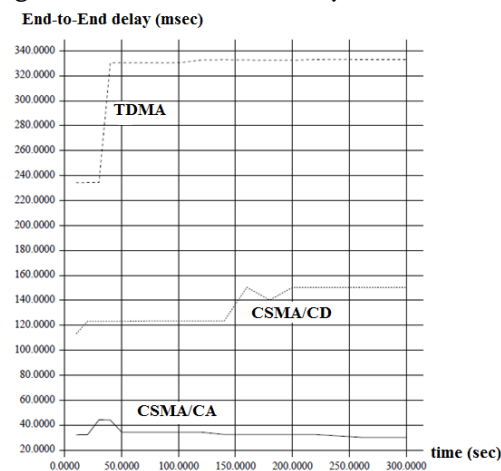
Figure 4.9: End-to-End delay comparison between protocols

V. CONCLUSION

WBAN systems are the networks formed by various body sensor nodes whose objective is to sense and forward the information to a distant access point. Various little remote sensors, deliberately set on the human body, make a Wireless Body Area Network System (WBAN) that can screen different vital signs, giving ongoing input to the client and medicinal work force. Patients or non-patients won't just have the capacity to get therapeutic guidance from an Expert and additionally have the capacity to send from any destination point via internet link and hence providing 'medical service, anytime and anywhere' termed as the "Ubiquitous Medical Care". Physical and MAC layers form the major role in the performance of a WBAN system. Hence three MAC types namely TDMA, CSMA/CD and CSMA/CA have been considered for the analysis in the project work. Various parameters such as Packet Delivery Ratio (PDR), End-to-End Delay, packet lost and throughput of the network calculated for three different techniques. From the results obtained it is concluded that CSMA/CA multiple access scheme performs better in comparison with CSMA/CD and TDMA schemes verifying in terms of Packet Delivery Ratio, End-to-End Delay and so on. However TDMA may be considered as the next best option for WBAN system.

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NVSSLMS Algorithm Adaptive Method Implementation for Acoustic Echo Cancellation

Mr. Shreyas H.[1], Mr. Ganesh U. G.[2]

[1]Assistant Professor, Department of ECE, Vivekananda College of Engineering & Technology, Puttur (D.K.), Karnataka, India

[2]Assistant Professor, Department of ECE, A J Institute of Engineering & Technology, Mangaluru, Karnataka, India

ABSTRACT

This paper presents a new method for variable step size for LMS algorithm. The proposed algorithm is based on an absolute mean of estimation current and prior error vector. It is called New Varying Step Size LMS Algorithm (NVSSLMS). The main goal of this algorithm is performance enhancement of adaptive echo cancellation system. The proposed time varying step size method begins the learning process with high learning rate value (μ_{MAx}) and then , it decays in an exponential profile to its minimum value (μ_{MIN}) .The proposed algorithm is tested with real speech input signal and the result shows that it has fast convergence time, low level of misadjustment , and high Echo Return Loss Enhancement (ERLE) compared with LMS and other Variable Step Size LMS algorithm (VSSLMS) which proposed by R.H. Kwong and E.W. Johnston under similar conditions. The amount of ERLE enhancement using proposed algorithm compared with LMS and VSSLMS algorithms is about 10 dB and 8 dB respectively.

Keywords: Adaptive Acoustic Echo Canceller, LMS algorithm, Variable step size LMS algorithm.

I. INTRODUCTION

The acoustic echo cancellation problem arises whenever a coupling between a loudspeaker and a microphone occurs in such applications as hands-free telephone and teleconferencing. This coupling result in the far-end talker's signal being fed back to the far-end taker creating annoying echoes and in some instances instability. The key to reducing the undesirable echoes electrically is to generate a replica of the microphone signal and subtract it from the actual microphone signal. This is illustrated in Fig. 1. Each side of the communication process is called an 'End'. The remote end from the speaker is called the far end, and the near end refers to the end being measured. The sound waves emanating from the loudspeaker propagate through the echo path of the acoustic environment. The echo path is a priori unknown and also time-varying. Even a slight movement of furniture or people in the acoustic environment can lead to drastic changes in the echo path. As a result, the adaptive echo canceller has the task of not only estimating the echo path, but also keeping track of changes in it. Traditional approaches to acoustic echo cancellation have used filtering algorithms which try to estimate the

impulse response of the acoustic path, h(n), and filter the incoming signal from the far end, x(n). A common approach for estimating h (n) is the Least Mean Square (LMS) algorithm.

However, a very serious problem associated with the LMS algorithm is the choice of the step-size (μ) parameter. The choice of the step size reflects a tradeoff between misadjustment and the speed of adaptation. It was shown that a small step size gives small misadjustment but also a longer Convergence time constant. On the other hand a large step size will in general provide faster convergence and better tracking capabilities at the cost of higher misadjustment. Any selection of the step-size must therefore be a trade-off between the steady-state misadjustment and the speed of adaptation. Subsequent works have discussed the issue of optimization of the step size or methods of varying the step size to improve performance. The objective of the alternative LMS-based algorithms is either to reduce computational complexity, reduce convergence time or enhance the performance in terms of the so called Echo Return Loss Enhancement (ERLE).
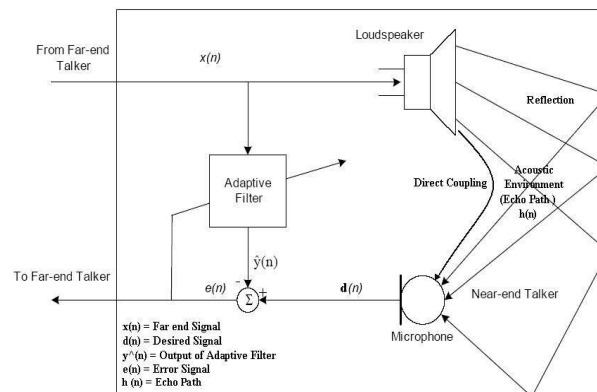
Fig 1. Adaptive Acoustic Echo Cancellation Scheme.

In this paper time varying step size LMS algorithm is proposed due to it has a powerful effect on the performance of the system also the structure of the AEC will not be changed. Moreover, this technique requires fewer overhead in computations, which is an important factor for hardware implementation. The proposed algorithm in this paper is called NVSSLMS algorithm (New Varying Step Size LMS). This a new proposed algorithm shows through computer simulation good performance compared with traditional LMS and other variable step size LMS algorithm (VSSLMS) which proposed by R.H. Kwong and E.W. Johnston in 1992 . The method in provides an important theoretical support of all error based variable step size LMS methods.

II. ADAPTIVE ECHO CANCELLER

The traditional solution to the acoustic echo problem is the acoustic echo canceller (AEC). An acoustic echo canceller achieves the echo removal by modeling the echo path impulse response with an adaptive filter and subtracting echo estimation from the microphone signal. The adaptive filter is the critical part of the AEC that performs the work of estimating the echo path of the room to get a replica of the echo signal. It needs an adaptive update to adapt to the environmental change, for example, people moving in the room. An important

issue of the adaptive filter is the convergence speed that measures how fast the filter converges to the best estimate of the room acoustic path. The acoustic echo path is assumed to be a linear filter with length L.

$$H = (h_1, h_2, h_3,\ldots\ldots h_L)^T \qquad (1)$$

Where L is the length of the echo path, and ( ) T denotes the transpose of a matrix or a vector.

Then the microphone signal is expressed as:

$$d(n) = H^T.X(n) + v(n) + r(n) \qquad (2)$$

where $X(n) = (x(n-L+1), x(n-L+2),\ldots\ldots x(n))^T$ and n is the time index. Therefore, HT.X(n) is the echo signal, v(n) is thenear end signal, r(n) stands for the noise signal and d(n) is the desired signal. A modeling adaptive FIR filter $H^\wedge = (h_1^\wedge, h_2^\wedge, h_3^\wedge,\ldots\ldots h_L^\wedge)^T$ is used to approximate the true echo path h. The echo estimate will be

$$y^\wedge(n) = H^{\wedge T}X(n) \qquad (3)$$

Where y^(n) is the output of the adaptive FIR filter and represents the echo estimate. Adaptive algorithms are used to search the optimum h^. Once the adaptive FIR filter converges, the residual signal will be the echo-cancelled outgoing signal so that only near end signal is enhanced. The echo signal can be cancelled successfully when the modeling filter approaches the true echo path. The echo-cancelled outgoing signal is

$$e(n) = d(n) - y^\wedge \qquad (4)$$

where e(n) is the output signal for the AEC scheme that is used for adapt the weights or impulse response of the FIR filter. The adaptive algorithm should provide real time operation, fast convergence, and high Echo Return Loss Enhancement (ERLE). ERLE is defined as the ratio of send-in power (Pd) and the power of a residual error signal immediately after the cancellation (Pe) (i.e. at steady state),

and it is measured in dB. ERLE measures the amount of loss introduced by the adaptive filter alone. ERLE depends on the size of the adaptive filter and the algorithm design. The higher the value of ERLE, the better the echo canceller. ERLE is a measure of the echo suppression achieved and is given by (5)

$$ERLE = 10. Log_{10}(Pd/Pe) \qquad (5)$$

III. ADAPTIVE FIR LMS ALGORITHM

The simple structure for adaptive Echo Canceller was the Finite Impulse Response filter (FIR) which can be trained by the Least Mean Square adaptive algorithm (LMS). Fig. 2 shows the structure of the adaptive FIR filter; where Z^{-1} is unit time delay
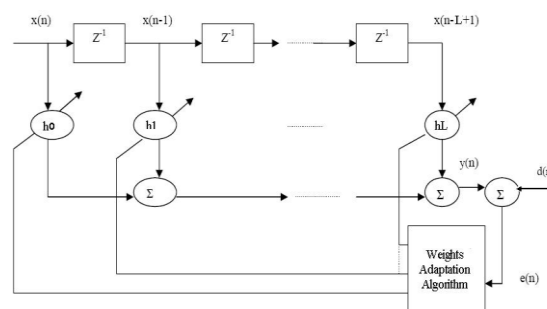
Fig 2. Structure of Adaptive FIR filter

This LMS algorithm, which was first proposed by Widrow and Hoff in 1960, is the most widely used adaptive filtering algorithm. Detailed considerations of LMS algorithm are given in. The method of steepest descent updates filter coefficients according to Equation (6),

$$H(n+1) = H(n) + 2\,\mu e(n)X_L(n) \qquad (6)$$

Where μ is the fixed step size, this algorithm suffers from slow convergence since the convergence time of LMS algorithm is inversely proportional to the step size. However, if large step size is selected, then fast convergence will be obtained but this selection results in deterioration of the steady state performance (i.e. increased the misadjustment (excess error). Also a small value of the step size will cause slow convergence but will enhance or decrease the steady state error level. Therefore, several methods of varying the step size to improve performance of the LMS algorithm, especially in time varying environments are proposed. In such environments, the step size must be adjusted automatically in order to obtain the following features: Adaptive filter must be able to track any change in the system, i.e. to reduce the lag factor which was a decreasing function of the step size. Reduce the tradeoff between the low level of misadjustment and fast convergence, i.e. both requirements, must be obtained

IV. A NEW VARYING STEP SIZE LMS ALGORITHM

To overcome the main drawback of the LMS algorithm, a modified version of the LMS algorithm is presented, which used time varying step size instead of the fixed step size as shown in this section. As explained previously this paper proposed a new algorithm which is called NVSSLMS. This time varying step size is adjusted according to absolute mean value of the current and the previous estimation error's vector

$$\mu(n+1)=\mu(n)(1-Abs(mean(e(n))*\delta) \qquad (7)$$

where $0<\delta<1$, and $mean(e(n))=(\sum_{k=0}^{L-1} e(n-k))/L$

i.e mean (e(n)) is the mean value of previous and current estimation values of error signal. Then,

$\mu(n+1)=\mu max$ if $\mu(n+1)>\mu max$ or $\mu(n+1)=\mu min$ if $\mu(n+1)<\mu min$

Otherwise

$\mu(n+1)=\mu(n+1)$

The main idea of (7) is to make the step size take a large value at the beginning of the learning process, and then it decays gradually until it reaches a fixed selected value in the rest of the learning process.

The way in which μ(n+1) is changing depends on previous value of step size μ(n) and also on the absolute mean of estimation error vector e(n) . Number of error signal elements in e(n) vector will depend upon the value of the FIR taps (L). The main reason of using error vector e(n) in (7) is that to make use of gradually decreasing the error signal from large value to small one. Furthermore, it is not required to recalculate again when the adaptive step size is adjusted and in turns, the proposed formula in (7) is simple when it is implemented in hardware. As shown in equation (7) one can start with large step size, to enhance the convergence speed, and gradually reduce it to attain its minimum value, to achieve a low level of misadjustment. To achieve best performance the step size should decrease to the next, smaller step in smoothing transient and in an exponential manner.

To ensure stability, the variable step size μ(n+1) is constrained to the pre-determined maximum μmax and minimum step size values μmin , such that μ(n+1) is set to μmin or μmax when it falls below or above these lower and upper bounds, respectively [3-5]. The constant μmax is normally selected near the point of instability of the conventional LMS algorithm to provide the maximum possible convergence speed. Given that the initial value of step size μ(1) (i.e. when n=1) equals to μmax .The value of μmin is chosen as a compromise between the desired level of steady state misadjustment and the required tracking capabilities of the algorithm. The parameter δ controls the convergence time as well as the level of misadjustment of the algorithm at a steady state.

Then the update equation (6) for the weight vector will be H(n+1) = H(n) + 2 μe(n)X(n)

Table 1 NVSSLMS Algorithm

Initial Conditions	$X(0)=H(0)=[0,0,....0]^T$ Assign values for u_{MAX} , u_{MIN} , and δ.
For each instant of time index n =1, 2 , ……, iteration , Compute	
Adaptive FIR filter output	$y^{\wedge}(n) = H^{\wedge T} X(n)$
Output Estimation Error	$e(n) = d(n) - y^{\wedge}$
Step Size Adaptation	$\mu(n + 1) = \mu(n)(1 - Abs(mean(e\ (n))\delta)$
Check The Upper and Lower bound of the μ(n+1)	$\mu(n + 1) = \mu_{MAX}\ if\ \mu(n + 1) > \mu_{MAX}$ or $\mu(n + 1) = \mu_{min}\ if\ \mu(n + 1) < \mu_{min}$ Otherwise $\mu(n + 1) = \mu(n + 1)$
Weights Adaptation	$H(n + 1) = H(n) + 2\,\mu\,(n)e(n)X(n)$

In this paper in addition to LMS, a comparison between the performance of the NVSSLMS and another Variable Step Size (VSSLMS) [3] algorithm is introduced. The steps required by the VSSLMS algorithm are shown below:

$\mu_{n+1} = \alpha\mu + \gamma e_n^2$ (10)

$0<\alpha<1\ \ \gamma>0$

If $\mu_{n+1}>\mu_{max}$ then $\mu_{n+1}=\mu_{max}$

$\mu_{n+1}<\mu_{min}$ then $\mu_{n+1}=\mu_{min}$

Otherwise $\mu_{n+1}= \mu_{n+1}$

V. SIMULATIONS

A. Simulation Methodology

The proposed a new variable step-size NVSSLMS algorithm is implemented in adaptive echo cancellation setup. The performance of the proposed algorithm is compared with the fixed step size LMS algorithm and with a variable step-size VSSLMS algorithm [3]. Computer simulations based on the adaptive echo cancellation setup shown in Fig. 1 were performed to examine the performance enhancement of the new algorithm.

Number of tap weights (i.e. L) is equal to 2048; real speech signal v(n) (near end speech signal) is used as input to the adaptive FIR filter, shown in Fig. 3.a, which it is sampled at 8 kHz. This input signal is then convolved with the impulse response of the echo path (H) (Fig. 3.b) which uses a long finite impulse response filter. Figure 3.c shows a real far end speech echoed signal. A measured microphone signal d(n) is shown in Fig. 3.d which

contains the near end speech v(n), the far end echoed speech signal that has been echoed throughout the room and added white Gaussian noise r(n) with zero main and variance one . The far-end and near-end speech signals were taken from the speech sample in Matlab2010b. Both signals were 10 sec in duration with a sampling rate of 8 kHz, The goal of the adaptive acoustic echo canceller is to cancel out the far end speech, such that only the near-end speech is transmitted back to the far end listener..

The step size for LMS algorithm is equal to 0.01, in order to ensure stability (or convergence) of the LMS algorithm; the step size parameter is bounded by the following equation [2]:

$$0 < \mu < \frac{2}{tap\,weight\,power} \qquad (12)$$

The μ_{max} and μ_{min} values of VSSLMS algorithm have been chosen as given in [3] i.e. μ_{max}=0.1, and μ_{min} =10-5 (Which is found to be a good choice in stationary and nonstationary environments and as given in the paper). The same values of these parameters were used also for NVSSLMS algorithm. μ_{min} s chosen to provide a minimum level of tracking ability. Usually, μ_{min} will be near the value of μ that would be chosen for the fixed step size LMS algorithm [3-5]. A typical value of ⬚ that was found to work well in simulations is α = 0.97. The parameter γ is usually small 4.8 X 10^{-4} [3-5]. While the δ parameter for NVSSLMS algorithm is equal to 0.0001.
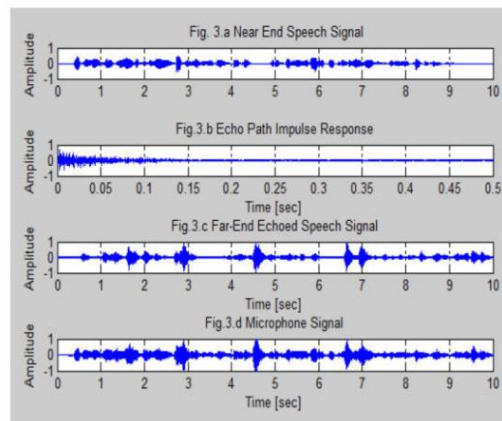
Fig 3: a: Near End Speech Signal; b: Room Impulse Response Signal; c: Far End Echoed Speech Signal; d: Microphone Signal.

B. Simulation Results

Fig.4 shows the estimation error square using different algorithms. It is clearly that the proposed algorithm has faster convergence time and small misadjustment compared with other algorithms. Moreover, figure5 shows the output error signal of adaptive echo cancellation for all algorithms. As shown, the proposed algorithm canceled the echo and added white Gaussian noise better than other algorithms. Therefore, the output error signal of the proposed algorithm is the best estimate of near end speech signal that was shown previously in Fi.g.3.a.
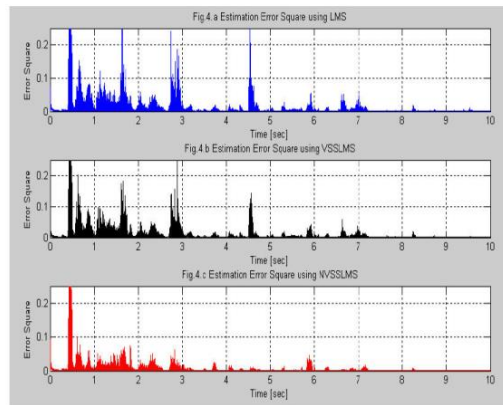
Fig 4: Estimation Error Square signal of adaptive echo canceller using different algorithms
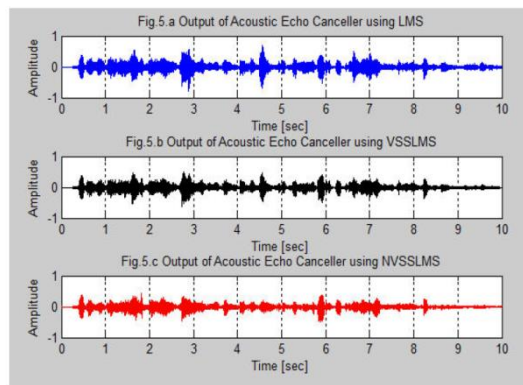
Fig 5: Output error signal of adaptive echo canceller using different algorithms

Fig.6 shows ERLE curve (equation (5)) for all algorithms. This figure shows that the NVSSLMS algorithm has higher ERLE value than all algorithms at the end of the convergence period, which means that it achieved to better echo suppression than all other algorithms. The amount of ERLE enhancement using proposed algorithm compared with LMS and VSSLMS algorithms is about 10dB and 8dB respectively.

From the simulation results, it is evident that, the variable step-size LMS adaptive algorithm gives a smaller error and provides good performance than the fixed step-size LMS adaptive algorithm and another VSSLMS algorithm.
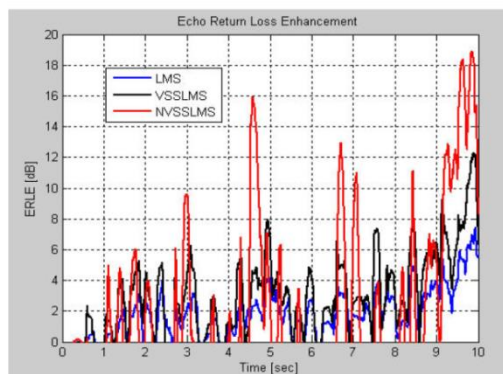
Fig 6: ERLE for all algorithms

VI. CONCLUSION

This paper focused in performance improvement of adaptive echo cancellation using new time varying step size LMS algorithms. The performance of the proposed algorithm was compared with that of the standard LMS as well as other variable step-size LMS algorithms through simulations. Results show that the proposed algorithm has a significant convergence rate improvement, low level of mis-adjustment in steady state and higher level of ERLE over fixed step size LMS and VSSLMS algorithms.

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Dry Hand Washing Machine Using Fog Disinfectant

Mr. Suhandas[1], Ms. Shifali A Rai[1], Ms. Madhuri Sharma[1], Ms. Shravya S[1], Ms. Sameeksha S Shetty[1]

[1]Department of Electronics and Communication Engineering, Vivekananada College of Engineering and Technology, Puttur, Karnataka, India

ABSTRACT

The importance of disinfection took an intense turn with the introduction of Covid-19 that in a real sense altered our attitude about private cleanliness. Nobody used to really think about it yet after Corona virus came into the image, disinfection turned into the essential worry of everybody no matter what their age, orientation and spot. The entire world got to know the need of legitimate sterilization practice. The first, and likely most clear method for sterilization is hand washing. As the US Centre for Disease Control states, "Hand washing is perhaps the most effective way to safeguard yourself and your family from becoming ill." As basic as it might appear, appropriate hand washing stays the best approach to eliminating microbes and destructive microorganisms from our hands. This forestalls the spread of sicknesses and protects our current circumstance, new, and clean. There are numerous simple methods for keeping the hands clean. The normal strategies utilized in numerous work environments incorporate the utilization of adequate cleanser and water or great liquor based sanitizers when water isn't effectively open. It will be more straightforward to approach hand washing more in a serious way when we know the advantages of keeping the hands perfect however much as could be expected and furthermore keeping the conditions appropriately cleaned. However, cleaning up various number of times each day could polish off unnecessary measure of water. To assist with settling this, we here plan a framework that gives hand washing while at the same time using less than 95% less water. By utilizing misting framework in our task we guarantee that the home grown sanitizer arrives at each side of our hands as mist and get that the disinfection done appropriately.

Keywords: Sterilization, Covid-19, Hand washing

I. INTRODUCTION

The world has seen the development of a few new irresistible illnesses, a significant number of which were significant general wellbeing dangers that were met with significant disease avoidance methodologies. Presently, a flare-up of novel corona virus (SARS-CoV-2), which causes the Covid-19 (shortened Corona virus) has spread quickly. Ecological defilement of emergency clinic surfaces basically adds to disease transmission for some microbes. Transmission of the Corona virus infection has been connected to close contact between people inside shut settings, like families, wellbeing offices, helped living, and private organization conditions. Additionally, people group settings outside of medical care settings have been seen as helpless against Corona

virus transmission occasions including freely available structures, religious public venues, markets, transportation, and business settings.

There is a dire need to battle Corona virus and to track down techniques to limit the overwhelming impact that causes locally. The importance of hand washing can't be made light of, especially in further developing nations where it is normal practice to eat with hands. In a few arising social orders, there is many times a wavering to wash hands before dinners; and in some, hand washing has laid out a by and large normal practice. Needing to eat with your hands has been going on for a really long time before anybody abruptly scholarly of cleaning up. Thus, enroute, through innovations and cleanliness measures, people are instructed to improve hand washing. Hand washing is the maybe best method for staying away from the transmission of sicknesses. Not washed or seriously clean hands are extremely well known structures to communicate numerous contaminations like fever, colds, the runs, sore throat, and other hand-borne illnesses.

Hand Cleanliness is perhaps the best methodology to moderate the transmission of microorganisms and stay away from out breaks, like the infection Corona virus. Advancing the act of hand washing with cleanser and water is one of the least complex, low tech and most practical general wellbeing measures to forestall transmission of Corona virus as well as numerous other transmittable infections. The COVID- 19 episode has concentrated entirely on the disappointment of local area readiness and its impact on metropolitan wellbeing in arising countries [3]. Cleanser should be utilized in relationship with streaming water close by washing is an essential technique to stay away from the exchange of Corona virus. The degree of surface pollution with Corona virus isn't comfortable and has not been found at this point however concentrates on have uncovered that sterilization prompts diminished transmission. Huge decrease in disease rates after synthetic misting of the emergency clinic has been seen in a few investigations.

Since the beginning of Corona virus pandemic it is been proposed to clean up numerous number of times each day. The accessibility of hand washing stations is seen to be a straightforward individual cleanliness movement with a positive externality as far as general medical advantages. Its entrance additionally relies upon the accessibility of a protected inventory of an adequate amount of water and sensible rates. Be that as it may, we can't stand to waste such a gigantic measure of water. The issues that would be made by wastage of water would make a more prominent issue than the actual pandemic. To assist with tackling this issue we here plan a framework that gives hand washing while at the same time using less than 95% water utilizing the idea of fogging method.

Sanitizing our hands every now and then is a vital variable in battling the pandemic. In any case, it doesn't really need such a lot of water to sanitize our hands. Also many individuals really end up over cleaning up (more than 15-20 seconds with full tap delivered). Sanitization simply expects that water arrives at each millimeter of our hand alongside a sanitizer or cleanser and it ought to be barely to the point of killing any contamination or assist it with sliding out of our hand. At the point when the taps turn on just 10 - 30% water really contacts our skin and rest simply streams over this first layer of water.

The proposed machine goes on one more level to empower significantly more water saving utilizing a mist based framework. The machine utilizes hazing and it creates fume of sanitizer fluid on passing with high tension through a limited line. The molecule size of mist (controllable in our instrument) being more modest than that of fluid, have greater versatility and infiltration to more profound surfaces which gives legitimate and

powerful sanitization. The machine is coordinated with a tank beneath it. The tank is loaded up with water alongside any protected home grown sanitizer fluid whenever required. At the point when the client rubs cleanser on his/her hands and embeds it into the framework, this consequently sets off a water misting framework that converts water in the tank to haze and drives it in the hand wash chamber.

Presently fog can arrive at all sides of the hand in under 5 seconds all things considered in vaporous state (water fume). Following 5-15 seconds of water mist openness the cleanser on clients hand is washed down with the fog. This requires under 95% of water that would be expected in conventional tap based hand washing. The machine comprises of a fan to drive in air that is expected to drive the mist into hand wash chamber.

The hand wash machine is driven by an Atmega based controller system that takes into consideration manual settings. These settings incorporate the ideal opportunity for which the machine should drive the fog for every client. The proposed machine considers hand washing and sterilization simultaneously while saving bunches of water. Automatic hand washing has many advantages, for example, cleanliness, lower costs and insignificant waste age. This will likewise work fair and square of cleanliness of people and furthermore the consciousness of individuals that there are plans like this. This permits us to accomplish our objective of restraint of the transmission of infection from lifeless things to individuals. In this way, sanitization utilizing haze will be a help to society during the essential season of the pandemic.

The paper[1] explores a scope of accessible hand sanitizers and their adequacy as well as the definition viewpoints, unfavourable impacts, and proposals to upgrade the detailing productivity and wellbeing. Further, this article features the viability of liquor based hand sanitizer against the Covid-19. It is essential to choose Liquor Based Hand Sanitizer with the fitting measure of liquor and practice the right hand cleanliness strategy while cleaning hands to guarantee every one of the microorganisms are really killed.

The paper[2] principally says that liquor based hand sanitizers are more compelling than cleansers, and furthermore simple to utilize. The paper additionally says that non contact administering is again essential to forestall microorganism spreading lastly, hand cleanliness is most significant and should be important for our day to day routine. This paper additionally showed the viability of the liquor based hand sanitizers, which diminished disease rates by walloping 30%. They utilized hand sanitizers with 60 to

70 percent ethanol or isopropanol for decreasing critical number of microbes..

The paper[3] recommends how Fluid peracetic corrosive (PAA) has been displayed to have incredible microbicidal action yet has similarity issues with an assortment of materials. The goals of this paper was to decide the microbicidal action, similarity to electronic gear, cleaning potential for research facilities, and shape remediation potential for a stroll in cooler of the dry misting framework (DFS) utilizing PAA. Results showed that the DFS is a viable sterilization innovation for labs as an option in contrast to formaldehyde, vaporous hydrogen peroxide, or vaporous chlorine dioxide (GCD).

The paper[4] specifies about how WHO suggested alcoholic hand sanitizers have been accounted for to make risk climate and human wellbeing. Hand cleanliness is fundamental need during Corona virus, particularly during outside, hand sanitizers address this issue. Liquor free and natural hand sanitizers are not difficult to figure out and have better outcomes contrasted and the alcoholic hand rubs. Hence it suggests a detailed examination on eco- accommodating/herbal sanitizers in view of their germicide properties to supplant the current compound based hand rubs.

II. OBJECTIVE

The main objective of the proposed system is to vanquish the over usage of water in disinfection of hands and to maintain the hygiene and deterge our hands by using herbal disinfectant in place of alcohol based sanitizer.

III. METHODOLOGY

- The machine is incorporated with a tank underneath it. The tank is loaded up with water alongside any protected natural sanitizer fluid whenever required.
- At the point when the client rubs cleanser on his/her hands and embeds it into the framework, this naturally sets off a water fogging framework that converts water in the tank to fog and drives it in the hand wash chamber.
- Presently fog can arrive at all sides of the hand in under 5 seconds for all intents and purposes in vaporous state (water fume). Following 5-15 seconds of water fog openness the cleanser on clients hand is washed down with the haze.
- This requires under 95% of water that would be expected in conventional tap based hand washing
- The machine comprises of a fan to drive in air that is expected to drive the haze into hand wash chamber.
- The hand wash machine is driven by an Atmega based control system that takes into account manual settings. These settings incorporate the ideal opportunity for which the machine should drive the mist for every client.
- Along these lines our proposed machine takes into account hand washing for sanitization simultaneously while saving bunches of water.

A. Block diagram
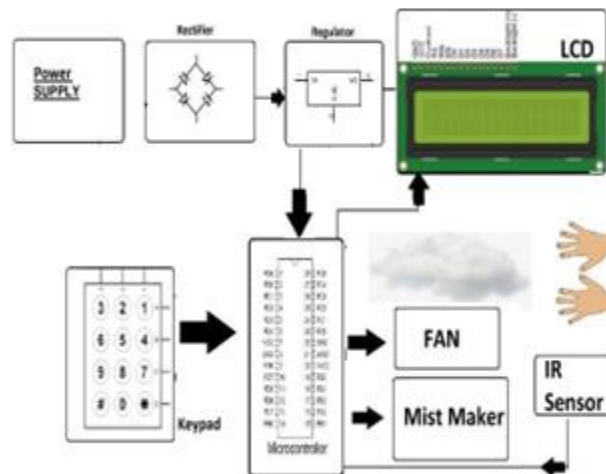
Fig 1: Block Diagram of proposed system

Rectifier-A rectifier is an electrical device that converts alternating current(AC), which periodically reverses direction, to direct current(DC), current that flows in only one direction, a process known as rectification. The

rectifier might be a half wave or a full wave rectifier. In this system, a bridge rectifier is utilized in light of its benefits like great dependability and full wave rectification. In positive half cycle only two diodes (1 arrangement of equal diodes) will work, in negative half cycle the other two diodes will conduct and they will conduct just in forward bias only.

Filter- Capacitive filter is utilized in this venture. It eliminates the ripples from the result of rectifier and smoothens the D.C. output got from this filter is steady until the mains voltage and load is kept up with consistent. Nonetheless, if either of the two is varied, D.C. voltage got now changes. In this manner a regulator is applied at the result stage.

Keypad- Keypads are a piece of HMI or Human Machine Interface and assume truly significant part in a small embedded system where human cooperation or human information is required. Matrix keypads are notable for their basic design and simplicity of connecting with any microcontroller.

ATmega328P-The Atmel ATmega328P is a 32K 8-bit microcontroller in light of the AVR architecture. Numerous directions are executed in a single clock cycle giving a throughput of right around 20 MIPS at 20MHz. The ATMEGA328-PU arrives in a PDIP 28 pin package and is appropriate for use on our 28 pin AVR Improvement Board.

IR sensor-IR sensor is utilized in the venture to recognize the presence of hands inside the machine. The turning of the microcontroller exclusively relies upon the detection of the hands by the sensor.

B. Flow Chart
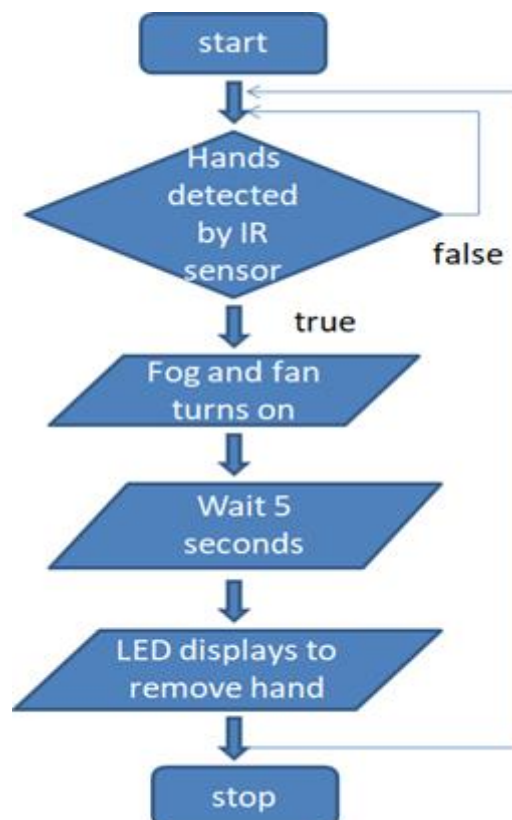
Fig 2: Flow chart of proposed system

IV. RESULTS AND CONCLUSION

This sort of sterilization facilities are vital in this day and age on the grounds that since pandemic is concerned its extremely valuable in disinfection of hands without being contacted and it is likewise savvy and financially helpful for the buyer in numerous.

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Performance Analysis of Modified Transmission Control Protocol for Mobile Ad-Hoc Network

Mahabaleshwara Bhat P1, Gurusandesh M2

Department of E & C Engineering, Vivekananda College of Engineering & Technology, Puttur, Karnataka, India

ABSTRACT

Mobile Ad-Hoc Network (MANET) is made up of self-configurable mobile nodes, with each mobile node acting as a router for the other nodes, allowing data to flow over multi-hop network routes. However, the mobility and unpredictable behavior of wireless MANET makes the network connection unreliable. Frequent network route changes lead to a high rate of link failure, which affects Transmission Control Protocol (TCP) performance significantly. Traditional TCP cannot detect route failures and link congestion losses that occur in MANETs. Therefore, in this paper a potential enhancement of the performance of TCP is proposed with an Explicit Link Failure Notification (ELFN). ELFN is a method of managing link failures with a dynamic cache update method in order to improve TCP performance. The proposed method is simulated using the Network Simulator-2 (NS-2) tool. As per the simulation results, the proposed TCP-ELFN outperforms standard TCP in terms of packet loss, delay, and normalized routing load.

Keywords— Mobile Ad-Hoc Network, Transmission Control Protocol, Explicit Link Failure Notification

I. INTRODUCTION

A Mobile Ad-Hoc Network is a network in which a group of mobile computing devices communicate among themselves using wireless radios, without the aid of a fixed networking infrastructure [1]. Their use is being proposed as an Internet extension, but they can be utilised wherever that a fixed infrastructure is not available or preferred. Routing is the process of determining a path from a source to any network destination. The routing protocols of MANET can be classified into three types: reactive routing protocols, proactive routing protocols, and hybrid routing protocols [2].

TCP was initially introduced for the wired networks where network congestion is the primary cause of packet losses [3]. TCP is primarily concerned with congestion control, and any packet loss is only considered a cause of network congestion. As a result, the transmission rate is reduced to avoid further network congestion. The default TCP interpretation of any packet loss as a cause of network congestion works fine in wired networks but not in wireless networks. Due to transmission failures and contention issues, the broadcast aspect of wireless networks frequently results in packet losses. Device mobility and network partitions may lose packets owing to route failures since MANETs provide dynamic topology. TCP's failure to distinguish losses and act

accordingly has a negative impact on overall performance. Many methods for improving TCP speed when used with MANETs have been proposed. [4–6]

Routing protocols for MANET are designed, classified, and analysed using a variety of methods. Many of the proposed models are based on TCP/IP and extend existing routing techniques from wired networks [7]. The reactive routing protocols, also called on demand protocol, call for a route determination mechanism only when it is needed. When a node wants to interact with another node, it first looks in its routing table for a route. If it finds one, communication begins right away; otherwise, the node starts a route discovery process.

The TCP-congestion control mechanism will excessively slow the transfer rate, leading the network to underutilize the available bandwidth. Therefore, the goal of this proposed method is to improve TCP's performance in MANET by introducing an Explicit Link Failure Notification (ELFN) method into the TCP system. The Ad-hoc On-demand Distance Vector (AODV), a reactive routing protocol will be used to test and evaluate the performance of the proposed method in MANET scenarios.

This paper consists of six sections. The performance of TCP over MANET is explained in section II. Section III describes the proposed method. The simulation procedure, results for various testing scenarios and discussion are given in section IV and V. Finally, conclusion is presented in section VI.

II. PERFORMANCE OF TCP OVER MANET

When using TCP across a network with a long-delay link or a larger Bandwidth-Delay Product (BDP), performance suffers significantly [8]. TCP transmission rates shall not exceed the lesser of the Receiver's Advertised Window (rwnd) or the Congestion Window (cwnd) per Round Trip Time (RTT) at any given point in time. As a result, the congestion window size must be equal to or greater than BDP before TCP can fully utilise the network's available bandwidth. When a connection is re-established, The TCP, on the other hand, has no information how much network bandwidth is available. As a result, it doesn't know what the BDP is or how large the congestion window should be.

To probe networks, TCP types often use two sorts of mechanisms: congestion-avoidance and slow-start methods [9]. When the congestion window size is large enough, it works well. Directly, the congestion-avoidance system will look for more available bandwidth, thereby extending the congestion window in a linear manner. The slow-start technique, on the other hand, uses exponential window expansion to begin slowly and investigate network capacity, doubling the congestion window size per RTT [10].

The present TCP protocols were found to have performance concerns in networks with relatively high correlation error rates and extended propagation delays in both experimental and analytical tests [11]. Throughput is roughly proportional to the congestion window, which measures the amount of unacknowledged data that the sender node can transfer to the receiver node [12] and is identical with RTT of a connection from TCP's perspective. Each time the base station detects a packet loss or connection failure in a wireless environment, it sends an ACK packet to the sender node with a zero value for window size in order to keep the sender node in a continuing mode and avoid dropping its congestion window. To maintain end-to-end semantics, the base station relays ACK packet returns to the sender node only when the receiver node has ACKed data.

The TCP/IP protocol stack can be modified to use the RRER packet as the link failure notice. As a result, when TCP receives an RRER packet after the modifications, it is able to identify the link failure that is generating the congestion. The "standby" mode is activated by halting normal packet transfer until the connection is recovered, then restarting transmission. Additional information, such as port number and sender address, is transferred in the RRER packet, which is identical to the "host unreachable" Internet Control Message Protocol [13]. This can be determined at the sender node of which connection this packet is for. When the sender node receives an RRER packet, it recognises it as the source of the original packet. As a result, this type of failure might be reported to the TCP layer. TCP's operation in this instance will halt any further packet transmissions until a new route is computed. As a result, it aids in preventing fresh sent packets from being lost along the broken route and freezing the TCP's state connection, as well as preventing the window size from being reduced and entering the slow-start phase [14].

III. PROPOSED METHOD

Mobility loss in MANET is misinterpreted by regular TCP as congestion loss. As a result, it may lower TCP performance by implementing unnecessary congestion management measures. Since the reliable TCP used in wired networks performs poorly and the overall throughput of the ad-hoc network is low, proposed ELFN plays a critical role in improving throughput. ELFN is a system for managing link failures with a dynamic cache update method in order to improve TCP speed. This indicates that the ELFN method is a technique to improve TCP's handling of link failures, which are common in wireless ad-hoc networks. All nodes that function as routers in MANET have a full TCP/IP protocol stack having access to the Internet protocol layer's routing protocols. As a result, when the next node in the network loses the connection range and packets cannot be sent to it, these protocols might detect a link failure. It will transmit the Route Error Notification (RRER) in this situation, which will flood all nodes, including the source node.

IV. SIMULATION

The proposed method is simulated using the Network Simulator-2 (NS-2) tool. The performance of standard TCP and TCP-ELFN in MANET are evaluated using three performance metrics: packet normalisation routing load, loss, and average end-to-end delay. Using packet loss to evaluate network performance is critical for understanding how well the network reacts to congestion or, in the case of MANET, frequent link breakdown. The loss of a packet is calculated as follows.

Packet Loss= Total Packets Sent-Total Packets Received ---(1)

The quantity of routing packets transmitted per packet forwarded to the destination is known as Normalised Routing Load (NRL). NRL also considers each forwarded packet to be a single communication. The amount of path or link changes or disconnection that occurred during the simulations has a significant impact on NRL. The following formula is used to determine the NRL.

NRL= Number of Routing Packets transmitted/ Number of Routing Packets Received --- (2)

When packets are sent and received between two nodes, the average time between sending and receiving is referred to as the average end to end delay. The average end-to-end latency shows that if the value is larger, the network is congested, making routing algorithms ineffective. The following formula is used to compute the average end-to-end delay.

Average End − to − End Delay

$$= \frac{\sum_{i=1}^{n} TimeofPacketReceived_i - TimeofPacketSent_i}{TotalNumberofPacketsReceived} \quad ---(3)$$

The number of nodes and the speed of migrating nodes, which reflect node densities, are variable parameters in this study. For analysing the performance of each simulation setting, simulations will be conducted with varied node density and different speed of travelling nodes. The scenarios in this work include six distinct node density values (10, 30, 50, 70, 90, and 100) for TCP and TCP-ELFN, as well as five different node speed values (5, 10, 15, 20, and 25) for TCP and TCP-ELFN. As a result, a total of 22 scenarios will be simulated, with each scenario being repeated 10 times.

The following fixed parameters were used in this study, as shown in Tables 1 and 2:

TABLE 1: Node Density Simulations with Various Settings for TCP and TCP-ELFN

Parameters	Parameter Value
Channel Type	WirelessChannel
Propagation Model	TwoRayGround
Net Interface Type	WirelessPhy
Interface Queue Type	DropTail/PriQueue
Antenna Model	OmniAntenna
Transport Protocol	TCP, TCP-ELFN
Simulation Time	100s
Number of Nodes	10, 30, 50 ,70 ,90, 100
Speed of Nodes	15 m/s
Max. Connections	0.5
Simulation Area	500x500m
Mobility Model	Random Waypoint
Routing Protocol	AODV
Packet Size	512 bytes
MAC Type	802.11

The NS-2 simulation is run repeatedly with varying parameters for the speed of travelling nodes and the number of nodes. After the of the simulation, NS-2 will generate a trace file containing all of the simulation's data, which may be retrieved later using an AWK script.

V. RESULTS AND DISCUSSION

This section compares the performance of TCP-ELFN versus conventional TCP in two scenarios.

a.   Run the simulations with both the regular TCP and TCP-ELFN to see how they function when different numbers of nodes are available. It's important to see how the network's performance with TCP-ELFN and conventional TCP changes as the node density changes. The speed of the travelling nodes has been fixed at a constant of 15 m/s for this experiment. For each simulation, however, the number of nodes has been set to 10, 30, 50, 70, 90 and 100. The simulation configuration's setting parameter values are listed in Table 1. The experiment is performed ten times for each situation, yielding an average value for each metric.

The performance of the TCP-ELFN and standard TCP is compared in Figure 1.
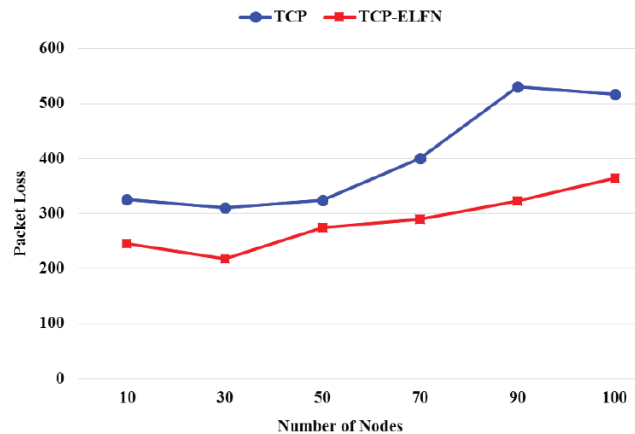
Figure 1. Packet Loss of TCP vs TCP-ELFN with six node density settings

The results shows that TCP-ELFN performed better in all six node density settings (10, 30, 50, 70, 90, and 100), as it created lower packet losses in all six node density settings. Despite the fact that as the number of nodes increases, both TCP and TCP-ELFN methods demonstrate an increasing pattern of packet loss. As a result, the quantity of packet losses for each number of node density demonstrates that TCP-ELFN has reduced packet losses, making it more suitable for every network. This result is obtained because there are more information or packet exchanges in the network when the number of nodes is fixed between 70 and 100 for TCP, but the network is capable of handling such scenarios better with the upgrade in TCP-ELFN.

In terms of average end-to-end delay, Figure 2 compares the performance of TCP-ELFN with standard TCP. We can see from the graph that, regardless of the number of nodes supplied to the network, TCP-ELFN has a substantially lower average end-to-end delay than normal TCP. As can be seen, when utilising standard TCP, the average end-to-end delay increases as the number of nodes increases. This is because when there are a lot of nodes in the network, the time it takes to deliver a packet to the target node increases due to the occupied transmission between nodes and the network.
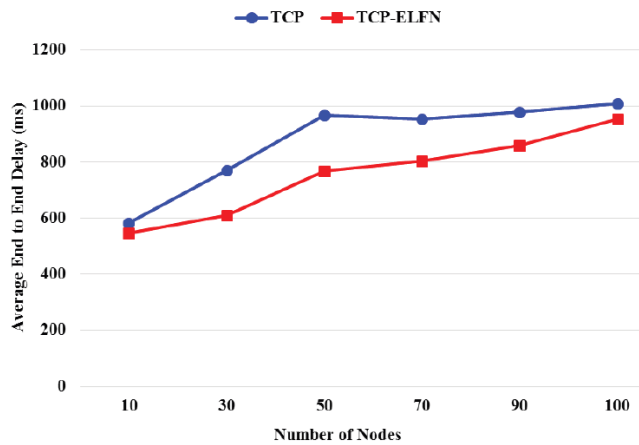
Figure 2. Average End to End Delay of TCP vs TCP-ELFN with six node density settings

As explained previously, NRL considers each forwarded packet to be a single transmission. The number of path or link changes or disconnection that occurred during the simulations has a significant impact on NRL. When the TCP-ELFN and standard TCP are supplied with varying numbers of nodes, the performance of the TCP-ELFN and standard TCP is compared in Fig 3. The NRL of TCP-ELFN and conventional TCP reveal an intriguing trend in the figure. The normalised routing load for TCP-ELFN is substantially higher than conventional TCP when the nodes are set to 10 to 70. This is because the ELFN plays an important function in informing downstream nodes about network behaviour, which results in a reduction in routing packets over the network. When the number of nodes is between 90 and 100, however, TCP-ELFN outperforms ordinary TCP by having a lower NRL.
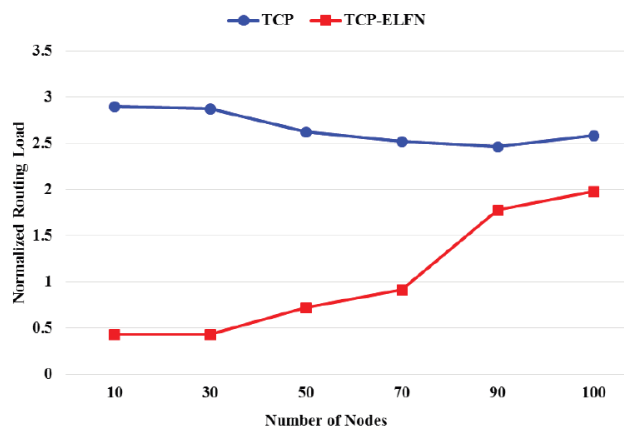
Figure 3. Normalized Routing Load of TCP vs TCP-ELFN with six node density settings

b.   Run the simulations with TCP-ELFN and standard TCP to see how they perform when the speed of the network's traversing nodes is changed. We investigated speeds of 5, 10, 15, 20, and 25 m/s in this research. The number of nodes in this experiment has been set at a constant of 100 nodes. The experiment is performed ten times for each situation, and the average value for each metric is calculated.

When the speed of the moving nodes is changed, Figure 4 shows a performance comparison between TCP-ELFN and standard TCP in terms of packet loss.
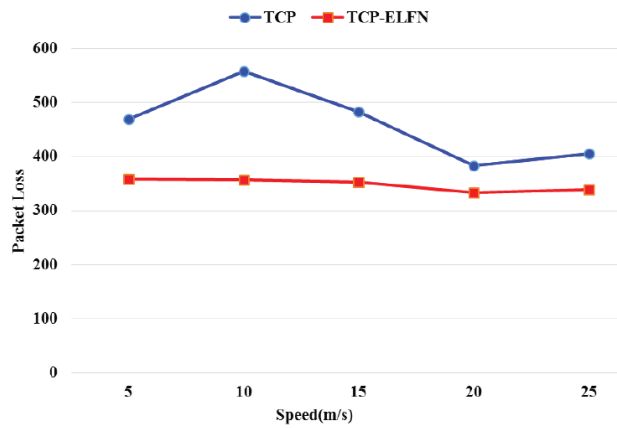
Figure 4. Packet Loss of TCP vs TCP-ELFN with five node speed settings

When it comes to packet losses, the chart clearly shows that TCP-ELFN outperforms standard TCP. This is because, as a result of the ELFN mechanism, TCP modestly adapts the development of the sending packet rate. This is owing to the behaviour of an explicit link failure notification system, which delivers information about route and link failures to the TCP sender. As a result, it will not respond to failures as if congestion had happened.

When the network is set up with different values for the node's speed, Figure 5 shows the performance comparison between TCP-ELFN and standard TCP in terms of average end2end delay. In all five values where the node's mobility is taken into account, the TCP-ELFN performs significantly better than the standard TCP by introducing significantly less delay. When the nodes' speeds are 5 (m/s) and 25 (m/s), respectively, TCP-ELFN achieves an average end-to-end delay that is between 12.68 percent and 50.48 percent lower than standard TCP.
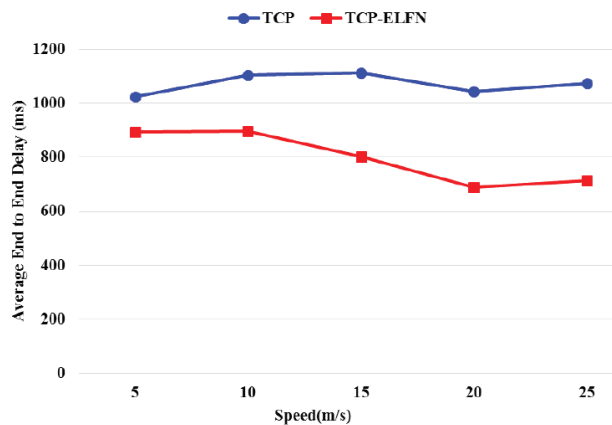
Figure 5. Average End to End Delay of TCP vs TCP-ELFN with five node speed settings

When the network is supplied with different node mobility, Figure 6 shows the performance of the TCP-ELFN and standard TCP in terms of normalised routing load. TCP-ELFN managed to surpass the standard TCP with its ELFN method, as shown in the figure. This is because, when the node moves faster, one connection will become disconnected from the other as a result of the movement, necessitating more frequent reestablishment of the route.
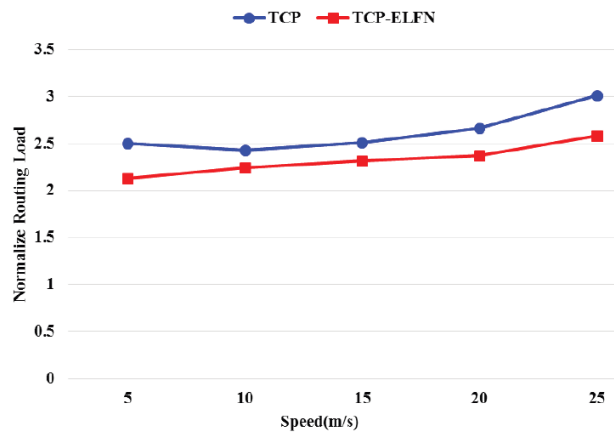
Figure 6. Normalized Routing Load of TCP vs TCP-ELFN with five node speed settings

VI. CONCLUSION

We analysed the effects of node density and node speed on TCP performance in a MANET. When TCP is used in a wireless environment, it still believes that congestion, not bit error, is the source of packet loss. As a result of the confusion, network performance will be reduced since standard TCP will use the congestion control technique whenever it detects packet loss in the network. TCP-ELFN overcomes the problem of standard TCP, which treats losses caused by route failures as network congestion signals. From the results, we can conclude that TCP-ELFN outperforms regular TCP because TCP-ELFN informs the TCP sender node about route failure and link, which prevents the sender node from reacting to the failure when congestion occurs. This indicates that by combining ELFN with MANET, TCP performance can be increased. According to the results of the evaluation performance study, TCP with ELFN provides higher quality services than standard TCP.

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Automatic Detection of Repeated Stuttering Speech

Naveena C

Assistant Professor, Department of ECE, Vivekananda College of Engineering Technology, Puttur, Karnataka, India

ABSTRACT

Stuttering is an involuntary disturbance in the fluent flow of speech, characterised by involuntary repetitions, interjections, and prolongations of sounds. There is a high proportion of prolongations and repetitions in stuttering. Major progress is being made in both technology and the exploitation of automatic speech recognition of dysfluent speech. Automatic detection of features in stuttering is difficult and has been a diagnostic challenge for speech-language pathologists. This current work is conscious of the automatic detection of instances such as prolongations and repetitions in stuttering speech. We propose a method for obtaining the stuttering speech from stuttered people. The source signal is extracted by eliminating the effect of vocal tract resonances from the stuttering speech signal. Experimental investigation helped to identify the stuttering events which were validated for the subjective identification of stuttering by the speech language pathologists.

Keywords—Stuttering, Automatic Speech Detection

I. INTRODUCTION

Speech is a complex neuromotor activity controlled by the nervous system. Speech attributes such as nasal voicing, dental, describe the way speech is articulated. The peripheral systems involved in the production of speech are respiration, phonation and articulation. Speech is the most frequently used form of communication among the human beings. Not all human beings are blessed with normal speech. Stuttering is one of the most common speech problems associated with speech pathology. Stuttering problem affects more male members compared to females a ratio of 1:3[1].

Speech recognition systems digitize, separate speech from background noise, finds the phoneme from the audio frames, compare the phoneme to predict the word and finally based on the language properties next word will be predicted in a speech sequence [2, 3 and 4].

Stuttering is a speech disorder characterized by certain types of speech disfluencies, such as Sound/syllable repetitions, prolonged sounds, and Dysrhythmic phonations or articulatory fixations [5]. With proper speech therapy techniques, the persons with stuttering (PWS) can be trained to shape their stuttering speech into fluent speech.

The common method followed by the Speech language pathologist (SLP) for the assessment of stuttering is by counting and classifying the occurrences of disfluencies such as repetitions, prolongations, and articulatory fixations. The traditional method is subjective, inconsistent, time consuming and prone to error [6]. Hence, automatic stuttering recognition methods are used to automate the measurement of Disfluency count and identify the type of Disfluency which helps in providing an objective and consistent assessment of stuttering.

This research work focuses on automatic detection of prolongation and repetition events in stuttering. Objective assessment of stuttering can aid the SLPs in their diagnostic procedures. In the recent years, many efforts have been made in the objective assessment of speech disorders. Epoch is the instant of significant excitation of the vocal tract within a pitch period. Most epoch extraction methods rely on the error signal derived from the speech waveform after removing the predictable portion. Epochs yield important information for the analysis of speech. The classification results obtained from the epoch were successful in identifying the instances of repetitions and prolongations in stuttering.

Also, we extract the human voice separately from the noise in the given audio speech signal with the help of Mel-frequency cepstral coefficients (MFCCs) feature extraction, then classify the stuttering and non-stuttering speech signal. After classifying stuttering and non-stuttering speech signal we remove the stuttering speech signal then the audio signal is passed.

This research paper is organized as follows: In Section III, the methodology of the system is presented. Furthermore, this section covers feature extraction algorithm and classification technique. Experimental results and discussion are presented in Section IV. Finally, conclusions are discussed at the end.

II. LITERATURE SURVEY

Automatic Stuttering speech recognition is usually carried using some of the classification techniques like ANN, HMM, SVM. This segment introduces a review of past works found in the literature which focuses on how the Automatic Stuttering speech recognition is being carried out.

A. Hidden Markov Models (HMMS)

HMM is one of the most commonly used techniques in ASR, especially in Automatic stuttering speech recognition like prolongation, repetition of words. HMM is a technique used to predict the phones from the given set of speech signal. The properties of HMM are well understood, with many sophisticated and efficient algorithms for training and decoding developed around it. These factors have made HMM incredibly popular in ASR, and have resulted in huge improvement over Dynamic Time Warping (DTW) [7, 8].

Recognize the utterance "eks" ("X") using HMM is shown in Figure 1. The audio signals are divided into frames or segment during pre-processing. Each segment is considered as a states of the HMM which is denoted as circles. The arrow in states denotes the transitions between each state.
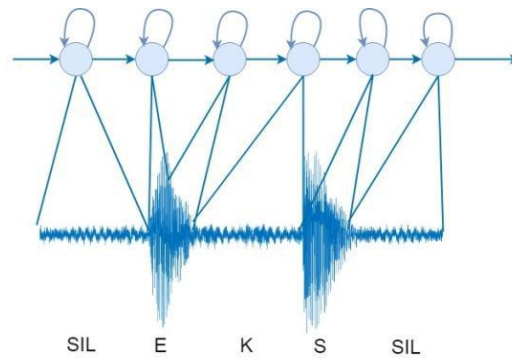
Fig. 1 Recognise the utterance "eks" ("X") using HMM

Tian-Swee et al proposed a stuttering recognition system for the children with the help of HMM. HMM model is trained with voice pattern of stutter and non-stutter children's speech to classify the stutter speech. The process achieved 96% accuracy in finding the non-stutter speech and 90% accuracy in stutter speech recognition [9].

B. Support Vector Machine (SVM)

SVM separates given set of data points of two types into two separate groups using hyperplane. Data points that are nearest to the hyperplane is known as support vectors [10, 11].
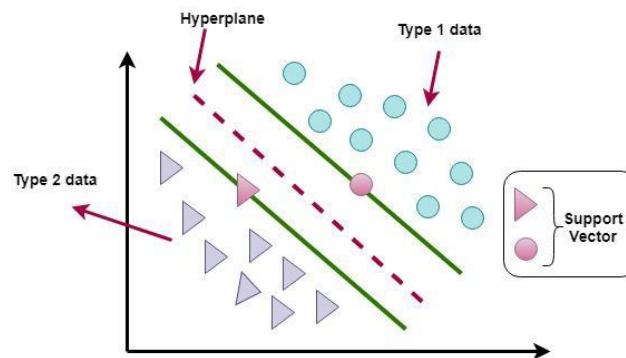
Fig 2. Support Vector Machine

Ravikumar et al [12] used SVM for implementing automatic stutter speech recognition. The stutter speech samples of fifteen adults were collected within which 12 samples are utilized for training and 3 samples are utilized for testing purpose. This work performs higher with the 94.35% accuracy. That is higher in comparison with their previous work.

C. Artificial Neural Networks (ANNs)

ANN is one of the major tools used in machine learning for finding patterns which are too complex for humans. As the "neural" part of their name suggests, they are brain-inspired systems which are intended to replicate the way that we humans learn. Neural networks consist of input and output layers, as well as a hidden layer consisting of units that transform the input into the output.

Technique to detect the dysfluency in speech signal and to classify stutter and non-stutter speech ANN are widely used. ANN was trained with different features like MFCC, zero crossing rates (ZCR), Pitch etc. Such a

combination gave better accuracy of 94.52% for repetition and 96.71 % for prolongation. When compare with other combination of features MFCC along with ANN shows an 88.29% average accuracy [13].

III. METHODOLOGY

In the proposed system first, we classify the stutter and non-stutter speech separately then speech signal is corrected and stored as shown in Fig 3. Secondly corrected speech is used to identify stutter speech in real world ASR.

The procedure of stammered speech recognition is isolated into five phases: Segmentation, Pre-emphasis, Epoch Extraction, Feature Extraction, Classification.
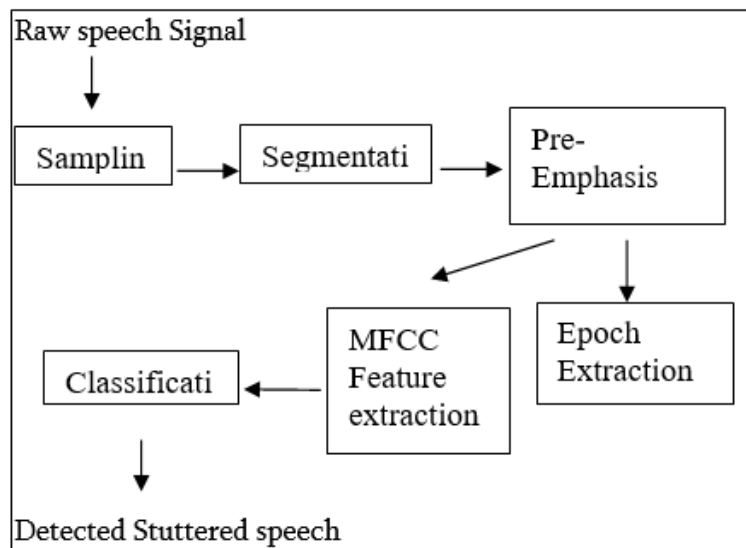
Fig 3. Automatic Stuttering Speech Detection

A. Speech signal pre-processing
The stuttering speech signals were sampled at 44.1 kHz since most of the salient features for speech processing are within 8 kHz bandwidth. By using decimation method, the signals were down sampled to 8 kHz by a factor of n where n = 44.1 KHz/8KHz.

B. Segmentation
Segmentation of speech signals is widely used for speech analysis and recognition purposes. Segmentation is a process in which continuous speech is divided into smaller units having boundaries with fine resolutions. The smaller units can be of any forms like word, phone and syllable. Segmentation can be carried out in both manually as well as automatically. Automatic segmentation is better when compare with Manual segmentation. Various ways to perform automatic segmentations are Fourier Transform, Short Term Energy, Minimum Phase Group Delay Method, Wavelet Method, Discrete Wavelet Transform (DWT) and Word Chopper Technique [14]. In this proposed system we used DWT method for segmentation since it uses frequency and time concurrently due to that computing the threshold value will be accurate [15].

C.   Feature Extraction

Feature extraction is used to convert the acoustic signal into a sequence of acoustic feature vectors that carry a good representation of input speech signal. Researchers working on this area discovered that if the speech signal is observed using a very small duration window, the speech content in that small duration appears to be more or less stationary. That brought in the concept of short-time processing of speech. In this technique, a small duration window is considered for processing at a time. This small duration is called a frame. To process the whole speech segment, we need to move the window from beginning to end of the segment consistently with equal steps, called shift. Based on the frame-size and frame-shift we can calculate M frames. For each of the frames, MFCC coefficients are computed. Steps in calculating MFCC are given below.

- Take the Fourier transform of (a windowed excerpt of) a signal.
- Map the powers of the spectrum obtained above onto the mel scale, using triangular overlapping windows.
- Take the logs of the powers at each of the mel frequencies.
- Take the discrete cosine transform of the list of mel log powers, as if it were a signal.
- The MFCCs are the amplitudes of the resulting spectrum.

D.   Pre-Emphasis

The Strategic separation is sustained from numerical issues throughout the Fourier transform, Signal-to-Noise Ratio (SNR) raise by stabilizing the frequency spectrum. The non-spectral methods will enhance the information of the excitation source of the vocal tract. The primary and most significant mode of excitation is due to the activity of glottis. Figure-3 shows block diagram to extract the low frequency information and the breathy noise part of the glottal excitation in stuttering speech.

E.   Epoch Extraction

Events occur at several levels of speech production and it is important to identify events before further processing of the signal. In this work, the instances at the production level are considered, that is, the instances occurring due to major source of glottal vibrations (epochs). Fig 4 indicates the speech signal, filtered output, and the normalized error for stuttered BA and Normal BA.
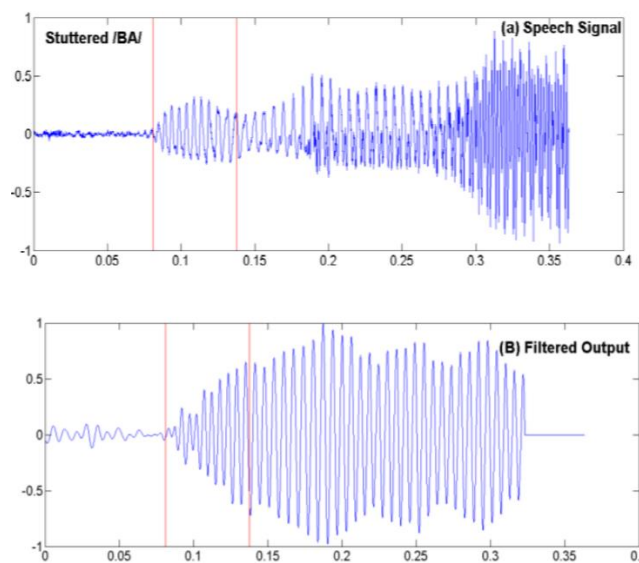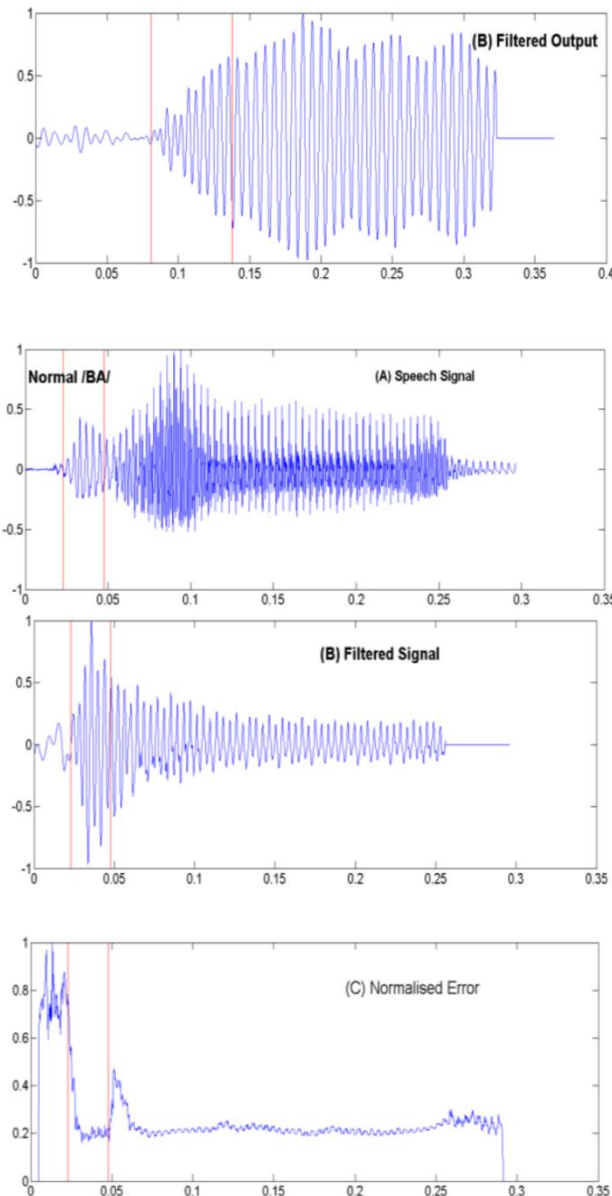
Figure 4: **The speech signal, filtered output, and the normalized error for stuttered BA and Normal BA.**

IV. RESULT

Recognition of Stuttering and Non-Stuttering intervals

For evaluating the proposed method, here stuttering and non-stuttering Classification was done through MFCC method. The evaluation was implemented on the UCLASS Stuttering speech database. A total of 10 hrs 30 mins stuttering speech database were splitted into the ratio of 3:1 for training and testing. For Feature extraction 100ms and 200ms were selected as windows size and 0.8, 1 and 1.2 threshold were selected for detecting the stuttering and non-stuttering boundaries. Table 1A represents the Accuracy of the model indicated by

precision, recall and F1score. Precision represents the percentage of relevant. Recall refers to the percentage of total relevant results correctly classified. Harmonic mean of precision and recall is denoted by F1 score.

TABLE 1 A: STUTTERING AND NON-STUTTERING BOUNDARY DETECTION

Thershold		FD=32 , WS=100 SS=50		FD=384, WS=100 SS=50	
		AM	LM	AM	LM
0.8	Precision	0.27	0.49	0.26	0.50
	Recall	0.34	0.63	0.31	0.60
	F1 Measure	0.30	0.55	0.28	0.54
1	Precision	0.28	0.51	0.26	0.52
	Recall	0.33	0.62	0.30	0.59
	F1 Measure	0.30	0.56	0.28	0.54
1.2	Precision	0.29	0.53	0.26	0.53
	Recall	0.33	061	0.29	0.58
	F1 Measure	0.31	0.57	0.27	0.55

TABLE 1 B: STUTTERING AND NON-STUTTERING BOUNDARY DETECTION

Thershold		FD=32, WS=200 SS=50		FD=384, WS=200 SS=50	
		AM	LM	AM	LM
0.8	Precision	0.40	0.69	0.35	0.56
	Recall	0.40	0.67	0.39	0.67
	F1 Measure	0.40	0.67	0.37	0.64
1	Precision	0.41	0.70	0.36	0.62
	Recall	0.38	0.63	0.38	0.65
	F1 Measure	0.39	0.66	0.37	0.63
1.2	Precision	0.44	0.72	0.38	0.64
	Recall	0.35	0.57	0.37	0.61
	F1 Measure	0.39	0.64	0.37	0.62

[FD Feature Dimension, WS Window Size, SS Shift Size, AM Accurate Match, LM Limited Match].

The improved performance of the proposed method may be attributed to the following reasons. 1) The entire speech signal is processed at once to obtain the filtered signal. 2) The proposed method is not dependent on the energy/magnitude of the signal. 3) There is only one parameter involved in the proposed method; the length of the window for removing the trend from the output of 0-Hz resonator. 4) There are no critical thresholds involved in identifying the epoch locations.

V. CONCLUSION

In this paper, focused on classifying the stuttering and non-stuttering speech signal by using MFCC classifier and then correcting the prolongation and repetition of words in a given stutter speech signal. Corrected signal is stored in database. Finally with the corrected speech signal we predicted corresponding text for a given stutter speech signal and also reduced 2% of WER when compare with SVM and ANN.

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Design Implementation and Verification of Synchronous FIFO

Nazia A M[1], Amrithapriya K K[2], Fiza[2], Shilpa A[2], Chaithra L S[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

With the conventional directed test bench, it is highly improbably to handle verification of current complex Integrated Circuit (IC) designs, because a person has to manually create every test case. The greater the complexity of the designs, the higher the probability of bugs appearing in the code. Increasing complexity of ICs has created a necessity for performing verification on designs with an advanced, automated verification environment. Ideally this would eliminate chipre spins, minimizing the time required to enable checking of all the design specifications, ensuring 100 percent functional coverage. This deals with the design of Synchronous FIFO using Verilog. A FIFO (First- In-First-Out) is a memory queue, which controls the data flow between two modules. It has control logic embedded with it, which efficiently manages read and write operations. It has the capability to notify the concerned modules regarding its empty status and full status to help ensure no underflow or overflow of data. This FIFO design is classified as synchronous, as clocks control the read and write operations. Both read and write operations happen simultaneously using of Dual port RAM or an array of flip-flops in the design. After designing the Synchronous FIFO, its verification is carried out using the Universal Verification Methodology.

Keywords—FIFO, UVM, Xilinx ISE, Eda playground

I. INTRODUCTION

FIFO is an acronym for First In First Out, which describes how data is managed relative to time or priority. In this case, the first data that arrives will also be the first data to leave from a group of data. A FIFO Buffer is a read/write memory array that automatically keep track of the order in which data enters into the module and reads the data out in the same order. In hardware FIFO buffer is used for synchronization purposes. It is often implemented as a circular queue, and has two pointers: Read Pointer/Read Address Register and Write Pointer/Write Address Register. Read and write addresses are initially both at the first memory location and the FIFO queue is Empty. When the difference between the read address and write address of the FIFO buffer is equal to the size of the memory array then the FIFO queue is Full. FIFO can be classified as synchronous or asynchronous depending on whether same clock (synchronous) or different clocks (asynchronous) control the

read and write operations. Synchronous FIFO refers to a FIFO design where data values are written sequentially into   a memory array using a clock signal, and the data values are read out sequentially from the memory array using the same clock signal. The building blocks of a synchronous FIFO include memory array and flag logic controlled by the read control logic and the write control logic. An array of flip-flops forms the memory array and width and depth expansion of the array can be achieved easily through parameterization, as it is implemented in Software.

II. RELATED WORK

- Vinoth Nagarajan "Design and verification of synchronous FIFO using universal verification methodology", in this paper he described the designing of Synchronous FIFO module and its verification using UVM test bench environment. design specifications, ensuring 100 percent functional coverage. This paper deals with the design of Synchronous FIFO using Verilog. A FIFO (First- In-First-Out) is a memory queue, which controls the data flow between two modules. It has control logic embedded with it, which efficiently manages read and write operations. It has the capability to notify the concerned modules regarding its empty status and full status to help ensure no underflow or overflow of data. This FIFO design is classified as synchronous, as clocks control the read and write operations. Both read and write operations happen simultaneously using of Dual port RAM or an array of flip-flops in the design. After designing the Synchronous FIFO, its verification is carried out using the Universal Verification Methodology (UVM). A detailed Discussion about the verification plan and test results is included.

- "Designing of 8-bit Synchronous FIFO Memory using Register" File Harish Sharma, Gurgaon Charu Rana. T. M. University, Gurgaon FIFO is implies first in first out using queue methodology for memories read and write of any information and data using some control logic. The whole work of FIFO is fully dependent on the control circuitry and clock domain. It is often used to control the flow of data from source to destination by the transition of every clock. Basically FIFO differentiate by clock domain either Synchronous or Asynchronous. There are various methods to designing and synthesized FIFO but here fully focused on the memory which is used to store the data in domain of clock either sync. and async. or single and multiple clock cycles. This paper will differentiate the design, synthesize and analyze a Synchronous FIFO using Register file memory by older version of Synchronous FIFO. In this paper, conclude the effect of using register file instead of random access memory for storage of data in FIFO memory. This work shows change the parameters like on- chip components (clock, signal, input and outputs etc), clock domain, type of resources, and how to minimize and optimize hierarchy of the device. The RTL description for the FIFO is written using Verilog HDL (hardware description language). And design is simulated and synthesizes in Xilinx ISE Design suite 12.4. The RTL code simulated in ISim Simulator.

- Niraj Agarwal "Implementation and Verification of FIFO using system Verilog Methodology". This paper describes the designing and implementing FIFO module using Verilog language and verification of realized FIFO design using system Verilog framework. Developing complex nature of patterns concurrency of Integrated Circuits has made conventional coordinated test- benches an un- workable answer for testing.

Nowadays, testing as a word has been substituted with check. Confirmation specialists need to guarantee what goes to the plant for assembling is an exact representation of the specification of con- figuration. Verification is the maximum time consuming stage in the whole design process, thus it has become a necessity to minimize the time required to encounter the confirmation necessities. The relentless growth in the complexity of the system, has led to the requirement of a more advanced, well organized and automated approach for creating verification environments. As the designs gets complex, the probability of occurrence of bugs increases. This gives the introduction of the verification phase for verifying the functionality of the IC and to detect the bugs at an early stage. In this paper, the synchronous FIFO design is verified using System Verilog Verification Environment.

III. PROPOSED WORK

A. Synchronous FIFO

The synchronous FIFO has single clock port for both data-read and data-write operations. Data presented at the module's data-input port (DATA_IN) is written into the next available empty memory location on a rising clock edge when the write-enable input (WR_EN) is high. The memory full status output (FULL) indicates that no more empty locations remain in the module's internal memory. Data can be read out of the FIFO via the module's data-output port (DATA_OUT) in the order in which it was written by asserting read-enable (RD_EN) prior to a rising clock edge. The memory-empty status output (EMPTY) indicates that no more data resides in the module's internal memory. Requesting a read operation while the EMPTY flag is active will not cause any change in the current state of the FIFO. Similarly, a write operation while the full flag is active will not cause any change in the current state of the FIFO.

Fig.1.1: Block diagram of FIFO

B. Verification plan

Verification plan is written before verifying any project to ease the work of verification engineer. Based on the requirement of the project, verification plan is to be built which includes list of test cases and coverage models. Fig.2 shows the verification flow which explains the types of phases went through the verification process.

C. Universal verification methodology

1. UVM Classes

- UVM includes class libraries from which different components for verification can be derived. It has 3 classes.

- UVM Object: It is a base class for UVM data and components which define the random seeding and methods of operation for copy, create, print, record, etc.
- UVM Components: It is a root class for UVM component which defines factory interface and transaction recording. Each UVM component can be addressed through a hierarchical path name.
- UVM Transaction: Transactions are driven by UVM Transaction. It is transient in nature and inherits UVM Object features. It gives timing and recording interface.

2. UVM Test Bench

UVM test bench architecture classified into three parts:

i.   Generating the stimuli.
ii. Stimulus as input to DUT.
iii. Verifying the functionality and measuring the overall coverage.

- UVM Test Bench consists of a number of components which will be helpful to build reusable test bench
- Sequence Item: It has data field which is used to generate stimulus and represents the communication at the level of abstract.
- Sequence: It is a collection of sequence item where items are randomized and then sends to driver.
- Sequencer: It controls the request and response of the sequence item between driver and sequence.
- Driver: It is used to drive signals to DUT using virtual interface.
- Monitor: It monitors the signal activity of design inter- face and converts pin information into the packets and transfers to the scoreboard and coverage collector.
- Agent: It is encapsulation of sequencer, monitor and driver. It can have an active and passive agent. Passive agent is used only to monitor DUT activity. Whereas active agent drives the signal to DUT and instantiates the components in it.
- Scoreboard: It will receive the transaction from agents and compares the DUT output with expected values to check the correctness of DUT.
- Environment: It holds the multiple agent and components like scoreboard and functional coverage. A test bench can have numerous environments.
- Test: It explains the test scenario and hold configuration properties, environment and class overrides, etc.
- Top: It is the root of the hierarchy and the top contains the verification components, DUT instance, clock and reset generator log, interface instances etc.

3. UVM Phases

- The simulation is carried out in a set of phases to achieve synchronizing mechanism. It is divided into 3 categories.
- Build time Phase: It executes in zero simulation time and runs in top down style.
- Run time phase: The run phase is a time taking phase, test cases will run in this phase. This phase is performed from start to end of simulation.
- Clean Up Phase: In this phase results are collected from scoreboard and coverage after run phase.

D. Synchronous FIFO UVM Test bench

- Fig. 1.2 shows verification components where Agent is the data agent. Data agent transmits the data from sequencer to DUT. Scoreboard will give the results of test scenarios and coverage gives the coverage report.
- Virtual sequence is required to coordinate the stimulus in multiple driving agent.
- Interface consist all input and output signals of synchronous FIFO. It provides communication between driver and DUT.
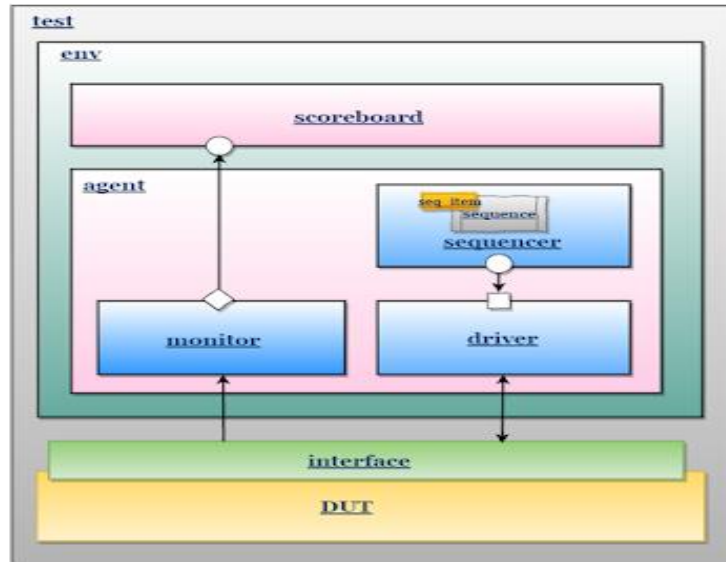
Fig 1.2: Test bench of synchronous FIFO

IV. RESULTS AND SIMULATION

Designed synchronous FIFO is verified using UVM test bench, the simulation is carried out in EDA Playground tool. The scoreboard results are obtained by comparing actual data and expected data, if the data matches, successfully compared will be displayed.

V. CONCLUSION

Synchronous FIFO is verified for possible scenarios using UVM test bench, which have advantage of time reduction with the help of base class, provides reusable components, define the input stimuli by constraint randomization. The designed synchronous FIFO can be used in the application of SOC and FPGA has it is reliable and consumes less time for verification because of UVM.

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Real Time Fuel Monitoring and Theft Detection Using IOT

Ms. Rebecca Angela Fernandes[1], Imad Assadi[2], Mohammad Afnan[2], Mohammed Asheem Hameed[2]

[1]Assistant Professor, Department of Electronics and Communication, Moodbidri, Karnataka, India
[2]Fourth Year, Department of Electronics and Communication, Mangalore, Karnataka, India

ABSTRACT

The Project works in the field of the fuel management system, which handles the theft alert and sensors which determines the live situation of the fuel tank. Also fuel theft is major problem in society. In our project we implemented if fuel gets theft then alert will be send to owner of vehicles also buzzer makes noise so that owner of vehicles, someone like watchmen or in charge of parking area get aware and take action.

This system offers a theft detection System in addition to manual monitoring of fuel. This system measures fuel volume and sends measured volume to the owner's mobile. It also provides a technique for detecting theft or fraud incidents in case of fuel theft or fuel leakage are practically verified. This system allows for an automated analysis and monitoring of fuel level, having a reduced cost due to affordable and easy-to-acquire electronic components

Index terms: Ultrasonic sensors, Flow sensors, buzzer, Camera, power supply, ESP32

I. INTRODUCTION

Now a day's all world become digital so that we can easily deal with real time system. At same time digital fuel meter which is implemented in recent vehicle system has drawback that is actual fuel present in fuel tank of bike is not shown in term of digits instead shown in terms of bar or deflecting needle. Due to this we did not get idea about actual fuel present in fuel tank of bike it only shows the level of fuel present in fuel tank. Sometimes customer fill fuel from petrol filling pump they filled the petrol in digitally but in our vehicle there is no digital system there is bar or deflection needle system. The figure shows the existing fuel meter in bikes and cars. But it cannot give the accurate value of fuel filled, so the petrol filling pump owner is cheated on customer but customer do not know about cheating due to existing fuel metering system.

All benefit goes to the petrol filling pump owner so that they many times cheated with customer. To solve this problem we developed a system of digital fuel meter that indicate value of fuel in digits such as 1lits, 1.5lits, 2lits etc. The digital fuel meter is applicable for all type of vehicles like car and bikes etc. Vehicle Petrol theft is one of the main concerns of many bike owners and car owners. Many times we have heard or some of us have already faced that petrol from their bike or cars has been stolen. The bike owner or car owner is unaware about the fuel theft. When he ride bike next time because of fuel thefting he have to face lot of problems. To avoid such problem Digital Fuel Meter and antitheft system should be implemented in vehicle. In this system we used

the microcontroller as the main part which send the message to the owner by using the GSM module when the theft occurred and buzzer will start to indicate that fuel get theft all this process is real time so that more accurate and secure. GSM based vehicle fuel theft detection system with SMS indication has application in car, bikes and all other vehicles. While implementing the model, we have used telecommunication, to be specific; SMS is integrated or improvised to the present vehicle security system. Instead of human to human telecommunication, this system create new entity which is machine to human telecommunication. This project aims to use GSM technology to monitor security of fuel.

II. LITERATURE SURVEY

The work in this area has not been done very much. It is a very recent research area. In one of the articles GSM modem has been used, which send message to the owner of the vehicle when there is fuel theft going on. This system assures the security of vehicle fuel whenever the vehicle is at rest and also monitors the fuel level in the fuel tank. If the fuel level decreases when the bike is at rest the system detects that fuel theft is going on. And it will raise the alarm and send the message to the owner of the vehicle that "Fuel Theft Detected". To send this message GSM module is used. This GSM module has a unique IMEI number which is used to track the vehicle's position. The major drawback of this method is that it takes a long time to deliver the message, the position of the vehicle is not accurate most of the times and it is complicated to use.

In another system developed by Mr. P. Senthil Raja and Dr. B.G.Geetha Vehicle Area Network (VAN) and embedded design have been used. In the proposed system, the owner of the vehicle immediately receives a message when the fuel tank is opened by the operator or by a fuel traded and also the height of the fuel tank when opening and closing of the tank. The system uses wireless-based communication for monitoring the vehicle's position. The process involves measuring the fuel level followed by eliciting the information and sends it to the server for further detection. The major drawback observed in this project is that the numeric lock opens after several trials, which is very time consuming, also the proposed system is extremely expensive. There is a scope of improvement for sensors.

Mr. Heda Venkata Sai Ajith1 and Mr. Pinjala Sai Kiran have developed an antitheft security system that utilizes an embedded system designed with GSM to monitor and safeguard a car. In an attempt of theft, the system sends a text message to the car owner and at the same time starts up an alarm from the buzzer installed within the system. The sensors are not effective in most cases, also, it is complicated to do the setup within the fuel tank.

Our system uses a microcontroller Node MCU for processing all user commands. Node MCU is used since it has inbuilt Wi-Fi module which is used to connect to the internet and receive user commands. Device will monitor the environment using different sensors and with the help of the internet, information is sent to the server using Wi-Fi. Our system is cost effective and easy to deploy. Also the sensors used work with great efficiency with almost zero percent chances of error.

III. FUNCTIONAL PARTITIONING OF THE PROJECT

A. Working Mechanism

Fuel theft Monitoring project consists of Node MCU, ultra sonic sensor to measure fuel level, flow sensor to detect fuel thefting, GSM module used to send SMS to alert user about fuel thefting and fuel level, camera is used to take live coverage of the thefting. In this circuit 9V, 2A SMPS issued to give power supply to all the components which take 230 input from main supply and convert it into 9V. This 9V further down to 5v from Node MCU inbuilt voltage regulator. Flows ensorused to detect flow of fuel. GSM module used here to send Alert SMS to user about fuel level. If fuel amount get reduced during ignition OFF condition then owner get fuel theft alert SMS. Buzzer is also used alert surrounding about fuel thefting
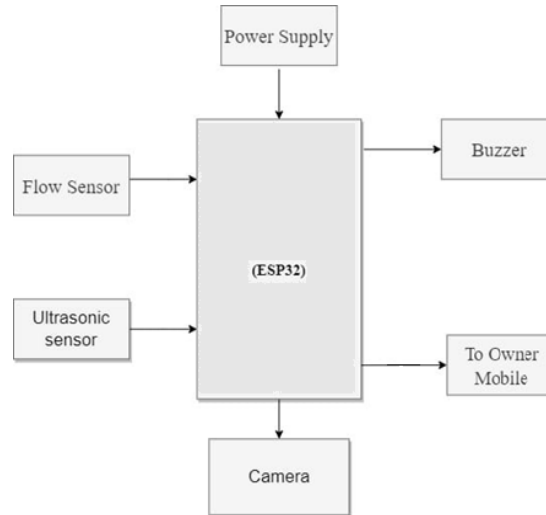
B. Methodology

Design and implementation of real time monitoring and theft detection system is monitor fuel dispensing from the fuel dispenser in filling stations and it detects fiddle by measuring the amount of fuel flown through the flow sensor. If the amount of fuel dispensed from dispenser doesn't match with the amount shown to us in the android application or cloud account, then the fraud can be detected. Another thing about this system is, fuel thefts can be caught by using ultrasonic sensor which is fixed at the fuel pipe which is basically present at the vehicles
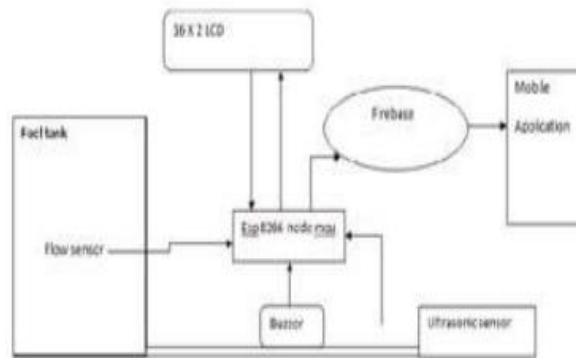
C. Flow Chart of the System

The flow chart of the system can be seen in Figure 8. The system waits for input checks whether the fuel tank is opened or closed in the "Is fuel tank lid open?" phase. If the fuel tank is open, and system is activated. Microcontroller sends warning to the owner. After that, the system will take measurements from fuel level sensor in "Check vehicle fuel level" phase. If the fuel level drastically decreases then the data is been saved and the owner receives a message. While this process takes place the camera starts to take live coverage of the theft happening.
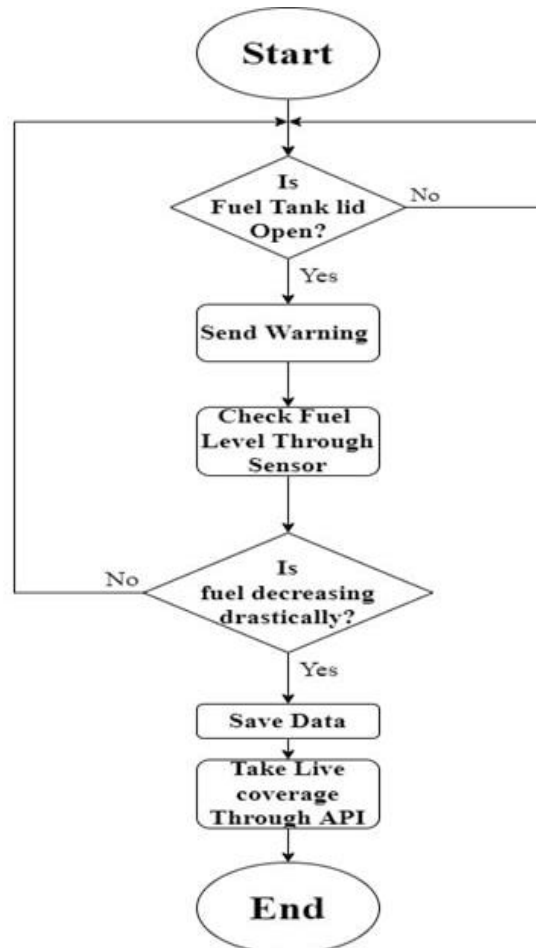
IV. CONCLUSION

The proposed method works efficiently in fuel monitoring in fuel stations and theft detections. This also provides real-time data with in time on web portal and android application. By this system the thefts can be detected at parking places and also at bunks. This proposed system could help us solve these two problems

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Automated Toll Collection System Using GPS and GPRS

Mr. Kiran A.R.[1], Mohammed Shareef[2], Surendra, Sheik Thousif[2], Swaliha Sheik Ahmad[2]

[1]Assistant Professor, Department of Electronics and Communication, Moodbidri, Karnataka, India
[2]Fourth Year, Department of Electronics and Communication, Mangalore, Karnataka, India

ABSTRACT

Developing countries like India needs a significant improvement in infrastructure such as roads or highways. Construction of these highways is a costly affair, which can't be invested by the government alone. Normally Public private partnerships are made to construct such a huge projects. The money spent on these projects can be regained by collecting toll from the passengers who use the roads.

The toll collection system, especially in India faces some problems such as long queue lines, escaping from toll plazas etc. These systems can service only 300 vehicles per hour, and if more than that numbers of vehicles arrive at that plaza, server traffic jams may occur. To solve this we are proposing to create geo-fences using GPS by giving latitude and longitude of the corner of the toll plaza. By comparing the position of vehicle and toll plaza, the owner of the vehicle can be charged from the account.

Index Terms—toll collection; geo-fences; GPS

I. INTRODUCTION

The toll collections is a phenomena to get back the investment made on the infrastructure from the people who are using it. In Indian scenario, there are problems faced in collecting the toll such as no uniformity of toll rate throughout the various sections of Indian highways. The fare is also not uniform because these agencies are normally operated by a private organization, and there are many complaints from the people such as under charging. There are so many allegations against these private agencies for non-reporting/under-reporting of the toll fee. Due to limitations of service of the vehicle of the toll plazas which is around 300 vehicles per hour, there are problems of large traffic jams, crowding and congestions of vehicles, which leads to both a waste of fuel and time. This paper is formed as follows Section II presents the introduction to GPS and GSM, Section III presents system working and their discussion. Finally the paper is concluded with Section IV.

II. INTRODUCTION TO GPS AND GPRS

The GPS is used here to find the position of the vehicle accurately, using triangulation technique. The GPRS kit in the vehicle is used to transmit the location of the vehicle to the server. Each GPRS has a unique SIM (Subscriber identity module), which is used to uniquely identify the vehicle. The position of the vehicle is

checked against the geo feces of the toll plaza, and if they come in that range, the amount will be debited from the account of the vehicle owner. The hardware kit of card is given in Fig 1. The GPS and GPRS are integrated using ARM microcontroller. The GPS position information is sent to the server using GPRS. The block diagram representation is given in fig.

III. LITERATURE SURVEY

AUTOMATED TOLL COLLECTION SYSTEM USING GPS AND GPRS:

Sudheer Kumar Nagothu

In this paper proposed to collect toll fee from the owners of the vehicle. Wastage of time and fuel because of the large traffic jams has been solved by implementing toll collection using GPS. In this project gps is used to find the location of the vehicle when the vehicle comes in the geofence area of the toll area gprs send the data of the vehicle to the database then the fee is directly deduced from the owner's bank account then the information is sent through the email or message

Automated Toll Collection Using Satellite Navigation

Ms.Kirti A.Lonkar , Ms. Pratibha P. Kulkarni , Ms Monalisha Dash 3, Mr.Abhishek Dhawan , Mr.Hemant R.Kumbhar , Mr.Monika P.Gagtap

In this paper Purpose of the proposed system is to do the tasks remotely on the client machine through server. The aim is to develop Toll Collection System on express highway in such a way that, so the user have no need to keep money with him to pay toll and without the vehicle even having to slow down or stop at a toll. The system architecture of GPS-based ETC system which includes five key parts of unit: interfacing hardware device, manual toll collection team, control unit, Transaction management unit and the money Payment Center. When vehicle moves into the toll area, interfacing hardware device checks current vehicle's position coordinate from GPS with the virtual toll node coordinate, kept in the storage of interfacing hardware device. After logistic determining, the interfacing hardware device sets up wireless communication channel through GSM module. Interfacing hardware device sends transaction message to control system by the GSM module through mobile network. After auditing to control system saves toll data and sends back transaction information to the Interfacing hardware device. The Interfacing hardware device receives and displays the transaction result then it is working properly.

IV. FUNCTIONAL PARTITIONING OF THE PROJECT

V. SYSTEM WORKING

A. Technical Requirements

For this system to work well, the vehicle which is fitted with this system must be represented separately, for e. g., by providing separate color for number plate of the car, and providing separate line for this type of car at the toll plaza to get serviced at a fast rate.

The kit designed for this application is given in the Fig. 1, where GPS and GPRS are combined using the ARM controller. By using "always on feature" of GPRS the location of the vehicle can send to the server. It requires 1GB internet data, which costs less than 100INR in Indian Scenario.

B. Flow of the System working

The GPS latitude and longitude data from the device which is shown in the Fig. 3 will be sent to the server continuously.

The toll gate latitude and longitude are stored in the database. For this application we have used SIM from a same company, staring with a unique 5 numbers. The sixth digit may represent vehicle registration state, the seventh and eight digits may represent vehicle registration district, and the 10th number can give type of vehicle i.e. whether it is a heavy vehicle, or small vehicle etc…The mobile tower is located at the toll plaza, and the information of the vehicles which comes near the range of the mobile tower located at the toll plaza will be stored in a temporary database. The position of the vehicles in the range of mobile tower will be compared with the position of the toll plaza, when it's less than 200m, the vehicle database as shown in Fig.4. Now these vehicle information is once again comrade one by one, which are stored in ascending order of distance. When the distance between vehicle and toll plaza is less than 5 meters, amount will debited from the account of the vehicle owner, which will be acknowledged with a SMS to the customer, and the barrier is lifted and also the number is immediately removed from the database. If there is no balance in the account of a customer, the bill can be sent to the vehicle owner home with fine, which should be paid immediately or else the vehicle may be seized.

The position of the vehicle is compared with the toll plaza position using have sine formula, and if the vehicle is within the range of toll plaza, amount will be taken from the account of the person.

Where is latitude and longitude of present position, is latitude and longitude of toll plaza position and RE is radius of earth (around 6371000 meters), and all angles are in radians. Distance in meters is given by d. When the distance d is less than 200 meters the vehicle information is stored in the database, in ascending order of distance. A record of the vehicle journey can be maintained for any future check, or if there is any complaint from the owner because of over charge. In Indian Scenario, drivers tries to skip the toll plazas, by taking alternate routes, these alternate routes also can be geo referenced, and it can be found when they try to escape from toll plazas and they can be heavily fined.
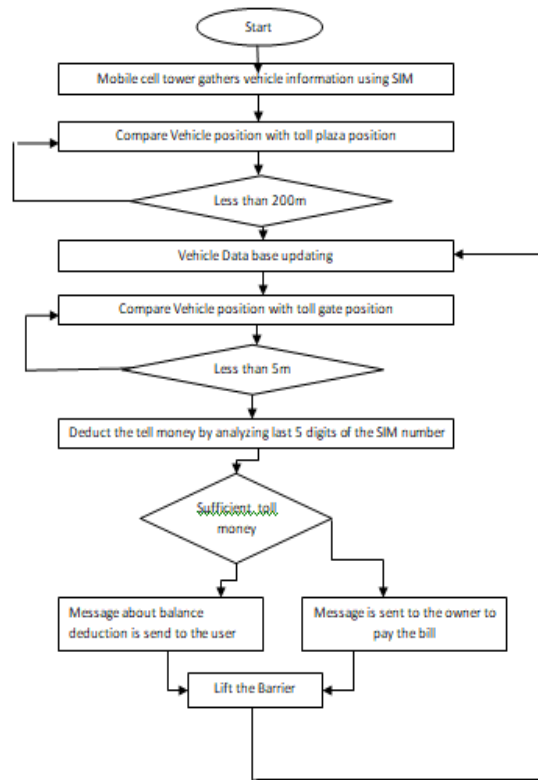
VI. CONCLUSION

A method has been proposed to collect toll fee from the owners of the vehicle. Wastage of time and fuel because of the large traffic jams has been solved by implementing toll collection using GPS. Each vehicle is identified uniquely by SIM of the GPRS, and the amount is debited from the respective amount of vehicle's owner, which is acknowledged by the SMS/Email to owner of the vehicle. Since everything is computerized, the under charge or over charge collection of toll by private agencies is solved. A uniform fare can be collected throughout the country.

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Solar Powered Grass Cutter Robot

Ms. Pavithra S G[1], Mr. Avin A V[2], Mr. Avinash V[2], Mr. Deekshith B P[2], Mr. Sujana Kumar[2]

[1]Assistant Professor, Department of ECE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Department of ECE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

This paper implements the design of a Solar powered grass cutter robot is battery operated system, which uses a batteries, one battery is used to run the vehicle movement which is dc motor. The other one is used to power grass cutter motor. The system uses a solar panel for charging vehicle movement battery. The microcontroller operates the vehicle movement as well as the grass cutter at the same time the image processing concept is used in the robot to detect the presence of grass, the system uses gyro sensor in order to achieve perfect 180 degree turns to achieve complete garden. The use of robotic technology for lawn mowing has been carried out to minimize the risk of hazards that can be experienced as well as to consider energy efficiency, time and cost. However, in some conditions, robotic-assisted work has not been completely left without human supervision. So even though there has been a lot of research into the implementation of this lawn mower robot, there are still gaps in development to improve its performance and efficiency. This research builds a lawn mower robot and its control support system using the capabilities of an Android-based smartphone. The robot built is able to perform manual movements (forward, backward, turn left, and turn right) as well as make trims through commands sent from smartphones or move autonomously through the targeted land area. Of course, with the addition of an ultrasonic sensor module to prevent the robot from hitting solid objects in front of it.

Keywords: - Lawn, Mower, Gyro sensor, Rasperry pi.

I. INTRODUCTION

As the world moves towards automation, it is beneficial to have a robotic assistant to facilitate human tasks. The robot described in this project has been built considering the fulfillment of this necessity as the fundamental objective. There are The use of solar power as an alternative source of energy has been in existence long before now but has not had diverse application methods due to other frequently used sources of energy. Solar energy involves the process of harnessing radiant light and heat from the sun using a range of ever evolving technologies such as solar thermal energy and photovoltaics. These technologies are broadly characterized as either passive solar or active solar depending on how the energy is converted to solar power. The effectiveness of these technologies have made solar energy a very important source of renewable energy and thereby giving room for new developments in its wide range application processes. In the world today,

world's power consumption is taking a shift from the use of common sources of energy such as fossil fuel and wood fuels to solar energy. The change in energy consumption trend was due to the awareness of fossil fuel pollution and its contribution to global warming, and also the fact that fuel energy is non-renewable and unsustainable. In Nigeria today, like most other developing countries, fossil fuel has been a basic source of non-renewable energy. Pending the fact that we import fuel there is always a tendency of a hike in the cost of fuel as a result the economical instability. Lawn maintenance is the art and vocation of keeping a lawn healthy, clean, safe and attractive, typically in an for new developments in its wide range application processes. This research builds a lawn mower robot and its control support system using the capabilities of an Android-based smartphone. Lawn maintenance is the art and vocation of keeping a lawn healthy, clean, safe and attractive, typically in a garden, park, institutional setting or estate. Man is constantly trying to adapt to his environment by creating a habitat suitable for his Image processing is a technique that makes use of an image as an input, performs certain operations on it, and yields the output as required for a specific application. In the robotic system described in this Project, an image of the signaling object, provided as an input to the robot, can, in turn, be used to help the robot identify the intended direction. Nowadays Robots are successfully capable of performing various human tasks that may be difficult due to them physical disabilities, size constraints or harsh environmental conditions.

II. LITERATURE SURVEY

[1] **Solar Based Wireless bluetooth Grass Cutter Application –** Vickey Jain, Abhinay Alishety, Prabhath Kumar, semantic scholar, Corpus ID: 6079134, 2015. This paper proposes a system whereby the human control becomes a specific key to manipulate a robot, but nowhere a bluetooth recognition module is used. In this system, an android application is used to recognize the human voice and is converted to text. This text is further processed and used to control the robot. Keeping in mind the need of the day (requirements of the present day), our goal is to move towards making access to the manipulation of everyday objects to individuals with motor impairments. But the voice recognition module involves a high cost when it comes to practicality (reality). Using our system, we perform several studies on control style variants for robots. Results show that it is indeed possible to learn to efficiently manipulate real-world objects with only bluetooth as a control mechanism. Our results provide strong evidence that the further development of voice-controlled robotics will be successful.

[2] **Bluetooth Controlled Robot using Image Processing -** Mahesh Kumar Kaura, Vipul Honrao, Sayali Patil, Pravish Shetty, (IJARAI) International Journal of Advanced Research in Artificial Intelligence, Vol. 2, No. 5, 2012. Service robots directly interact with people, so finding a more natural and easier user interface is of fundamental importance. the purpose in using robots is slowly expanding .The traditional way robots are operated is obsolete While earlier works have focused primarily on issues such as manipulation and navigation in the environment, few robotic systems are used with user-friendly interfaces that possess the ability to control the robot by natural means. To facilitate a feasible solution to this alternative, we have implemented a system through which the user can give commands to a wireless robot using gestures. Through this method, the user can control or navigate the robot by using gestures of his/her palm, thereby interacting with the robotic

system. The command signals are generated from these gestures using image processing. These signals are then passed to the robot to navigate it in the specified directions.

[3] Robotic blade control using command and remote - Dr. R. S. Chaudhari, K. A. Chandra, Sandeep Bagane, International Journal of Computer, Information Technology & Bioinformatics (IJCITB) ISSN:2278-7583, Volume-1, Issue-1. The human-robot voice interface has a key role in many application fields. Hand gesture is a very natural form of human interaction and can be used to effectively in an human-computer interaction . In this paper, we propose a "Human Machine Interfacing Device" utilizing hand gestures to communicate with computers and other embedded systems acting as an intermediary to an appliance. Developments in the field of communication have enabled computer commands to be executed using hand gestures. This paper discusses hand glove-based techniques that use sensors to measure the positions of the fingers and the position of the hand in real-time. Interaction using gesture technology for effective communication empowers physically challenged to interact with machines and computing devices including an graphic interactions and simulations. This paper focuses on wireless data control that are proposed to be used for movement recognition and accordingly robot movement can be done.

[4] Grass Cutter Robot - Lavanya K N, Nischitha B R, Ramya Shree D, T Asha, C Gururaj International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT) This project is a real-time monitoring system by which humans interact with robots through gestures. This is an immense aid for people for whom mobility is a great challenge. There is a dire need for a vision-based interface over voice recognition as it failed to mandate the robots because of modulation and varying frequency. Gesture recognition consists of three stages: capturing of images, image processing, and data extraction. The implementation is achieved by navigation of the robot through various gestures. By the impact of this project, a life of physically challenged people becomes less challenging. From further research, it will benefit various areas including applications in military and high-security basis.

[5] Solar Powerd Grass Cutter Robot - Solar Based Wireless Grass Cutter, International Journal of Science Technology and Engineering, Vol. 2, 2016, 576-580 .This paper implements the design for a robot that can be controlled simply by using interactive inputs from the operator such as voice and gesture along with object tracking. The system aims to create a prototype of a futuristic automated personal assistant for domestic as well as industrial purposes. Google text to voice API and Grassfire algorithm is used to control the basic locomotion of the system. The robot consists of a gripper arm which is used to pick and hold objects as desired by the operator.

III. METHODOLOGY

The main objective of our project is to grass cutter is totally operated on solar energy so that the pollution and usage of fuel controlled and this can be done by Bluetooth control and it will function by taking movements in this project we navigate the wireless robot in environment using human commands where mainly the grass

recognition is done by image processing and movement is done by controller. This basically use an algorithms and applications of these commands are like "grass cutting", "body left", "body right", "turn left", "turn right", "move forward", "move backward", "stop". Are sent to system and store these commands are retrieve from raspberry pi module where the respective instruction runs based on command the robotic movement will done. Where it uses the interfaced to an ultrasonic sensor for the of object detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected.
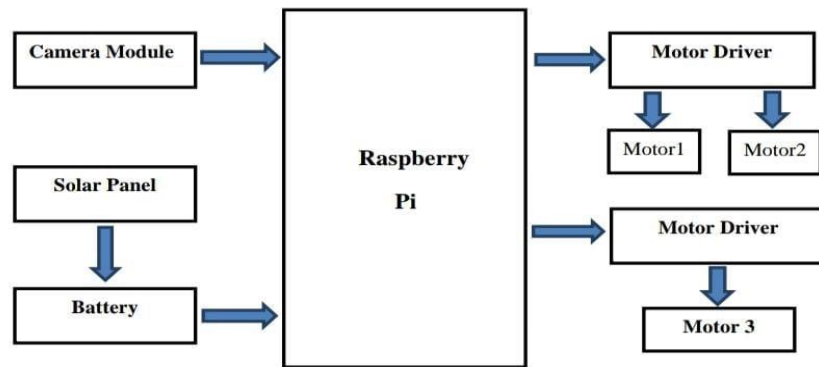
Figure 1: Block diagram of the proposed system.

A.   Image recognition

In this project we are making a real-time image Recognizer using the Media Pipe framework and TensorFlow in OpenCV and Python.to process the input image which has taken in real-time using webcam. OpenCV is a real-time Computer vision and image-processing framework built on C/C++. But we'll use it on python via the OpenCV-python package. In OpenCV, hand image is converted into multi-dimensional arrays, which greatly simplifies their manipulation.

Digital image processing is the exercise of computer algorithms to perform some certain image processing task on digital images, as a subcategory or field of digital signal processing. Digital image processing has various advantages over analog image processing. It permits a much spacious range of algorithms to be applied to the input data and can be avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over multi dimensions digital image processing may be modeled in the form of multidimensional systems. A digital image is a representation of a two-dimensional image as a finite set of digital values, called picture elements or pixels, where Pixel values typically represent gray levels, colors, heights, opacities etc. Digitization implies that a digital image is an approximation of a real scene.

relate to that the raspberry pi which results movement of the grass cutter.
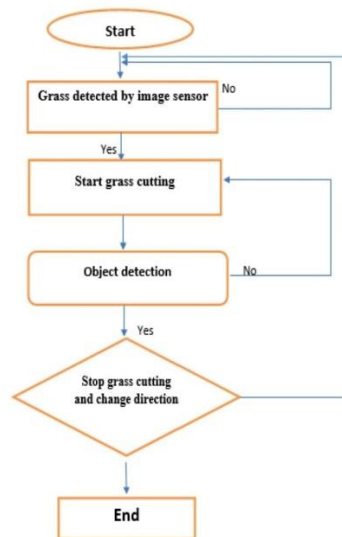
Figure 2: Flow chart of Image recognition.

B. Bluetooth Control

The Raspberry Pi single-board computer has had built-in Bluetooth connectivity since the release of the Raspberry Pi 3 in 2016, allowing you to connect wireless peripherals such as keyboards, game controllers, headsets, and more to your device. If you don't have a model of Raspberry Pi that has Bluetooth built-in, you can use a third-party USB adapter to add support. You may need to install additional software packages to do this, depending on the adapter you use. If you're using the Raspberry Pi OS (previously Raspbian), then Bluetooth should be enabled by default, but you'll need to follow these additional steps to connect and set up grass cutter system. While the additional Bluetooth software packages you'll install here can be useful for Raspberry Pi OS Lite users, you won't be able to use the Blueman Bluetooth Manager tool itself, as f the instructions for setting up Bluetooth using the terminal.
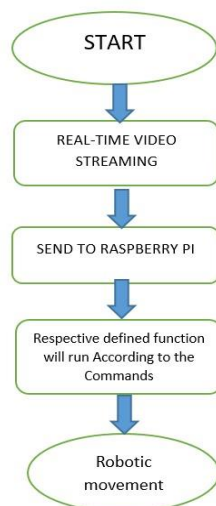
Fig3: Flow Chart of Bluetooth control

C.   Requirement

Hardware Used

1.   Raspberry Pi 3 B+ module: Quad core BCM2837B0 ARMv8 64bit CP, 1GB RAM, Bluetooth 4.0.
2.   Raspberry Pi camera
3.   Motor Driver
4.   Solar Panel

Software Required

1.   Raspberry Pi OS
2.   Open CV

IV. RESULTS

The proposed prototype model will take grass image as a input to the Grass cutter robot. As we using Bluetooth connectivity so because of this we can control the robot easily by using this system. In grass detection the images are preloaded. If the image matched with the preloaded one then it will perform certain task. The below figure shows the output of grass detection.

Fig1: Output of Grass detection

The below figure 3 shows the output object tracking

Fig2: Output of Object tracking

The below figure 3 shows the output of Blue Dot.
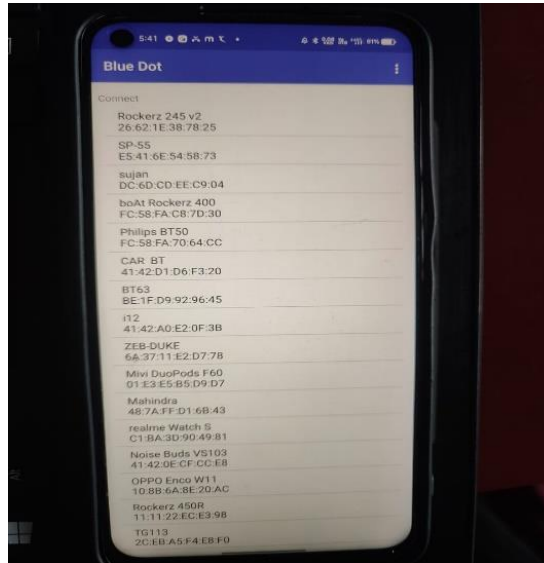
Fig 3: Output of Blue Dot

V. FUTURE SCOPE

The future scope of this project can be controlling the robot from a distant location with the help of camera and high range live transmission. By this we can still accurately perform the task and the robot can be fixed to a rover which moves wirelessly and performs the task. This will be very useful in Hazardous environment Applications mentioned above achieved by improving this model in terms of adding hardware components and improved software. The application can be integrated with other mobile and iot devices to improve user interaction and make the system more robust. The accuracy of the program can be further improvised by using machine learning and blade accuracy increasing. A genuine blend of various technologies in mentioned fields could make way for power tools and applications which will serve the community around the world. Finally, the user can be further designed to make it more accessible to the consumers. The whole point of making the solution a commercially viable product for the users is to help the impaired community around the world.

VI. CONCLUSION

In the project, we have suggested a prototype of a robot based on "Solar powered grass cutter" with image detection, i.e. to control a robot using bluetooth, without any complication. This paper implements the design of a robotic system that can be controlled using Bluetooth module provided as inputs by the user. The robot will be efficient and useful in reducing human efforts in various applications and hence will improve the overall efficiency of the system. The operation of the robot is distributed into two parts i.e. image processing, bluetoth control. Using machine larning language the scope of this robot, in terms of communicating with humans, can be broadened. we design a solar grass cutter robot, the main objectives of this project is to develop an easy to use control system, so that anyone automatically cut grass, build a cheap little robot

compared to those in the market. Using a powerful Raspberry Pi can handle more data.   Reduce the time and effort on users during the cut process. The size of robot is compact and portable. Also we using a lighter batteries and solar panels to make the robot much less weight. Finally, we used engines with high torque and lower speed.   The disadvantages are that sometimes response of the system is slow so in real times high DSP processors is needed to faster the system, extra weight of the robot where it needs great torque movement to remove the grass with small time.

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Yen-Vision: An Intelligent Military Combat Accessory

Mr. Gangadhara[1], Ms. Priya[2], Ms. Nisha[2], Mr. Sachin[2], Mr. Yogeesh.P[2]

[1]Assistant Professor and HOD, Department of ECE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of ECE, Yenepoya Institute of Technology, Moodbidri-574225, Karnataka, India

ABSTRACT

Until today, mobile computing has been very much confined to conventional computing form factors. That is laptops, tablets and smart phones, which have the recent developments in technology, have led to new emerging wearable devices such as night vision glasses. Among the recent inventions, these night vision glass is one of the wearable devices typically referred to be switchable glass that is capable of handling a wide range of computing that an ordinary human cannot do. In this project, the design of night vision glasses and its application in military combat was proposed. Night vision technology glasses has features like live video streaming, GPS location tracking and Earphone with Mic which enables duplex communication between GSM Module and Base station. And an IoT based pulse rate monitoring system is proposed. Like the smart phones, the newly emerged military accessory also has many features, which helps the military. Night vision can work in two different ways, depending on the technology used. Image enhancement and Thermal imaging is the technologies works by using the infrared light spectrum. This accessory gives the military soldiers the vision in all out dimness and the change of vision in low light conditions.

I. INTRODUCTION

In the modern years, technology has seen an innovative increase, advance in mobile and wearable technologies. Research on developing smart technology is taking its boom in recent years making the efforts towards enhanced human life. Soldiers are the backbone of any country's security. With the advancement in technology it is a must requirement that soldiers are equipped with a technology or system which will help them and provides help when they need it. Among the available smart technologies, night vision glasses play an important role for a soldier to attack the enemy targets. Night vision is the ability to see in lowlight condition by the amount of heat being made by objects. This project describes about the safety and location tracking IOT based electronic system for soldiers. The proposed intelligent military combat accessory was designed to improve the soldier's ability to see what's going on around them under dark lighting condition to distinguish what they see precisely. This project focuses on a prototype model that is designed to serve the purpose of providing vision to see in a dark environment and to monitor the health status of soldier during combat. Hence

we want to implement electronic system is fitted to the glass which has Night vision camera, Pulse sensor, Earphone with Mic, GPS and GSM Module which are interfaced with Raspberry Pi to control all of the above.

II. LITERATURE SURVEY

[1] Face detection and Recognition for smart glasses Constantino Alvarez Casado, Miguel Bordallo Lopez, Jukka Holappa, Matti Pietikainen. The paper was presented on 2015 International Symposium in Consumer Electronics (ISCE) provides the information about the construction of an application prototype which detects and recognizes faces in real-time, and runs independently on the device. It provides a description of the embedded implementation at a system-level where they highlighted the application development challenges and trade-offs that need to be dealt with battery powered wearable devices. This smart glass device is integrating a HD camera, WQVGA display, microphones, speaker and movement sensor. Smart glasses can perform all the face detection and recognition, their program can only display the face position and identifier and did not include the additional information about the person. The implementation of the system was done by Considering latency and energy efficiency, Evaluation of the system. The recognition solution used in this paper utilizes feature vectors based on the local binary patterns. The further implementation of this project includes the addition of gender classification, heart rate measurements.

[2] Recent advances in Smart glass application security and privacy B. A. Delail and C.Y Yeun. The paper published in 10th International conference for the Internet Technology and Secured Transactions, 2015 gives the introduction about the Smart glass which is based on the components available in modern smart phones. This includes the CPU, Sensors and operating system. Thus would share similar security threats and privacy issues of the Smart Glass from two different perspectives, as well as propose preliminary solutions to overcome such risks. This includes a suggested two-factor authentication for smart glasses based on PIN or voice combined with an iris scan. The purpose of this work is to examine the current state-of- the- art of smart glass applications, and analyze existing and potential security and privacy issues. The proposed system includes new security and privacy challenges, where some problems are well known and shared among similar devices and also IoT.

[3] Smart Glasses System Using Deep Learning for the Blind and Visually Impaired Mukhriddin Mukhiddinov and Jinsoo Cho. The paper presented on 2019 IEEE 8th Global Conference Consumer Electronics describes a smart glass system which includes object detection, object extraction and text recognition models using computer vision and deep learning for Blind and Visually impaired people. The system presents smart glasses which are potential assistive technology to aid these people in individual travel and social comfort and safety. The system consists of wearable sensors (Smart glass with camera, GPS sensor, Ultrasonic sensor), Data processing modules (Computer vision, GPS calculator, Distance calculator).They introduced client-server architecture that consists of smart glass and a smart phone and an artificial intelligence server to perform image processing tasks. The goal of this project is to create convenience and opportunity to Blind and visually impaired people to facilitate independent travel during both day and night time. To achieve this goal along with smart glass they have also used multifunctional system that can capture images by mini camera and object detection by CNN algorithm.

[4] Wearable Smart Spectacles using Arduino Vishal Thorat, Pranesha Naik, Pranav Shetty, Manish singh, Kishor G Sawaskar. The paper presented on April 2020 International Journal of Engineering and Technical Research project describes about smart spectacles which consists of OLED Display, Lipo battery, HC-05 bluetooth and side switch interfaced with Arduino NANO. The smart glass works on the principle of reflection and focusing of light. The information displayed on the OLED screen will be reflecting on the anti reflecting glass with the help of mirror and then it is focused on to the screen by focal lens. The system analyzes the capacity to reflect projected digital images as well as allow the user to see through it or see better with it. While early models can perform basic tasks, such as serving as a front end display for a remote system, as in the case of smart glasses utilizing cellular technology or Wi-Fi, modern smart glasses are effectively wearable computers which can run self-contained mobile apps. Some are hands free and can communicate with the Internet via natural language voice commands.

III. METHODOLOGY

The proposed military combat accessory is designed to develop a soldier's health, night vision video streaming and position tracking system, which mainly consists of Raspberry Pi as Controller. The proposed system is having Client and Server side. Initially setup the system and check the activity of camera, pulse sensor, GSM and GPS module. After checking the activity the sensors will send the obtained input data to the controller. On writing the python code and interfacing it with the IoT platform. Then the platform checks the IP address matches or not. If the IP address matches then the result will be monitored using IoT platform. If the match not found then it will again check for the components activity. The figure 1 shows the Flowchart of an intelligent military combat accessory.
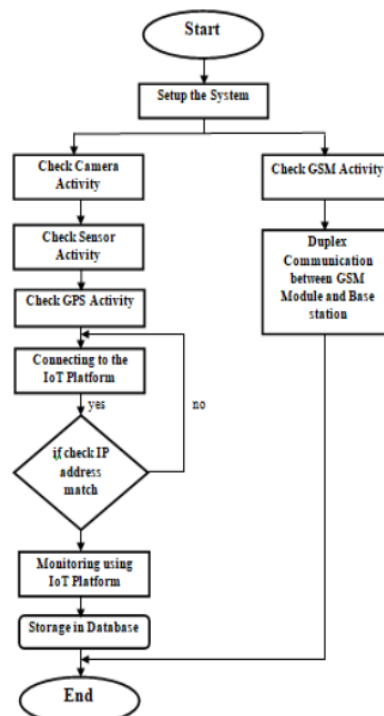
Figure 1: Flowchart of an intelligent military combat accessory

In this system also we can measure the pulse rate of the soldier. This system will also give the GPS information for preparing accurate surveys and maps, taking precise time measurements, tracking position or location, and for navigation. GPS works at all times and in almost all weather conditions. Finally this system helps the soldier by using the Earphone with Mic. They can hear the voice command from base station and can give reply to that. The figure 2 shows the block diagram of the proposed system.
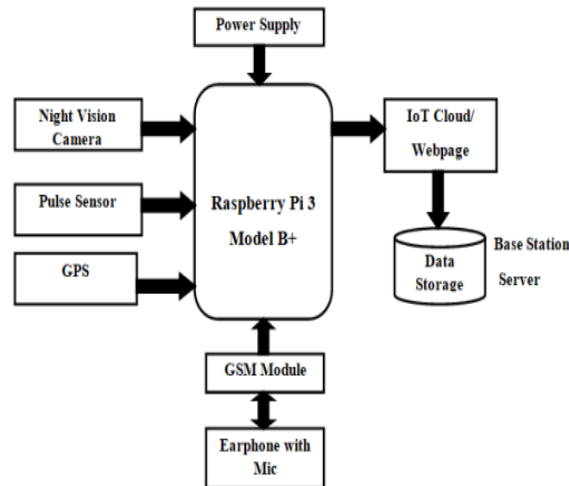
Figure 2: Block Diagram of the proposed System

IV. COMPONENT DESCRIPTION

1. Raspberry Pi 3 Model B+

The Raspberry Pi is a credit card-sized computer. It is used to accept inputs from sensors connected and provide an output action on the desired device connected to it. The Raspberry Pi can run a full range of ARM GNU/Linux distributions, including Snappy Ubuntu Core, Raspbian, Fedora, and Arch Linux, as well as Microsoft Windows 10 IoT Core. The Raspberry Pi 3 Model B+ has many performance improvements over the Model B including a faster CPU clock speed (1.4 GHz vs 1.2 GHz), increased Ethernet throughput, and dual-band Wi-Fi. It also supports Power over Ethernet with a Power over Ethernet HAT.

2. Raspberry Pi Night Vision Camera Module

Raspberry Pi Camera is a Raspberry Pi Camera Module that supports night vision. It is compatible with all revisions of the Pi. Powered with a 5 megapixel OV5647 sensor, its best resolution is 1080pThe IR LED board that helps the night vision function has onboard photo resistor, the ambient light detector. An adjustable resistor is provided on it to control the ambient light threshold of toggling the infrared LED, when ambient light is lower than threshold value, the infrared LED is on, vice versa. Onboard screw holes are used for both attachment and power supply.

3. NEO 6M GPS Module

The neo 6m GPS unit uses the latest technology to give the best possible positioning information and includes a larger built-in 25 x 25mm active GPS antenna with a UART TTL socket. A battery is also included so that you can obtain a GPS lock faster. This is an updated GPS module that can be used with ardupilot mega v2. This GPS

module gives the best possible position information, allowing for better performance with your Ardupilot or other multicolor control platform.

4. Pulse Sensor

The Pulse sensor Amped is a plug and play heart rate sensor. It essentially combines a simple optical heart sensor with amplification and noise cancellation circuitry making it fast and easy to get reliable pulse readings. Also it sips power with just 4 mA current draw at 5V so it has great mobile applications.

5. SIM900A GSM Module

The **SIM900A** is a readily available **GSM/GPRS module,** used in many mobile phones and PDA. The module can also be used for developing IOT (Internet of Things) and Embedded Applications. SIM900A is a dual-band GSM/GPRS engine that works on frequencies EGSM 900MHz and DCS 1800MHz. SIM900A features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. The figure 3.5 shows the SIM900A GSM Module.

6. Earphone with Mic

The night vision glasses proposed in this paper is having a earphone with mic. Mic is a device (transducer) used to convert sound waves into a varying electric current; normally fed into an amplifier and either recorded or broadcast. Microphone connected to GSM Module will call the person and give the message to the base station. The earphone is used here for receiving the voice command from the base station via GSM Module.

V. RESULTS

The proposed prototype model can capture the images by absorbing infrared radiation from the objects. This way the soldiers can see an image of what's going on in the dark during the combat. And also by using this night vision camera the base unit can watch the live video streaming. Streaming is the method of data transmission used when someone watches video on the Internet. It is a way to deliver a video file a little bit at a time, often from a remote storage Live streaming is when the streamed video is sent over the Internet in real time, without first being recorded and stored. After interfacing Raspberrypi to hardware format the SD card and install raspberry pi os to SD card using raspberry pi imager. Connect Raspberry Pi to a network and login using username and password. The output of Camera and GPS module is shown in figure.

The below figure 3 shows the output of Night vision camera when interfaced with Raspberry pi.
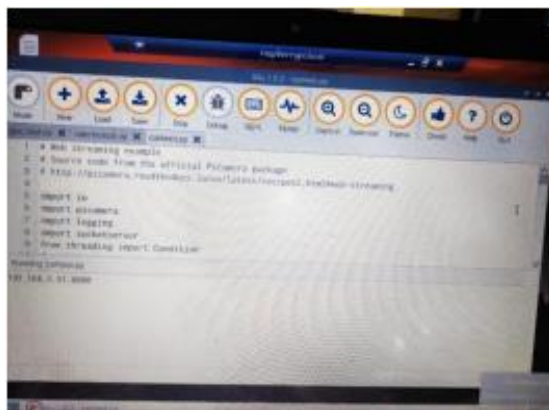
Figure 3: Output of Night vision camera

The below figure 4 shows the output of GPS module when interfaced with Raspberry Pi.

Figure 4: Output of GPS module

VI. FUTURE SCOPE

By using Ultrasonic sensor the night vision glass can also be turned into the assistive guide to the blind persons. The system can be modified by implementing the voice command in an advanced way using any of the available platforms like google assistant, Siri, Cortana, Alexa etc. It can be further expanded as navigational assistant to senior citizens who are suffering from memory loss by making various blinking combinations of LED and Camera in Night vision glass.

VII. CONCLUSION

The system provides the solution for the object and human detection in night time during combat .This system gives the solution on tracking the position and health of the soldier by using sensors and GPS module. Night vision glasses can be of great assistance in guiding and navigating. It can be used for safety purpose in case of health emergency. Using such wearable military combat accessory the life of soldiers can be saved.

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Cripple AIDER : IOT Based Assistive Device for Deaf, Dumb and Blind People

Sai Venkatramana Prasad[1], Nikhath Fathima[1], Divyashree T[1], Dakshayini Bhaira Naik[1], Sudarshan S[1]

[1]Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Focusing and addressing the problems faced by the differently abled people such as visually audibly and vocally challenged, through a single device is a tough job. A lot of research has been done on each problem and solutions have been proposed separately. But not all of them are addressed together. The aim of the project is to create a single device solution in such a way that is simple, fast, accurate and cost-effective. The main purpose of the device is to make the differently abled people, feel independent confident by seeing, hearing and talking for them. The paper provides a Raspberry Pi based aid for the blind deaf and dumb people. The proposed device enables visually challenged people to read by taking an image. Further, Image to text conversion and speech synthesis is done, converting it into an audio format that reads out the extracted text translating documents, books and other available materials in daily life. For the audibly challenged, the input is in form of speech taken in by the microphone and recorded audio is then converted into text which is displayed in the form of a pop-up window for the user in the screen of the device. The vocally impaired are aided by taking the input by the user as text through the built-in customized on-screen keyboard where the text is identified, text into speech conversion is done and the speaker gives the speech output. This way the device speaks for the user.

Keyword-Raspberry pi, tessaract OCR, espeak, putty, Opencv, python idle

I. INTRODUCTION

According to the statistics given by the world Health Organization, about 285 million people in the world are blind, 300 million are deaf, 1 million are dumb and many more suffering from one or more of the above mentioned physical disabilities. The developments in Science and Technology have reached to great heights in making the Human Life easier and comfortable, within a short span of time. During the last few decades, we have come across various technologies that have made our life so easier and comfortable that we even do not have to move our body to do a task. But always running in the race to be ahead of everyone we have forgotten that we still have a section of our population called the physically disabled people who are deprived of the advancements of Science and Technology because it has not given them that comfort that is required by them to feel that they too are the part of the society and they too can walk hand in hand with others. Communication being a fundamental aspect of human life is very much difficult for the people who are

Blind, Deaf or Dumb. There are a little means of communication between there people like the Braille Language for communication between Blind people and the Sign Language for Dumb and Deaf people.

II. LITERATURE REVIEW

[1]. Multi-Modal interference for interaction-Communication between hearing and visually impaired individuals: Nikolas Bourbakis AIIS Inc., Centerville, OH Wright State University ATRC, Dayton, OH, USA

This paper explains Blind module accepts images from the surrounding environment using the Tyflos device and converts them into NL text descriptions and vibration patterns. The NL text sentences are converted into speech sentences spoken to the blind user ear via an ear-speaker by providing to the user a verbal description of objects from the surrounding environment. The vibration patterns offer to the blind user a sensation for the 3D shape of certain objects. The Deaf module accepts sounds from the surrounding environment using the Koufos device and converts them into NL text sentences or image and vibration patterns. The icons used in this project are stored in an Icon Database. The vibration patterns provide to the deaf user the sensation of pitch, tone and volume.

[2]. Design of an Assistive Communication Glove Using Combined Sensory Channels: Netchanok Tanyawiwat and Surapa Thiemjarus National Electronics and Computer Technology Center NECTEC PhD.

This paper presented a new design of a wireless sensor glove developed for American Sign Language Finger spelling gesture recognition. Glove was installed with five contact sensors. 3D accelerometer on the back of the hand in addition to five sensors on the fingers. In order to save number of channels and installation area into the same input channel on the BSN node, each pair of flex and contact sensors were used. The signal is analyzed and separated back into flex and contact features by software. The glove design is thinner and more flexible with electrical contacts and wirings made of conductive fabric and threads. ASL finger spelling gesture recognition experiments have been performed on signals collected from six speech-impaired subjects and a normal subject for validation. The experimental results have shown a significant increase in classification accuracy with the new sensor glove design.

[3]. An Intelligent Approach of Text-To-Speech Synthesizers for English and Sinhala Languages: Pabasara Jayawardhana and Achala Aponso from Informatics Institute of Technology, Colombo, Sri Lanka:

This paper attempts to investigate novel Text-to-Speech algorithm based on Deep voice which is an attention based, fully convolution mechanism. The procedure of producing speech synthesis involves with learning statistical model of the human vocal production mechanism which is eligible of taking some text and vocalize that as speech. This paper would reveal the route of the attempt where there is the destination of accuracy and realism. Serenity and fluency are the most important qualities which expect from a TTS. The idea is to give an outline of discourse amalgamation in the Sinhala language, compresses and replicates about the characteristics of different blend procedures utilized.

[4]. Communications using a speech-to-text-to-speech pipeline: Rafael Dantas and chris exton from Lero University of Limerick, Ireland

In this paper, we discuss the feasibility of using an automated speech-to-speech pipeline to encode voice samples instead of regular voice codecs, in situations that require high data compression with high packet loss

scenarios. To analyze the advantages of using a speech-to-text transcription as a voice encoder and a text-to-speech synthesis as a decoder and compare it against standard a PCM A-law codec, we have measured the error rate of user-transcribed sentences based on the Semantically Unpredictable Sentences (SUS) test. Some of the PCM speech samples were also played in a way to simulate poor network conditions, specifically 5% and 10% packet loss. These were added to compare the performance of the speech-to-text method to standard voice codes. Additionally, we have evaluated how similar the transcribed messages were to the ground truth by measuring the Levenshtein distance between the sentences and also their Double Metaphone phonetic representations.

[5]. Full Duplex Communication System for Deaf & Dumb People: Shraddha R. Ghorpade, Surendra K. Waghamare International Journal of Emerging Technology and Advanced Engineering (IJETAE)

This paper proposed a useful tool to facilitate communication between deaf and dumb people. Planned methodologies interpret gestures as voices and vice versa. Executes the activity using the HMM (Hidden Markov) model. Sign language is a very good tool to facilitate communication between deaf and normal people. This system is designed to reduce the communication gap between people and the normal world because it facilitates two-way communication. Planned methodologies translate language into speech. This system overcomes the time limit of people with speech impairments and improves behavior. This system converts audio signals into speech signals that can be easily explained by humans. Through this project, hearing-impaired people can use terrestrial signals as sign language and are converted into speech. The speech of the normal person of the voice form is converted into the gesture of the text and the hand, so that the communication can be made easily.

[6]. An IoT Based Device for Communication among Deaf, Dumb and Blind People: Varun Sai Krishna, Manikanta, K.Sharfuddin and Nagarjuna B.Tech IVth Year, Department of CSE, Kallam Haranadha reddy Institute of Technology, Guntur, AP, India.

In this paper, a glove is taken along with a MEMS Sensor attached to it. The Deaf, Dumb and Blind People only communicate in sign language accordingly. This becomes difficult when comes to communication with normal individuals. So, to prevent this, an electronic framework is developed with two switches and a glove with MEMS Sensor. When the glove is tilted or moved, the sensor detects and is fed into Arduino Uno and the pre- loaded command is played on the speaker through the voice IC and is displayed on the LCD. The Switch consists of four commands each. When the switch is swapped the respective commands will work.

[7]. IOT based assistive device for Deaf, Dumb and Blind people: Anushka Sharma, Muktak pandya and Diksha Garg from Vellore Institute of Technology, Chennai - 600 127, Tamil Nadu, India

In this paper they used Google Cloud Vision API (Application Programming Interfacing) encapsulates powerful machine learning models in an easy to use REST API and enables developers and users to apprehend the content of an image. It is used for classification of images into thousands of categories, detecting individual objects and faces within images, and reading printed words contained within images. Optical Character Recognition (OCR) is used to enable the user to detect text within images, along with automatic language identification. Vision API supports a huge and broad set of languages. Initially Conventional neural network (CNN) based model is used to detect localized lines of text and generates a set of bounding boxes. Script identification is done by identifying script per bounding box and there is one script per box.

[8]. Interactive Communication Interpreter for Deaf Dumb and Blind People: Mohd Hussain and K. Ravinder from PG Scholar, Dept of ECE(ES), Joginpally B.R. Engineering College, Moinabad, Hyderabad, TS. India.

In this paper, an electronic speaking system was designed to ease the communication process of speech impaired patients through synthesized speech. A data glove is developed which is internally equipped with multiple flex sensors that are made up of "bend-sensitive resistance elements". For each gesture, these internal flex sensors produce a comparative change in resistance of various elements. Then this change in resistance fed into the analog input of ARUINO UNO microcontroller. A switch, LCD display containing audio commands is connected with microcontroller. As the switch is pressed signal conditioning recognizes the specific gesture, display particular command on LCD display and plays the recorded audio command through speaker.

[9]. Reserved Blind, Deaf and Dumb Communicator: Amit Gupta, Likitha B S and Venkatrao P from Department of Electronics and Communication Engineering BNM Institute of technology, Bangalore, Karnataka, India.

The dumb can use their sign language to transmit the message while those who are unable to understand the sign language can make use of the device to get the output in the audio form. The message can also be displayed in the form of text on the LCD screen and in the form of Braille characters using the motors arranged in a format that resembles Braille character. Similarly, the blind can make use of the Braille keypad to input a message and the deaf can speak out the message with the help of a mobile app. Moreover, the transmission of message can be made over large distances by the use of IoT concept. Thus this approach can tackle to any type of difficulty.

[10]. Raspberry-Pi Based Assistive Device for Deaf, Dumb and Blind People: Shiyam Raghul M, Surendhar K, Suresh N and R. Hemalatha from Electronics and Communication Engineering, Sri Ramakrishna Engineering College, Coimbatore, Tamilnadu India.

The paper provides a way for the people with Hearing impairment to visualize / read which is in audio form by speech to text conversion technique and we also provides a way for the vocally impaired to represent their voice by the aid of text to voice conversion technique. All these three solutions were modulated to be in a single unique system. All these activities are coordinated with the use of Raspberry Pi. The visually impaired people are helped by the process in which the image to text and text to speech is given by the Tesseract OCR (online character recognition). The deaf people help with the process of an app which makes them to understand what the person says can be displayed as the message. Vocally impaired people can convey their message by text so the other persons can hear the message in a speaker.

[11].Raspberry pi Based Assistive Communication System for Deaf, Dumb and Blind Person: Suvarna Nandyal, Shireen Kausar, Computer Science and Engineering, PDACE

In this paper, the first process is for the blind people, in this process, the picture which is captured and stored in cloud is being first converted to text by Tesseract OCR. In this OCR, we apply the adaptive thresholding techniques to change the image to binary images. And so they were transferred them to character outlines and these characters outlines were converted into speech. And the group of words forms the text and it has been spoke out by the espeak. The second process gets on for the vocally impaired persons who cannot speak and they convey their thoughts by text, which are already captured and stored cloud (the stored data may vary

depending upon the developer's choice) that could be converted into the audio signal. The converted voice message is sent over the espeak.

[12]. A Novel Approach for Communication among Blind, Deaf and Dumb People: Rohit Rastogi Sr, Shashank Mittal, Sajan Agarwal CSE-Dept ABES Engg. College.

In this paper, The message to be sent by the user is taken as an input to the gadget. The input can be text, audio or Braille Language The gadget has a Microphone to take the audio input, the Sensor Glove for text input and a Braille Language Converter for taking the Braille Language input and converting it into text. If the message to be delivered by the sender is in the form that is acceptable and understandable by the receiver and the communication is a direct type of Communication, then the message is transferred directly to the receiver. For long distance communication, the input message is converted into audio message independent of the initial form and then it is transmitted through Wireless GSM Network to the receiver. For long distance communication, the sender must have the phone number of the receive. The Deaf and Dumb person will send a text message to the SHAROJAN BRIDGE through the Sensor Glove by the use of hand gestures as described in the American Sign Language. The Sensor Glove will convert the Gestures into an audio message. The audio message is then converted into text message by the use of Analog to Digital Converters i.e. ADS1606 and ADS1605 embedded on the BeagleBone Board. The output from the BeagleBone board will be converted from text to Braille Language using the Braille Lite circuitry so that the Blind can easily understand it. The vibrating motor also vibrates when the receiver receives the message. As in case the message is to be transferred to a long distance, the audio message obtained at the Step 2 is first transmitted to the long distant receiver by the use of Arduino GSM Shield and then Step 3 and Step 4 are followed to obtain the final Braille Language.

[13]. Sign Language Problem And Solutions For Deaf:

Pooja Gupta, Dr. Ambuj Kumar Agrawal, Dr. Shahnaz Fatima 3rd International Conference on System Modeling & Advancement in Research Trends (SMART) Moradabad, 2014.

In this conference paper author discussed the existing problems and solutions for deaf and dumb people. They stated some facts and myths about sign language like Sign language is the pictorial representation of spoken language but the fact is Sign language has its own grammatical Structure. Sign languages convey much of their prosody through non-manual signs. They discussed various methods like Speech to sign language interpreter system (SSLIS) A classifier is needed in sign language recognition to classify the input signs into different classes , Hidden Markov Model toolkit (HTK) It is mainly intended for speech recognition, but has been used in many other pattern recognition applications, Indian Gestural Interaction Translator (INGLT) – INGLT adopts a formulaic approach that directly generates the semantic structure where possible (about 60% cases), and defaults to a compositional mode for the others.

[14].A Study on Deaf and Dumb Students E-Learning System Using Sign Language: N.Vinoth, Dr.KNirmala International Journal of Scientific Research and Education (2016): 6113-6118

In this paper he studied about deaf students who use e-learning system using single hand sign language and double hand sign language in learning java language. He used four methods one hand with voice, one hand and no voice, two hands with voice and two hands with no voice. Mostly people like two hands with voice and the author recommends using it for deaf mute people.

[15]. E-LEARNING ENVIRONMENT FOR HEARING IMPAIRED STUDENTS: Hisyamuddin HASHIM, Zaidatun TASIR, Siti Khadijah MOHAMAD.

The Turkish Online Journal of Educational Technology (2013):

In this paper author described the environment for hearing impaired students. He stated that most e-learning environment available does not particularly can be useful to hearing impaired students. They often encounter problem in accessing the information available in terms of understanding it and using it in a proper manner.

[16]. Design of Communication Interpreter for Deaf and Dumb Person: Pallavi Verma1, Shimi S. L. Richa Priyadarshani Electrical and Electronics Department, Amity University, Greater Noida, Uttar Pradesh, India.

This project proposed gloves is implemented to capture the hand gesture made by disabled person and converting it into speech as well as text. A pair of gloves with flex sensors along each finger, thumb and arm is used to capture the movement of user. With the help of flex sensors degree of fingers, thumb and arm are calculated in voltage terms using voltage divider rule. Microcontroller is used for various functions like analog to digital conversion of data from flex sensors. Then digitized data is encoded in encoder and transmitted. Received data is decoded by decoder and gesture recognition system matches the incoming data with prefered data. If data is matched then it is given to speaker using voice section.

III. WORKING

1. TEXT TO SPEECH:

Text to speech is the conversion to be made in order to convert input text to be spoken via devices like speaker or earphones which helps the mute or dumb person to convey their messages. We make use of a library called espeak which probably helps us to convert text to speech using various steps. The input fed using keyboard undergoes linguistic analysis which deals with scientific analysis of language which mainly helps in construction of words, phrases and sentences for communication, the output of analyzed text undergoes phonetic analysis which helps us to understand sounds of various alphabets and concerned with identifying the contrastive units of speech sounds and their systematic variants in a language. As we have observed, the rule of writing and pronouncing doesn't remain same in all cases, in such exception situation phoneme plays a vital role in converting the grapheme into phoneme helping us to understand the sentence in an appropriate way, then comes prosodic analysis which analyzes the language based on its pattern of stress and intonation, this is regarded as an essential foundation for the analysis of syntax and meaning. After all these above operations speech synthesizer is used to convert the analyzed input in the form of speech using speakers. This makes the given input to be pronounced in a better, understandable and appropriate way.

2. SPEECH TO TEXT:

The speech to text conversion uses microphone to obtain input in the form of speech, the recorded input sound waves hit the diaphragm which vibrates and produces the electrical signals which further undergoes analog to digital conversion helping the analog electrical signals to be converted into readable text form. We make use of 3 main libraries called flac, pyaudio and speech recognition which helps in the easy execution of the conversion,

flac is an audio coding format used to obtain lossless compression of digital audio, it is very similar to mp3 file but it doesn't comprises of any loss in communication or loss in quality of audio which helps in receiving the lossless input fed through the microphone. Pyaudio is python library which provides binding for port audio, this helps us to easily play and record audio on various platforms. Next comes speech recognition library which converts spoken words in the form of text, as it allows computer to understand human language. Python also supports various speech recognition engines, including Google speech engine, Google cloud speech API, Microsoft Bing voice recognition and IBM speech to text. The input undergoes various above steps and produces lossless information in the form of text which helps the audibly disabled person to understand the information by reading in the form of text.

3.   IMAGE TO SPEECH:

In conversion of image to speech we capture image as an input using camera module which is portable light weight camera that supports raspberry pi, it uses MIPI camera serial interface protocol to communicate with pi, it is also used in taking high resolution videos. The camera module can be attached to raspberry pi's CSI port using 15-ribbon cable. The captured image is first converted to text for which we have to import few of the python libraries like tessaract ocr which is an optical character recognition (OCR) tool, it will recognize and read the text embedded in images, this library helps in reading the text present in the captured image, we also make use of Opencv which is a huge open source library that supports wide variety of programming languages, it can process faces, object and texts. Opencv undergoes various steps like edge detection, dilation, opening, closing and erosion which helps in image detection. The captured image undergoes image pre-processing where the colored image is converted to gray scale image, tessaract ocr reads the text from the image, extracts it and stores the text in a file. The extracted text is converted to speech using espeak and num2words which translates the number into words, speakers are connected to raspberry pi as output device through which the text is read out loudly, in this way the image can be converted to speech helping the visually impaired persons to read textbooks, messages or any other required information.
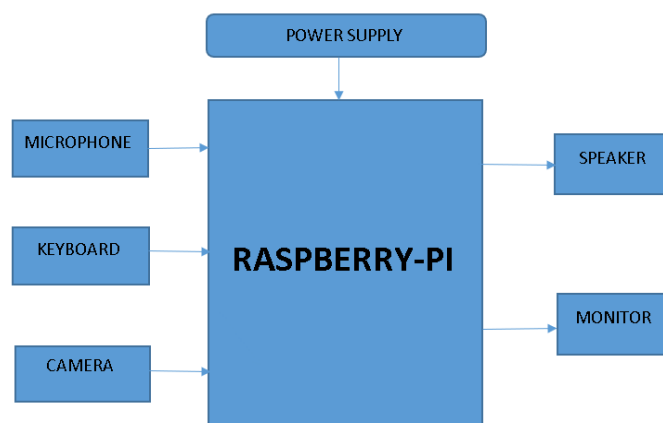
IV. METHODOLOGY

Fig: Block diagram for cripple aider

Raspberry pi 4 module which has 1.4 Giga hertz core A15364 bit it process at speed 1.5 gigahertz, we gave power supply to the raspberry pi. We insert addition SD card to Raspberry pi because raspberry pi do not have inbuilt memory. We are using raspberry pi camera module as input device to capture the image which contains text, this image is processed by the raspberry pi and gives output to the speaker by doing this we convert image into voice. The keyboard is used an input to raspberry pi for inputting text. The raspberry pi will convert   text into speech by espeak software and give output to the speaker. USB mic is used to capture the voice and it will give as input to the raspberry pi and it converts into voice to speech by voice recognizing software and display text on the monitor

V. FLOW CHART

TEXT TO SPEECH:
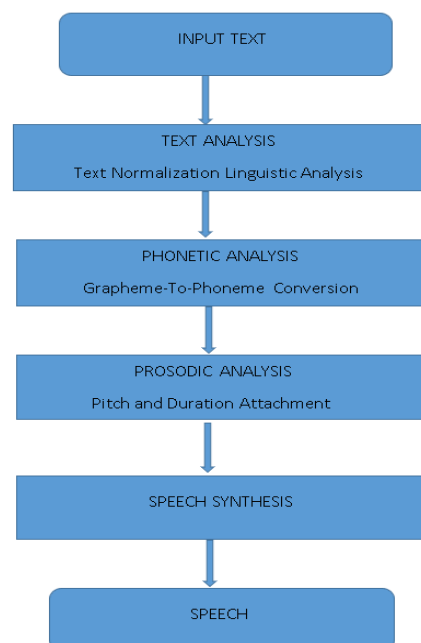
Fig: Text to Speech

Input in the form of text is obtained using keyboard. The given text undergoes linguistic analysis to verify the appropriations of the text. The analyzed text is fed in to phonetic analysis which plays a vital role in converting the grapheme into phoneme. Most of the words doesn't follow the rule of writing and pronunciations; they are many which sounds differntiately apart from the spelling which might lead confusion in understanding the proper meaning of the text delivered. Phoneme is a function which converts the grapheme or provided text into the manner of pronunciation, for example Xerox is pronounced as "ze@raux" it has the sound of z though the spelling is x this provide the way of delivering a message into its appropriate pronunciation.

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IMAGE TO SPEECH:

Fig: Image to Speech

In conversion of image to speech we capture image as an input using camera module which is portable light weight camera that supports raspberry pi, it uses MIPI camera serial interface protocol to communicate with pi, it is also used in taking high resolution videos. The camera module can be attached to raspberry pi's CSI port using 15-ribbon cable. The captured image is first converted to text for which we have to import few of the python libraries like tessaract ocr which is an optical character recognition (OCR) tool, it will recognize and read the text embedded in images, this library helps in reading the text present in the captured image, we also make use of Opencv which is a huge open source library that supports wide variety of programming languages, it can process faces, object and texts. Opencv undergoes various steps like edge detection, dilation, opening, closing and erosion which helps in image detection. The captured image undergoes image pre-processing where the colored image is converted to gray scale image, tessaract ocr reads the text from the image, extracts it and stores the text in a file. The extracted text is converted to speech using espeak and num2words which translates the number into words, speakers are connected to raspberry pi as output device through which the text is read out loudly, in this way the image can be converted to speech helping the visually impaired persons to read textbooks, messages or any other required information.

SPEECH TO TEXT:

Fig: Speech to text

Voice in the form of input is recorded in the microphone. Microphones work as transducers, converting sound waves (mechanical wave energy) into audio signals (electrical energy). The microphone diaphragm vibrates as it's subjected to sound waves and creates a coinciding audio signal via electromagnet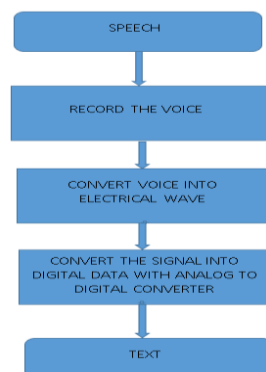ic or electrostatic principles that will be outputted. The electrical wave is converted into digital data using analog to digital converter, the digital data which is in the binary form is converted to its equivalent decimal values and then grouped into words using ASCII values to give the output as text which is displayed on the monitor, the software which is being used to convert digital data into text is voice recognizer.

VI. IMPLEMENTATION

Interfacing raspberry pi:
- Format the SD card
- Installing raspberry pi os to SD card using raspberry pi imager

Install Opencv:
- To install Opencv, one must have Python and PIP, preinstalled on their system.
- Open command line and run the command **"python –version"**
- To install OpenCV, just go to the command-line and type the following command:**"pip install opencv-python"**

Espeak:
- To make the Raspberry Pi speak and read some text aloud, we need a software interface to convert text to speech on the speakers. For this we need a Text To Speech engine.
- Next, install eSpeak., Run the command: "sudo apt-get install espeak"

Installation of tessaract ocr:
- Install tessaract ocr using engine, once the engine is downloaded open and run to start installation
- Command to tesseract is installed type in python prompt:

import pytesseract
print(pytesseract)

Installation of speech recognizer:
- The easiest way to install this is using" pip install Speech Recognition"
- Otherwise, download the source distribution from PyPI, and extract the archive.
- In the folder, run "python setup.py install."

PyAudio:
- PyAudio <u>wheel packages</u> for common 64-bit Python versions on Windows and Linux are included for convenience, under the third-party/ <u>directory</u> in the repository root. To install, simply run pip install

wheel followed by pip3 install ./third-party/WHEEL_FILENAME in the repository <u>root directory</u>.

Flac:

- A <u>FLAC encoder</u> is required to encode the audio data to send to the API, install a module using command **"pip install mutagen"**

Num2words Installation:

- The easiest way to install num2words is to use pip:
- **"pip install num2words"**

Subprocess installation:

- Subprocess in Python is a task that a python script delegates to the Operative system (OS).
- **" $ pip install subprocess.run"**
- To test it and to launch python **"from subprocess import run"**

VII.   CONCLUSION

By this paper, we have designed the prototype model for blind, deaf and dumb people by employing a single compact device. The important key factor of this project is to facilitate these people and to feel them more confident to manage their sites by themselves. The primary advantage is that the device can be taken away easily and is of about less weight.

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Segura: Grimace Perception for Safe Driving

Shashank M Gowda[1], Jayalaxmi[2], Harshitha[2], Prathvi S P[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Face detection has been around for ages. Taking a step forward, human emotion displayed by face and felt by brain, captured in image form can be approximated. Every year, many car accidents due to driver distraction occur around the world and cause many injuries. Driver face monitoring systems is one of the main approaches for driver distraction detection and accident prevention. Recognizing emotions from images is a trivial task for human eye, but proves to be very challenging for machines and requires many image processing techniques for feature extraction. Several machine learning algorithms are used. Any detection or recognition by machine learning requires training algorithm and then testing them on a suitable dataset. Machine learning algorithms as well as feature extraction techniques which would help in accurate identification of the human emotion.
Keywords—facial detection, facial feature, gesture recognition.

I. INTRODUCTION

Human emotions play an important role in the interpersonal relationship. Emotions are reflected from speech, hand and gestures of the body and through facial expressions. The human brain tends to recognize the emotions of a person more often by analyzing his face. Hence extracting and understanding of emotions has a high importance in the field of human machine interaction Human emotion displayed by face and felt by brain, captured in image form can be approximated. Every year, many car accidents due to driver distraction occur around the world and cause many injuries. Driver face monitoring systems is one of the main approaches for driver distraction detection and accident prevention. Recognizing emotions from images is a trivial task for human eye, but proves to be very challenging for machines and requires many image processing techniques for feature extraction. Several machine learning algorithms are used. Any detection or recognition by machine learning requires training algorithm and then testing them on a suitable dataset. Facial expression is an important indicator of a person's emotion. Computers and other electronic devices in our daily lives will become more user-friendly if they can adequately interpret a person's facial expressions, thereby improving human-machine interfaces. Facial expression recognition can be implemented in all computer interfaces, automated psychological research and treatment.

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II. SURVEY ON FACIAL EXPRESSION METHODOLOGY

Detecting emotional stress from facial expression for driving safety by the author Hua GAO, Anil Y¨uce, Jean-Philippe Thiran [1]. In this paper developed a monitoring system for detecting emotional stress of the vehicle driver. A pose normalization step is applied to further mitigate the impact of pose mismatch due to camera setting and pose variation. The proposed best system is able to successfully detect 90.5% of in-door and 85% of in-car test cases. The pattern of temporal dynamics of facial expressions and actions can also be integrated in the model training. Other cues such as head motion and acoustic signals could also be integrated to achieve better performance.

Bindu Verma and Ayesha Choudhary [2] discussed about a camera based, novel framework for determining the driver's emotions in real time through facial expression recognition. The novelty of framework is in using GGDA on expression subspaces created by features learned from two fine-tuned deep networks, Alex Net and VGG16. A camera mounted inside the vehicle constantly observes and detects the driver's face and the driver's emotions are recognized at regular intervals. The expression subspaces take into account the uncertainty and variations associated with the driver's face image that are caused by illumination changes, movement inside the vehicle, as well as variations in different instances of the same expression.

Suchithra, Suja P and Shikha Tripathi [3] Proposed method for emotion recognition in real time, based on geometric features using Raspberry Pi II. In this project achieved an overall accuracy of 94 % with average processing time of 120ms on Linux platform by using Raspberry Pi II (ARM1176JZF, 900MHz). The Raspberry Pi II is a very small hardware kit with low weight which can be mounted on a mobile robot. If a portable small display screen is attached to the mobile robot, it can display the emotion of a person dynamically under surveillance/social environments like hospitals, old age home etc.

Subash C. B. Gopinath [4] In this paper, a triangulation method for extracting a novel set of geometric features is proposed to classify six emotional expressions (sadness, anger, fear, surprise, disgust, and happiness) using computer-generated markers. The subject's face is recognized by using Haar-like features. A mathematical model has been applied to positions of eight virtual markers in a defined location on the subject's face in an automated way. The movement of the markers during facial expression directly changes the property of each triangle. The area of the triangle, Inscribed circle circumference and the Inscribed circle area of a triangle are extracted as features to classify the facial emotions. These features are used to distinguish six different facial emotions using various types of machine learning algorithms.

III. FACIAL EMOTION RECOGNITION SYSTEM

Facial emotion recognition involves three major steps i.e., face detection, feature extraction and expression classification.
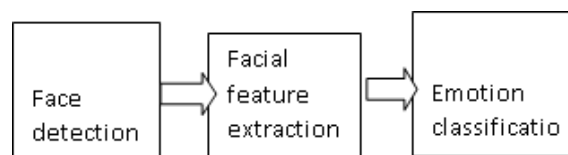

Fig 1: Facial Emotion Recognition System

A.   Face Detection

Face detection is the first and important part of the emotion recognition. Before further processing, it will detect the face, even though images contained only frontal facial expression data. Once the face is detected, it is easier to determine the region of interest and extract features from it. Face detection is based on histogram of oriented gradients from Dlib library. HoG descriptors along with SVM are used to identify the face from the image. Images are converted to gray scale and resized for uniformity.

B.   Facial feature extraction

For facial feature extraction, used the 68 landmark facial feature predictor from dlib. The face detector algorithm returns a window which is the detected face. The detected face is passed to the feature predictor algorithm. The predictor function returns the 68 points at the eyes (left and right), mouth, eyebrows (left and right), nose and jaw. Used numpy array to convert the 68 points to an array of 68 x and y co-ordinates representing their location. These are the facial features are used to predict emotion.

C.   Expression classification

For expression classification, first create the feature set and the target variable and use the Support Vector Machines to predict the emotions. Sklearn machine library was used to implement the Support Vector Machines (SVM) and Logistic Regression algorithms. To detect the multiple emotions support vector machine learning algorithm is used.

IV. PROPOSED METHOD

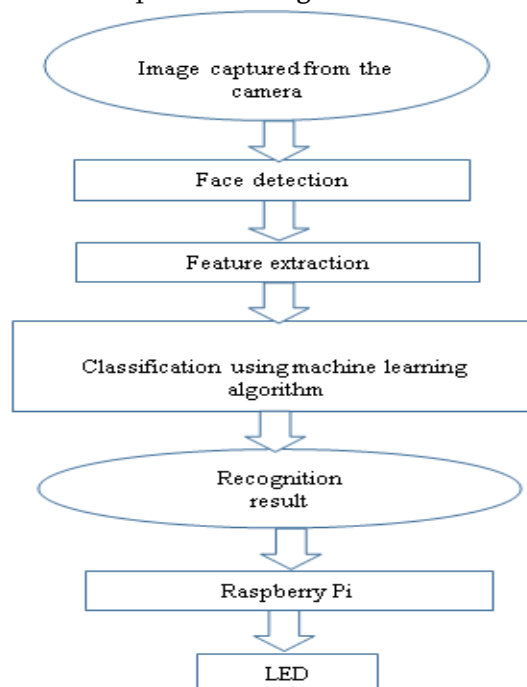Fig 2 shows the methodology of the facial expression recognition for safe driving.

Fig 2: Flow chart for facial expression recognition

The main goals of image processing algorithms include preprocessing detection and tracking of face, eyes and other facial components, and extraction of appropriate symptom from facial images. Facial recognition is done by using three main parts as shown in above Fig 2. Initially image is captured from the camera. Then face is detected by the captured image. Face detection is the first and important part of the processing. Before further processing, first detect the face, even though image contains only frontal facial expression data. Once the face is detected, it is easier to determine the region of interest and extract features from it. For face detection, histogram of oriented gradients (HOG) from Dlib library is using. HOG descriptors along with SVM are using to identify the face from the image. Image is converted into grayscale. Once the face is detected then the detected image is passed to the facial feature extraction. For facial feature extraction, is detect the landmark from facial feature predictor from dlib library. The detected face is passed to the feature predictor algorithm. The predictor function returns the facial points at the eyes (left and right), mouth, eyebrows (left and right), nose and jaw. Numpy array is using to convert the facial points to an array of x and y co-ordinates representing their location. Extracted image is classified by using the support vector machine learning algorithm. Support Vector Machines is to predict the emotions. Predicted emotion is shown by using the LEDs.

V. IMPLEMENTATION

Steps for facial expression recognition are given in below Fig 3.
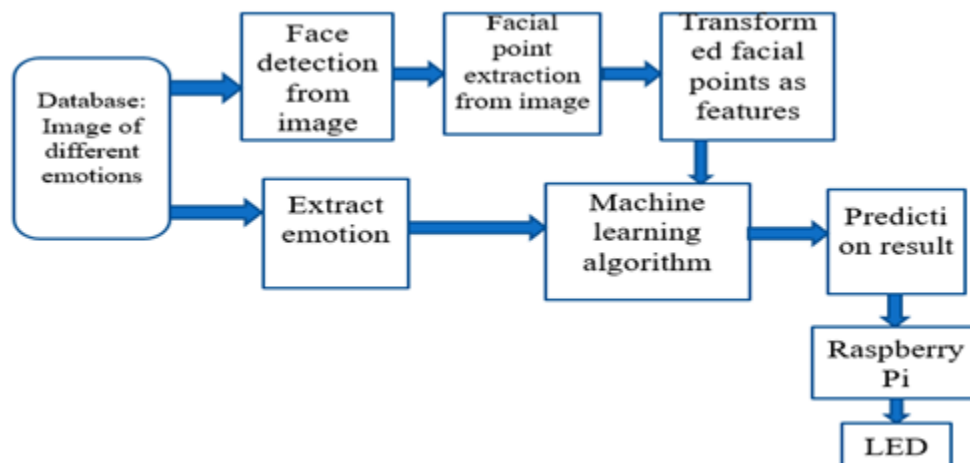
Fig 3: Block diagram for facial expression recognition

The extracted features and emotion recognition using machine learning and focus is on extracting features using python, image processing libraries and using machine learning algorithms for prediction. Implementation is divided into three parts. The first part is image pre-processing and face detection. For face detection, inbuilt dlib library is used. Once the face is detected, the region of interest and important facial features are extracted from it. There are various features which can be using for emotion detection. The focus is on facial points around the eyes, mouth, eyebrows etc. Face Database: Image of different emotions Face detection from image Facial point extraction from image Transformed facial points as features Machine learning. For face detection, histogram of oriented gradients (HOG) from Dlib library is using. HOG descriptors along with SVM are using to identify the face from the image. Image is converted into grayscale. Once the face is detected then the detected

image is passed to the facial feature extraction. For facial feature extraction, is detect the landmark from facial feature predictor from dlib library. The detected face is passed to the feature predictor algorithm. The predictor function returns the facial points at the eyes (left and right), mouth, eyebrows (left and right), nose and jaw. Numpy array is using to convert the facial points to an array of x and y co-ordinates representing their location. Extracted image is classified by using the support vector machine learning algorithm. Support Vector Machines is to predict the emotions. Predicted emotion is shown by using the LEDs.

VI. DETAILS OF THE PROPOSED SYSTEM MODULES

A.   Software required
1.   OPEN CV
OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. Opencv is build to provide a common infrastructure for computer vision application and to accelerate the use of machine perception in the commercial products. It is using for image transformation functions such as converting the image to grayscale. C++ and Python are the languages supported by OpenCV. It is a complete package which can be using with other libraries to form a pipeline for any image extraction or detection framework. The range of functions it supports is enormous, and it also includes algorithms to extract feature descriptors.

2.   PYTHON
Python is a powerful scripting language and is very useful for solving statistical problems involving machine learning algorithms. It has various utility functions which help in preprocessing. Processing is fast and it is supported on almost all platforms. Integration with C++ and other image libraries is very easy, and it has in-built functions and libraries to store and manipulate data of all types.

3.   DLIB
Dlib is another powerful image-processing library which can be using in conjunction with Python, C++ and other tools. The main function of dlib library is to detecting faces, extracting features, matching features etc. It has also support for machine learning.

4.   REMOTE DESKTOP CONNECTION
Remote desktop connection (RDC) is a Microsoft technology that allows a local computer to connect and control a remote PC over a network or the internet. It is done through a remote desktop service or a terminal service that uses the company's proprietary remote desktop protocol.

B.   HARDWARE REQUIRED

1.   RASPBERRY PI 4
Raspberry pi 4 model B with a 1.5GHz 64-bit quad core ARM Cortex-A72 processor, onboard 802.11ac wi-fi, Bluetooth 5, full Gigabit Ethernet, 2 USB 2.0 ports, 2 USB 3.0 ports, 1-8 GB of RAM and dual monitor support via pair of micro HDMI.

2. RASPBERRY PI CAMERA MODULE

The Pi camera module is a portable light weight camera that supports raspberry pi. It communicates with pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects.

VII. RESULT

Image is captured from the camera. And Then face is detected by the captured image. Face detection is the first methods which locate a human face and return a value in rectangle. Face landmark After getting the location of a face in an image, then it makes a points inside of that rectangle. The landmark function returns the facial points at the eyes (left and right), mouth, eyebrows (left and right), nose and jaw.
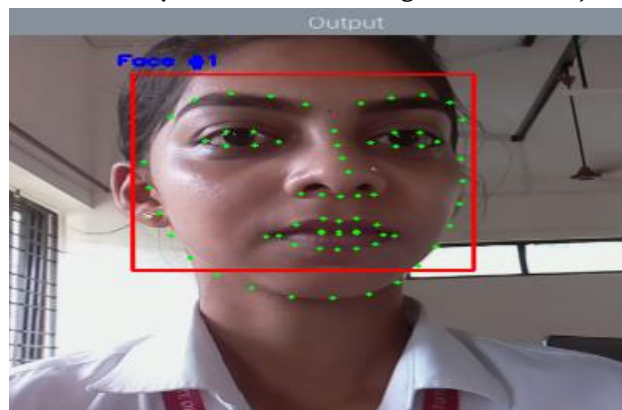
Fig 4: Face detection ad 68 landmark facial point using Dlib

VIII. FUTURE SCOPE OF THE PROJECT

Introducing a method for emotion detection from other modalities such as videos, spoken words, and written text. Furthermore, hardware implementation of the proposed approach is a research trend, which we are working on. Moreover, further machine learning techniques such as dictionary learning and semi-supervised learning can be performed to solve this issue.

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Automated Trolley for Shopping

Mr. Harsha C J[1], Spoorthi J[2], Prathijna S Hegde[2], Vignesh S[2], Anish R Kadamba[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Shopping and buying is an integral part of our daily lives. Big mega markets have a wide variety of items and different stores can have different deliveries of goods. It is difficult for many consumers to stand in the long queue for the billing of goods purchased. This causes a wastage of money and a poor bill for the wrong customer. Trolleys are used in supermarkets or grocery stores to make shopping simpler. However, it is difficult for customers to control the trolley while shopping. An automated customer following trolley was implemented which calculates the total sum of grocery items carried in the trolley by the customers. This reduces the customer's effort to pull the trolley and keep the line for the payment of the grocery products. Hence, it is proposed to design a smart trolley which can take care of shopping and billing. By this, the customer can walk straightaway into the shop, purchase products using the smart trolley and walk out of the shop. He gets the e-bill through the mail, and he can view his purchase details using the shop's website. With the development of wireless technology there are various fields wherein we can use this technology and use of wireless technology is favorable now a days. As we know that during sales and holidays we observe rush at supermarkets and due to this billing process becomes more time consuming and customer cannot stand for too long in a queue for billing purpose so, here we can make use of the automated shopping trolley which has barcode scanner, raspberry pi and LCD display. Using this trolley the customer will self scan the product by himself and prepare the bill. Hence, there will be no long queue in the supermarket at billing counter for billing purpose.

Keywords— Raspberry-pi, QR Scanner, Trolley, LCD Display

I. INTRODUCTION

Currently, human lifestyle has changed. Day to day life of an ordinary human being has become a lot more hectic. Time has become money. So, people actually do not have much time to spend for shopping which is an inevitable thing. That is why people prefer shopping in the malls so that they can get all the products at the same place. This saves them from going into different shops to purchase only a limited type of products. Though shopping in malls gives the benefit of saving time to people, they have only weekends to visit shopping

malls. This makes a problem at the cash counter because of increasing number of consumers. The customers have to stand in the billing lines for a lot more time than actual shopping time sometimes.

Seeing the general Indian population and way of thinking, In the existing, in the mall every person takes product put into trolley. After the shopping is done that person have to stand in the queue for billing. In the billing process a sell person scan barcode of each and every product and gives final bill. This process is very time consuming and it becomes worst on holidays, special offers or weekends. The solution to the problem has been given by smart trolleys using different techniques till date. There have been a number of methods designed for smart spending carts in order to make shopping easier for the customers in malls and save the time of customers by avoiding the requirements to stand in long billing queues.

II. LITERATURE SURVEY

Literature review is an overview of the previously published works on a specific topic. It is supposed to provide the research/author. A literature review serves the current study with in the body of the relevant literature and to provide context for the reader. Below papers are referred for our project.

R.N. Jogekar1, A.Kadav, R .Ghodeswar , P. Chavhan, P. Kadu, M.Paunikar[1] With the development of wireless technology there are various fields wherein we can use this technology and use of wireless technology is favorable now a days. In this paper we present our views on an automated shopping trolley using raspberry pi device combined with bar code scanner and LCD display. As we know that during sales and holidays observe rush at supermarkets and due to this billing process becomes more time consuming and customer cannot stand for too long in a queue for billing purpose so, here we can makes use of the automated shopping trolley which has barcode scanner, raspberry pi and LCD display. Using this trolley the customer will self scan the product by himself and prepare the bill. Hence, there will be no long queue in the supermarket at billing counter for billing purpose. This research paper will help the people to reduce manpower required in billing section. This can reduce the expenses incurred by the management. Users can be aware of the total bill amount during the time of purchase.

Ms. Sunitha.M , Sowmyashree P, Pallavi K V, Vismaya .M, Vaishnavi L M [2] Shopping at malls is becoming daily activity in various cities . Among the difficulties faced by the customers one difficulty is to follow queue through the billing process.The smart trolley consists of Raspberry pi, LCD display, DC Motor ,IR Sensor ,RFID Reader, Wi-Fi module and ESP32 micro controller. This system would prevent the problem of long queues at the billing counter. For the ease of customer automatic billing system will be proposed in which the cost of each product will be calculated through smart trolley and displayed on LCD. Thus the system creates the automatic bill of the purchased items from the trolley using RFID technique. Using this technique increases the security and also managed by checking the products on the trolley With the usage of Raspberry pi, the billing process takes place automatically. This will take the overall shopping .The main goal of this system is truly time saving out of all billing methods. This process saves time of the customer and reduce the staff requirements in the supermarket.

B. Pranusha, B. Madhavi, C. Greeshma[3] Supermarkets are where people come to buy a wide variety of items for domestic and commercial purposes. In metropolitan cities, we can see a huge rush at supermarkets, on

holidays and weekends. This becomes more when there are huge offers and discounts. In supermarkets, people purchase a variety of items and put them in the trolley. After purchasing one should approach the billing counter for billing purposes. With the help of a barcode reader, the cashier prepares the bill and this is a time-consuming process. This results in long queues at billing counters. This paper presents an idea to develop a system in supermarkets to overcome the above problem. To achieve this all products in the market should be equipped with a RFID tags and all the trolleys should be equipped with RFID reader and QR codes.

Mr. Suryaprasad , Proposed a novel product"[4] A Novel Low Cost Intelligent Shopping Cart(NLISC)" being developed to assist customers. The main objective is low cost, easily scalable and rugged. The system consists of 4 key modules (a)Location detection component(LDC)(b)server communication component(SCC)(c)user interface and display component(UIDC)and(d)Automatic billing and inventory management component(ABIMC).

III. PROPOSED METHOD DESCRIPTION

The Automated Shopping cart system with the help of barcode scanner which is present at the trolley connected with the raspberry pie and supermarkets database through Wi-Fi the customer can self-scan the product and aware of total cost of the bill as the overall information is display on the screen which is integrated on the trolley itself. The purpose of the raspberry pi is to operate the overall system .It works as a mini computer. Now, further after completing the shopping customer will go to the billing counter only for payment and as the overall total bill is already displayed on the LCD screen which is connected to raspberry pie and customer is already aware about total bill. This system is also beneficial for the customer who has certain budget limit. This automated shopping trolley will provide customer satisfaction as the customer will not stand in a long queue to know the total charge.
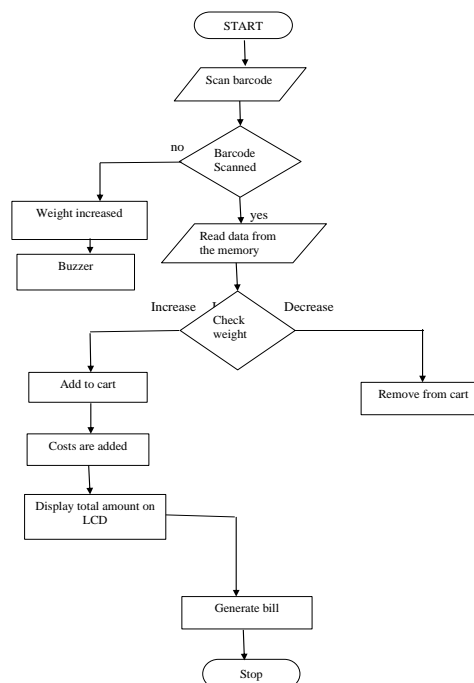

Fig2: Flow chart of automated trolley for shopping

Thus the system creates the automatic bill of the purchased items from the trolley using RFID technique.Using this technique increases the security and also managed by checking the products on the trolley.With the usage of Raspberry pi,the billing process takes place automatically.This will take the overall shopping .The main goal of this system is truly time saving out of all billing methods.This process saves time of the customer and reduce the staff requirements in the supermarket.

IV. IMPLEMENTATION
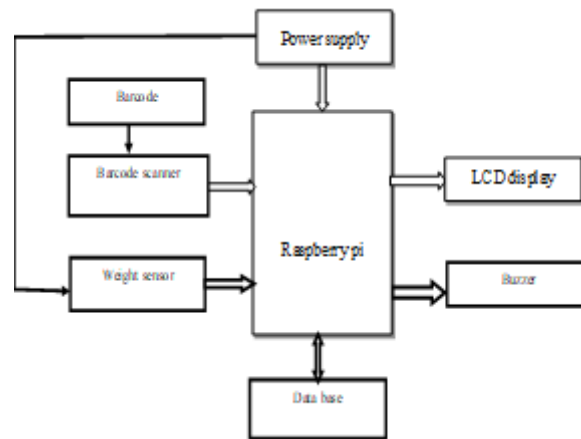
Fig3: Block Diagram of trolley

Fig4. Circuit Connection

The System introduces an object based tracking robot which is driven by wheels and controlled by a computer along with software. The objective of this paper is to design a robot which is automatically controlled by computer to track and follow an object. Image acquisition by the robot is achieved by a pi camera, and then it is sent to image processing software for further processing. This paper describe an object detection by the trolley with the help of PI camera, IR sensors, and image processing technique which is used in the field of robotics for identification and tracking of the object. Blob detection methods are aimed at detecting regions in a digital image that differ in properties, such as brightness or color, compared to surrounding regions. In an image some properties. are constant or approximately constant. Object is nothing but any living or non-living thing, and the word detection stands for identifying the object once known to the camera as input. Trolley consists of Raspberry pi, and Motors which are interlinked. Image of the object is captured using the Pi camera. Image captured by the camera will be forwarded and processed by the Raspberry pi [2]. Raspberry processor will apply

several image processing algorithms and detect the object. An external IOT is connected to the processor for the linkage between android device and raspberry pi. 10 rpm motors are used and they will follow the instructions properly given by the processor by keeping minimal distance

V. DETAILS OF THE PROPOSED SYSTEM MODULES

A. Software required

PYTHON IDLE:

IDLE is Python's Integrated Development and Learning Environment. It allows programmers to easily write Python code. Just like Python Shell, IDLE can be used to execute a single statement and create, modify, and execute Python scripts. It provides a fully-featured text editor to create Python scripts that include features like syntax highlighting, autocompletion, and smart indent. It also has a debugger with stepping and breakpoints features. This makes debugging easier. Python is a powerful scripting language and is very useful for solving statistical problems involving machine learning algorithms. It has various utility functions which help in preprocessing. Processing is fast and it is supported on almost all platforms. Integration with C++ and other image libraries is very easy, and it has in-built functions and libraries to store and manipulate data of all types.

XAMP Server:

XAMP is used for learning stack delivers the tools to develop a website. With this app, we can control the configuration when manually setting up the production environment. XAMP installs the MariaDB database, which is also known as MySQL. The user interface is designed as a control panel. A vertical menu bar is available on the right side with the buttons. The port and service settings do not need to be changed.

B. HARDWARE REQUIRED

RASPBERRY PI 4

Raspberry pi 4 model B with a 1.5GHz 64-bit quad core ARM Cortex-A72 processor, onboard 802.11ac wi-fi, Bluetooth 5, full Gigabit Ethernet, 2 USB 2.0 ports, 2 USB 3.0 ports, 1-8 GB of RAM and dual monitor support via pair of micro HDMI.

BARCODE SCANNER

A barcode scanner is an optical scanner that can read printed barcodes, decode the data contained in the barcode and send the data to the computer. Like a flatbed scanner, it consists of light source, a lens and a light translating for optical impulse into electrical signals.

WEIGHING SENSOR

A weight sensor is a type of transducer, specifically a weight transducer. It converts an input mechanical force such as load, weight, tension, compression, or pressure into another physical variable, in the case, into an electrical output signal that can be measured, converted and standardized. As the force applied to the sensor increases, the electrical signal changes proportionally.

LCD DISPLAY

LCDs were a big leap in terms of the technology they replaced, which include light-emitting diode (LED) and gas-plasma displays. LCDs allowed displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. Where an LED emits light, the liquid crystals in an LCD produces an image using a backlight.

LOAD CELL

Compression load cells are also commonly known as canister load cells or compression force sensors. They are used in single and multi-weigh installations including small tanks and hoppers right through to large silos and weigh bridges or any installation that requires compressive force measurements. The PT range of compression load cells is manufactured from tool steel or stainless steel and boast environmental ratings up to IP68. Ideal for high accuracy, a compression load cell is available for small capacity right through to heavy duty applications. Each load cell can be supplied individually or combined with our state of the art instrumentation for a complete weigh system.

VI. RESULT

Thus the system creates the automatic bill of the purchased items from the trolley using barcode technique. Using this technique increases the security and also managed by checking the products on the trolley. With the usage of Raspberry pi, the billing process takes place automatically. This will take the overall shopping. The main goal of this system is truly time saving out of all billing methods. This process saves time of the customer and reduce the staff requirements in the supermarket. This will help the people to reduce manpower required in billing section. This can reduce the expenses incurred by the management. Users can be aware of the total bill amount during the time of purchase.

VII. FUTURE SCOPE OF THE PROJECT

In near future instead of customer dragging the shopping cart, the cart could be "driverless" i.e., it could follow the customer around the mall by avoiding all the obstacles. Development of shopping list and navigation system to search the products in mall can be implemented. There can be voice assistance included. Robotic ARM can used for picking and dropping products in which case theft can be avoided

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Gesture and Voice Controlled Robot

Mr. Harsha C J[1], Mohammad Hafeel[2], Mahammed Ibrahim[2], Mahammad Kasim[2], Kalandar K[2]
[1]Assistant Professor, Department of ECE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India
[2]Department of ECE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

This paper implements the design of a robotic system that can be controlled using voice and gestures provided as inputs by the user. The robot will be efficient and useful in reducing human efforts in various applications and hence will improve the overall efficiency of the system. The operation of the robot is distributed into two parts i.e. voice processing, gesture control. The main objective of this project is to control the robot using gesture and voice commands. Voice recognition and gesture controlling techniques are two individual concepts traveling in the journey of technology. This work comes up with the model of a robotic arm being controlled by voice signals and hand gestures. The main foundation for this model will be an android application (Google assistance) and hand gesture in interaction with the robot using the internet. This technique is very useful since it takes real time video of hand and voice tracks it to get interface with robotic arm. A laptop camera will get the video different human hand gestures and Android app (Google assistance) for voice is needed. Tracking of such hand will interface the controller with robotic arm. The main aim behind this approach to program a robotic arm, so that it should be controlled by human hand gesture and voice will reach the locations where human will not be able to reach and do the given task by direct interfacing with human. hand or voice. In this we can see the real time movement of robotic arm.

Keywords: - Robotic arm, Gesture recognition, Voice recognition, Adafruit, IFTTT.

I. INTRODUCTION

As the world moves towards automation, it is beneficial to have a robotic assistant to facilitate human tasks. The robot described in this project has been built considering the fulfillment of this necessity as the fundamental objective. There are several day-to-day tasks performed by humans for which they need an assistant to help themselves with some equipment, tool, or any object, in general, this robot can be controlled by the human operator using voice or Gesture. Thus, the robot could navigate to the location as per the operator's wish. The robots that are controlled either by hand gestures or and can't do work on their own and are always dependent. Voice recognition and gesture controlling techniques are two individual concepts traveling in the journey of technology. Combining these two concepts enhances a wide range of applications ranging from assisting to controlling gadgets and helping society. This work comes up with the model of a robotic arm being controlled by voice signals and hand gestures. The main foundation for this model will an

image processing and IoT. This particular technique can be used for assistance for people with disabilities or in applications of industries like working robots controlled by voice and hand gestures. The robots that are controlled either by hand gestures or and can't do work on their own and are always dependent. Gesture recognition technology is used to control the robotic arm. Gesture recognition enables humans to communicate with the machine and interact naturally without any mechanical devices. Gesture recognition is a topic in computer science and language technology to interpret human gestures via mathematical algorithms. Gestures can originate from any physical motion or state but commonly originate from the face or hand. Gesture recognition enables humans to communicate with the machine and interact without any mechanical devices. Hand gestures are extensively used for robotic control applications and robotic systems can be controlled naturally and intuitively with such robotic communication. Image processing is a technique that makes use of an image as an input, performs certain operations on it, and yields the output as required for a specific application. In the robotic system described in this Project, an image of the signaling object, provided as an input to the robot, can, in turn, be used to help the robot identify the intended direction. Nowadays Robots are successfully capable of performing various human tasks that may be difficult due to them physical disabilities, size constraints or harsh environmental conditions.

II. LITERATURE SURVEY

[1] Voice Control Robot using Android Application -M. Narayana, Abhinay Alishety, Harsha Chapala, semantic scholar, Corpus ID: 60791349, 2015. This paper proposes a system whereby the human voice becomes a specific key to manipulate a robot, but nowhere a voice recognition module is used. In this system, an android application is used to recognize the human voice and is converted to text. This text is further processed and used to control the robot. Keeping in mind the need of the day (requirements of the present day), our goal is to move towards making access to the manipulation of everyday objects to individuals with motor impairments. But the voice recognition module involves a high cost when it comes to practicality (reality). Using our system, we perform several studies on control style variants for robots. Results show that it is indeed possible to learn to efficiently manipulate real-world objects with only voice (human voice) as a control mechanism. Our results provide strong evidence that the further development of voice-controlled robotics will be successful.

[2] Gesture Controlled Robot using Image Processing -Harish Kumar Kaura, Vipul Honrao, Sayali Patil, Pravish Shetty, (IJARAI) International Journal of Advanced Research in Artificial Intelligence, Vol. 2, No. 5, 2013. Service robots directly interact with people, so finding a more natural and easier user interface is of fundamental importance. While earlier works have focused primarily on issues such as manipulation and navigation in the environment, few robotic systems are used with user-friendly interfaces that possess the ability to control the robot by natural means. To facilitate a feasible solution to this requirement, we have implemented a system through which the user can give commands to a wireless robot using gestures. Through this method, the user can control or navigate the robot by using gestures of his/her palm, thereby interacting with the robotic system. The command signals are generated from these gestures using image processing. These signals are then passed to the robot to navigate it in the specified directions.

[3] Robotic arm control using gesture and voice -Dr. R. V. Dharaskar, S. A. Chhabria, Sandeep Ganorkar, International Journal of Computer, Information Technology & Bioinformatics (IJCITB) ISSN:2278-7593, Volume-1, Issue-1. The human-robot voice interface has a key role in many application fields. Hand gesture is a very natural form of human interaction and can be used effectively in human-computer interaction (HCI). In this paper, we propose a "Human Machine Interfacing Device" utilizing hand gestures to communicate with computers and other embedded systems acting as an intermediary to an appliance. Developments in the field of communication have enabled computer commands to be executed using hand gestures. This paper discusses hand glove-based techniques that use sensors to measure the positions of the fingers and the position of the hand in real-time. Interaction using gesture technology for effective communication empowers physically challenged to interact with machines and computing devices including 3-D graphic interactions and simulations. This paper focuses on wireless data gloves that are proposed to be used for gesture recognition and accordingly robot movement will take place.

[4] Gesture Controlled Robot -Lavanya K N, Nischitha B R, Ramya Shree D, T Asha, C Gururaj International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT) This project is a real-time monitoring system by which humans interact with robots through gestures. This is an immense aid for people for whom mobility is a great challenge. There is a dire need for a vision-based interface over voice recognition as it failed to mandate the robots because of modulation and varying frequency. Gesture recognition consists of three stages: capturing of images, image processing, and data extraction. The implementation is achieved by navigation of the robot through various gestures. By the impact of this project, a life of physically challenged people becomes less challenging. From further research, it will benefit various areas including applications in military and high-security bases.

[5] Voice Assisted and Gesture Controlled Companion Robot -Ms. Quanitah Shaikh, Mr. Rohit Halankar, Mr. Akshay Kadlay, International Conference on Intelligent Computing and Control Systems (ICICCS 2020), IEEE Xplore Part Number: CFP20K74-ART; ISBN: 978-1-7281-4876-2 This paper implements the design for a robot that can be controlled simply by using interactive inputs from the operator such as voice and gesture along with object tracking. The system aims to create a prototype of a futuristic automated personal assistant for domestic as well as industrial purposes. Google text to voice API and Grassfire algorithm is used to control the basic locomotion of the system. The robot consists of a gripper arm which is used to pick and hold objects as desired by the operator.

III. METHODOLOGY

The main objective of our project is to control the robot using gesture and voice command. The Wireless gesture and voice control robot will function by taking movements of hand and voice as the input for the movement of the robot in this project we navigate the wireless robot in environment using gestures and voice commands where gesture recognition is done by image processing and voice recognition is by converting speech-to-text. The voice and gesture is recognized using algorithms and applications these commands are like "pick the object", "place the object", "body left", "body right", "turn left", "turn right", "move forward", "move

backward", "stop". Are sent to adafruit to store these commands are retrieve from adafruit to esp32 module where the respective instruction runs based on command the robotic movement will done.
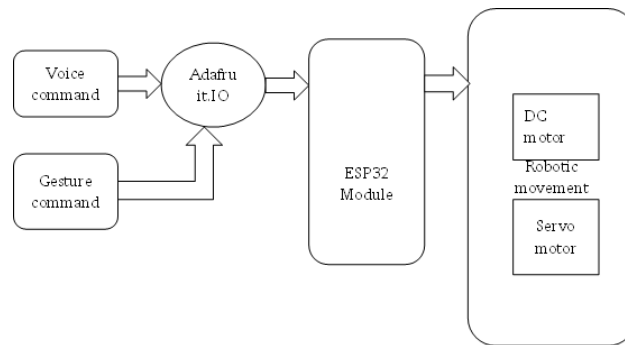

Figure 1: Block diagram of the proposed system.

A. Gesture recognition

In this project we are making a real-time Hand Gesture Recognizer using the Media Pipe framework and TensorFlow in OpenCV and Python.to process the input image which has taken in real-time using webcam. OpenCV is a real-time Computer vision and image-processing framework built on C/C++. But we'll use it on python via the OpenCV-python package. In OpenCV, hand image is converted into multi-dimensional arrays, which greatly simplifies their manipulation.

For instance, a grayscale image is interpreted as a 2D array with pixels varying from 0 to 255. The necessary packages are imported then the models are initialized the image is read from the webcam. Media Pipe is a customizable machine learning solutions framework developed by Google it comes with some pre-trained ML solutions such as face detection, pose estimation, hand recognition, object detection, etc. We'll first use Media Pipe to recognize the hand and the hand key points. Media Pipe returns a total of 21 key points for detected hand. TensorFlow is an open-source library It can be used across a range of tasks but has a particular focus on deep neural networks. In TensorFlow has gesture recognizer model so key points will be fed into a pre-trained gesture recognizer network to recognize the hand pose. Depending upon the hand pose the function relate to that is run in raspberry pi which results movement of the robot arm.
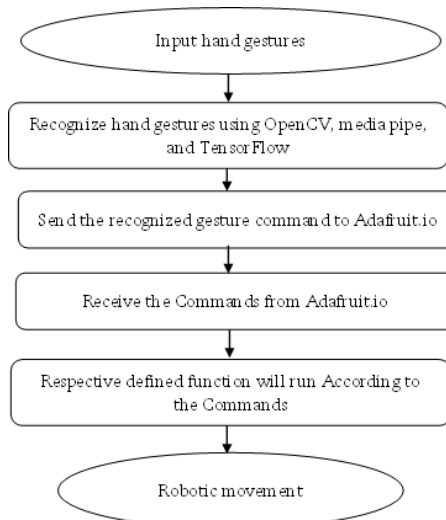

Figure 2: Flow chart of gesture recognition.

B. Voice recognition

Voice recognition is the ability of a machine or program to receive and interpret dictation or to understand and carry out spoken commands. Voice Recognition includes Google assistant along with Adafruit server and IFTTT service. In our project Google Assistance is used to recognize voice command given by the user. First the voice input is given to google assistant which converts speech to text and this text transferred to IFTTT. IFTTT (If This Then That) is web service in which users can create simple conditions these conditions executed or triggered when changes in other connected web services occur. In IFTT some preloaded conditions are there when the input text matches the preloaded condition which send the output to Adafruit.io (feed). Adafruit.io is a cloud based IoT platform. it is useful for storing data, viewing data and can also control devices. The Figure explains the recognition of voice using google assistance and IFTTT.
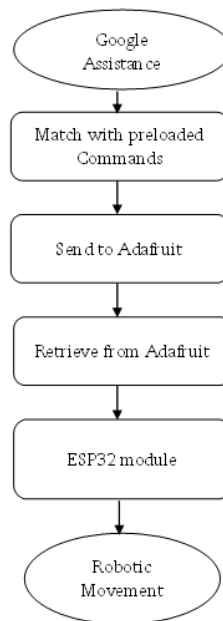
Fig3: Flow Chart of Voice recognition

C. Requirement

Hardware Used

1. ESP-WROOM-32 module: Tensilica Xtensa LX6 microprocessor @ 160 or 240 MHz CPU, 320 KiB SRAM, this provides Wi-Fi (and in some models) dual-mode Bluetooth connectivity.
2. MG995 Servomotor
3. NEMA17 4.2 kg-cm Single Shaft Stepper Motor.
4. 60 RPM - 12V Centre Shaft DC Geared Motor.
5. L298 Motor Driver
6. A4988 stepper motor driver.

Software Required

1. PyCharm
2. Google Assistant:
3. IFTTT
4. Adafruit

IV. RESULTS

The proposed prototype model can take voice signal or voice commands and gesture command as input to control the robot. As we using cloud interface so because of this we can control the robot anywhere in world using internet we can complete certain task using this system. In voice recognition the commands are preloaded to IFTTT. the voice commands are matched with these commands. Stored in Adafruit. same with gesture recognition where each command stored and retrieved continuously. The below figure shows the output of gesture recognition.

Fig1: Output of Gesture recognition
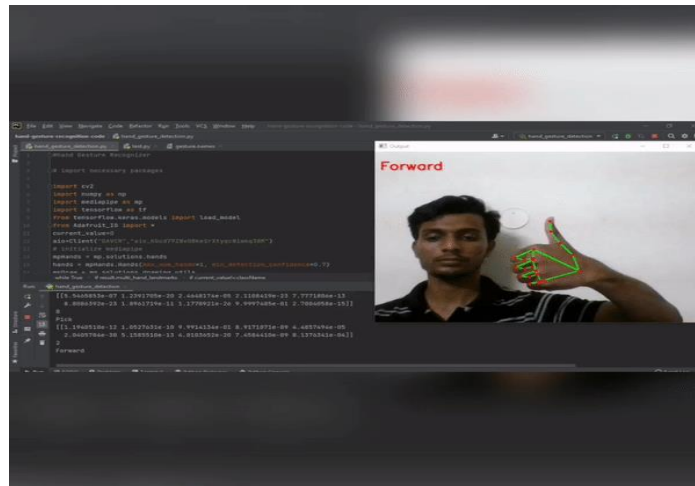
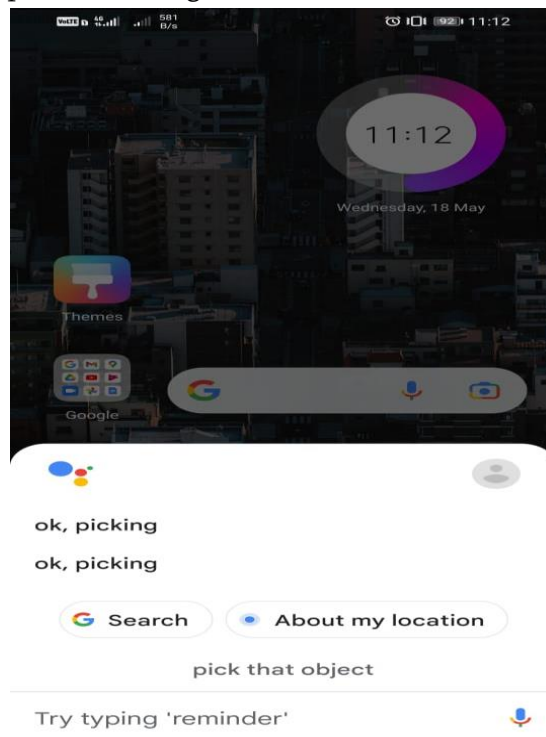The below figure 3 shows the output Voice recognition.

Fig2: Output of Voice Recognition

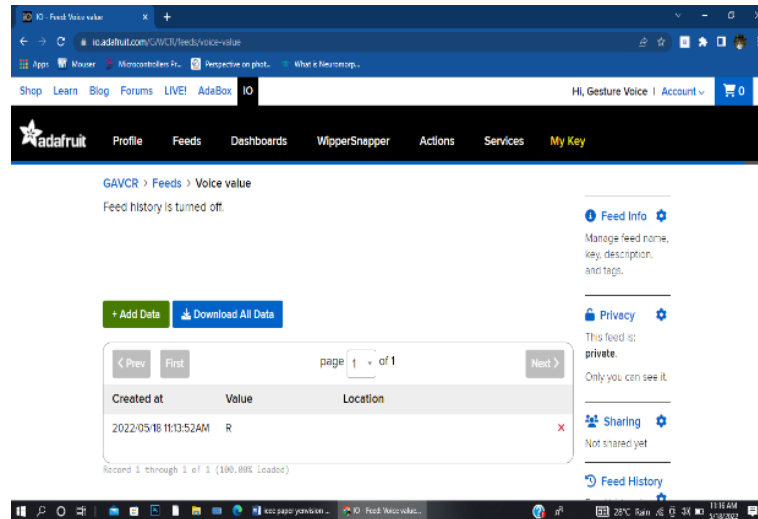The below figure 3 shows the output of Adafruit.io server.

Fig 3: Output of Adafruit.io server

V. FUTURE SCOPE

The future scope of this project can be controlling the robot from a distant location with the help of camera and high range live transmission. By this we can still accurately perform the task and the robot can be fixed to a rover which moves wirelessly and performs the task. This will be very useful in Hazardous environment Applications mentioned above achieved by improving this model in terms of adding hardware components and improved software. The application can be integrated with other mobile and iot devices to improve user interaction and make the system more robust. The accuracy of the program can be further improvised by using neural networks. Alternate stress could be put on the use of the application in the fields of medicines, military, governance, etc. A genuine blend of various technologies in mentioned fields could make way for power tools and applications which will serve the community around the world. Finally, the user can be further designed to make it more accessible to the consumers. The whole point of making the solution a commercially viable product for the users is to help the impaired community around the world.

VI. CONCLUSION

In the project, we have suggested a prototype of a robot based on "Human Gesture Recognition" with Voice Recognition, i.e. to control a robot using gestures and voice, without any complication. This paper implements the design of a robotic system that can be controlled using voice and gestures provided as inputs by the user. The robot will be efficient and useful in reducing human efforts in various applications and hence will improve the overall efficiency of the system. The operation of the robot is distributed into three parts i.e. voice processing, gesture control, and image processing. Using natural language processing (NLP), the scope of this robot, in terms of communicating with humans, can be broadened. Such robots can then be used as waiters in hotels or for domestic purposes in household activities. A sturdy robotic arm can be built and thereby upgrading the hardware of the robot, it can be used to carry heavy loads or objects where the involvement of

humans is not possible and is dangerous. It can also be used as a robotic assistant in hospitals for doctors and nurses during treatments of patients or performing surgeries. In this age of technology where humans and machines are working together to take technology to the next level, such type of prototype could play a vital role in various fields and pave the way for the future generation.

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E : Genius a Conversational AI

Sai Venkatramana Prasad[1], Afra Banu[1], Safa Maryam[1], Haseena Banu[1]

[1]Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

The aim of this paper is to design and implement a chatbot that can serve as virtual teaching assistant to make learning more effective and comprehensible as it can help with tutorial videos, blogs, wikis etc. The educational chatbot known as E:GENIUS A CONVERSATIONAL AI can act as a dedicated personal tutor for each student, helping students to respond to students with everyday tasks. This is making other businesses available on messaging platforms leads to proactive interaction with users about their products. A technology like messaging where it will be able to interact with the users.Making an ordinary project into a personalized interactive API which can maintain conversation non-distracting and funway.

KEYWORDS: Chabot, Python, natural language preprocessing, artificial intelligence.

I. INTRODUCTION

Chatbots are conversational programs, answering user questions on websites, in app or even at home like Amazon's Alexa. And they can do even more for us. Chatbots are becoming virtual assistants in our daily lives. Many social networks opened their APIs to allow their users to interact with bots. Even today, most chatbots are not intelligent at all. They do not understand the meaning behind a question nor do they do well in reasoning. Since the first chatbot was published in 1966 by Joseph Weizenbaum, most chatbots still use simple pattern matching and provide prepared answers. [4]Often it is the human willingness which helps traditional chatbots to pass the Turing test. In other words, many traditional chatbots only generate an illusion of understanding. In our project we explore how a chatbot can give information to students about college related information. Building a chatbot is easy. But before building a bot, you need to decide on the purpose of building the bot and what solution it has to offer to an existing problem. Chatbots can be built in two ways: a) a rule-based approach which requires hard coding and b) via machine learning that necessitates streaming data for the system to learn on its own. This paper presents a formal methodology for designing and implementing a chatbot as an intelligent tutor for a university level. The teaching process will involve a close collaboration between humans and machines, and instructional roles can possibly be disseminated amongst multiple chatbots.
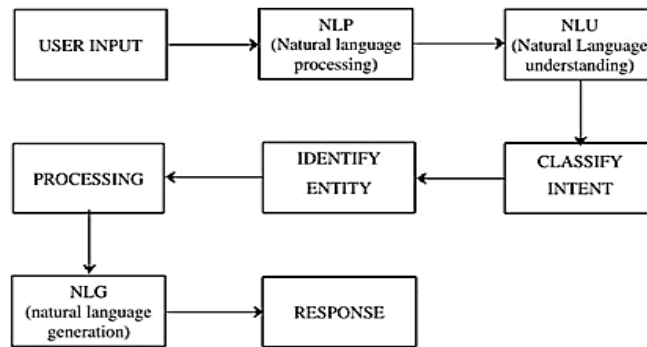
II. METHODOLOGY

Fig1: BLOCK DIAGRAM OF E: GENIUS

There are two categories of chatbots. We are implementing command based chatbot, where chatbot rely on a databank of replies and heuristics. The user must be very specific while asking the questions so that the bot can answer. Hence, these bots can answer limited set of questions and cannot perform function outside of the code. This rule-based E: GENIUS performs two main tasks i.e.it will response to student queries as well student academic details such as notes, feedback, videos as well as question paper. It is created in python programming language. This system is developed using Visual Studio.We use flask to create web app or web-based user interface. This flask-based web app contains a chatbot which we have to train by chatterbot library files and make conversation with bot. Import the library file Chatterbot-corpus. These modules are used to quickly train E:geniusso that it can respond to various inputs in different languages, it is still useful to have these training sets available to prime a fresh database and make the variety of responses that a bot can yield much more diverse.

You can create a new trainer to train your chat bot from your own data files. You may choose to do this if you want to train your chat bot from a data source in a format that is not directly supported by Chatterbot. It is also possible to import individual subsets of Chatterbot's corpus at once. For example, if you only wish to train based on the English greetings and conversations corpus then you would simply specify them like given below, chatterbot.train("chatterbot.corpus.english.greetings","chatterbot.corpus.english.conversations")
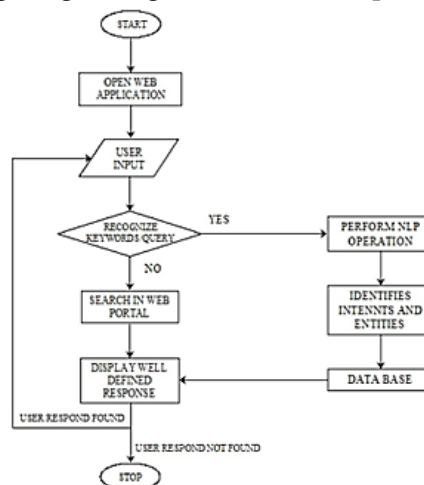

Fig2: FLOW CHART OF E:GENIUS

- E: genius will perform the requested actions and retrieves the data of interest from its sources, which may be database or external resources that are accessed through an API call upon retrieval the response generation component uses Natural Language Processing (NLG).
- To prepare a natural language human like response to the user based on the intent data and context information returned from user message analysis component.
- The input Query will pass on to Natural Language Tool Kit(NLTK) which works on Intent classification algorithm to identify patterns in the Query and classify the Tag associated with the query.
- Natural language processing (NLP) is the method which convert human input text into structured data so that the machine can understand it.
- Natural language processing (NLU) uses algorithm to classify the intent(verb) and recognize the entity
- (noun or action content).
- Natural language generation (NLG) convert structured data of the machine into text so that human can understand it.
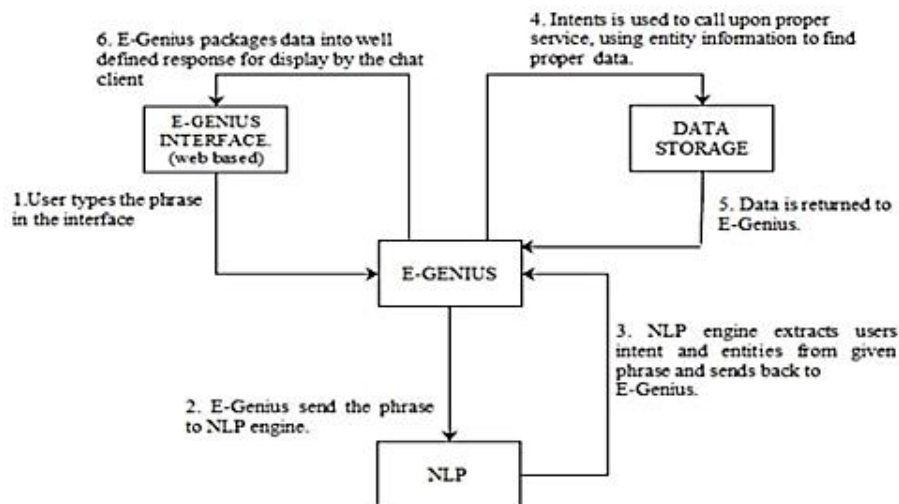
Fig3: ARCHITECTURE OF E:GENIUS

User types the phrase in the interface and E: genius send the phrase to NLP engine. NLP engine extracts users intent and entities from the given phrase and sends back to E: genius. Intents used to call upon proper service, using information to find proper data then data is returned to E: genius packages data into well-defined responsefor display by the chat client.

III. APPLICATIONS

- E: GENIUS is a software application used to conduct an online chat conversation via text or text-to-speech and also providing direct contact with a live human agent.
- E: GENIUS used in e: commerce as well as healthcare sector too.

- E: GENIUS enable the students to updated with college activities, saves time for the students as well as teachers.
- It will provide us a readily available information source without taking any physical efforts ex: Notes, videos question papers.
- Better student engagement, Efficient teaching assistants and Instant assistance to students.

IV. CONCLUSION

E:GENIUS is helpful in guiding students with correct and most up to date sources of information. It is advantageous for international applicants for queries such as fee payment and academic matters. E:GENIUS typically provide a textbased user interface, allowing the user to type commands and receive text. When chat bot technology is integrated with popular web services it can be utilized securely by an even larger audience can run on local computers, though most of the time it is accessed through the internet. E:GENIUS can give a human like touch to some aspects and make it an enjoying conversation. And they are focused entirely on providing information and completing tasks for the humans they interact with.

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YENSAT- Analysis of Stratosphere Using Picosat

Mrs. Nazia A M.[1], Venkatesh C[2], Puneeth[2], Varun Shetty[2], Suraj[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Periodic study on the nature is needed for survival and upscaling the livelihood of every being on earth. One of the studies is on atmosphere where temperature, humidity, radiation and many more stats which proportionally make difference in the natures cause. This advance can be observed through satellites from space. Compared to present scenario CubeSat has gained popularity among the students and researchers etc. The reason is that, nano satellite has the ability similar to larger satellite, but in tiny compact size. It has gained popularity within students and can be made using low-cost devices with compared to conventional methods. Although the system of cube satellite different from larger satellites system, cube satellite is an easy and cheap way for student to start learning about satellite. The proposed project is to develop a Picosat which collects the environment data of stratosphere, process and communicate with the base station which is present in the ground level. The main purpose behind the satellite was to analyze the atmosphere (stratosphere or mesosphere), performance of 3D printed carbon body, image capturing and transmission through RF signaling. This becomes a more advanced creation in our technology. Lots of advantages can be observed in cube satellite. However, making and working with this technology we can gain more knowledge towards it and this can attract more people towards research.

I. INTRODUCTION

A small satellite, miniaturized satellite, or small sat is a satellite of low mass and size, usually under 500 kg (1,100 lb). While all such satellites can be referred to as "small", different classifications are used to categorize them based on mass. Satellites can be built small to reduce the large economic cost of launch vehicles and the costs associated with construction. Miniature satellites, especially in large numbers, may be more useful than fewer, larger ones for some purposes – for example, gathering of scientific data and radio relay. Technical challenges in the construction of small satellites may include the lack of sufficient power storage or of room for a propulsion system. One rationale for miniaturizing satellites is to reduce the cost; heavier satellites require larger rockets with greater thrust that also have greater cost to finance. In contrast, smaller and lighter satellites require smaller and cheaper launch vehicles and can sometimes be launched in multiples. They can also be

launched 'piggyback', using excess capacity on larger launch vehicles. Miniaturized satellites allow for cheaper designs and ease of mass production. Another major reason for developing small satellites is the opportunity to enable missions that a larger satellite could not accomplish, such as: Constellations for low data rate communications, using formations to gather data from multiple points, In-orbit inspection of larger satellites, University-related research, Testing or qualifying new hardware before using it on a more expensive spacecraft.

II. LITERATURE SURVEY

Literature review is an overview of the previously published works on a specific topic. It is supposed to provide the research/author. A literature review serves the current study with in the body of the relevant literature and to provide context for the reader. Below papers are referred for our project.

George Hunyadi [1] refers that fostering collaboration between government, industry and academia in order to find unique, low cost solutions to technical small satellite issues. The program was designed to apply to nanosatellite-scale projects in an effort to drive down cost and complexity of technology demonstration and small satellite science missions. (Small satellites are typically categorized as micro sats [~100 kg], nanosats [~10 kg], and picosats [~1 kg]. The terminology is somewhat arbitrary and is simply meant to convey relative size.)

Petro Nevodovskyi [2] refers that one of the reasons for climate change (i.e., stratospheric ozone concentrations) is connected with the variations in optical thickness of aerosols in the upper sphere of the atmosphere (at altitudes over 30 km). Therefore, aerosol and gas components of the atmosphere are crucial in the study of the ultraviolet (UV) radiation passing upon the Earth. M. So far, there has been created a sample of a tiny ultraviolet polarimeter (UVP) which is considered to be a basic model for carrying out space experiments regarding the impact of the changes in stratospheric aerosols on both global and local climate.

D.-H. Cho, D.-H. Lee, and H.-D. Kim [3] describes that Attitude Determination and Control. The attitude determination and control system (ADCS) consist of the MEMS magnetometer, MEMS gyroscope, analogue sun sensor, and star tracker as the attitude sensor and 3-axis magnetic torquers and 3-axis reaction wheels as the actuator. In this system, MEMS sensors such as a magnetometer and gyroscope are implemented, and these sensors are integrated into the OBC. For this reason, these sensors are always turned-on during flight, making data measurement possible. Thus, it is possible to use the angular velocity data from a gyroscope directly during the detumbling mode, and the improved detumbling control can be applied based on the geomagnetic estimator and gyroscope feedback control. CubeSats, in particular, which were originally conceived for use in student education have found uses for bona fide science, technology demonstration, commercial remote sensing, military, and other missions. The use and capabilities of small satellites, generally, have grown with electronics miniaturization, secondary payload launch availability, and other factors driving growth.

Rizky Pratama Hudhajanto [4] describes that use of SDR device with the nano satellite technology. SDR is used as a communication device for nano satellite, in the sky, to communicate with the ground unit. As a computer device to operate with SDR, a mini-PC, Raspberry Pi, is used. Raspberry Pi is chosen because of its compact size, and its processing ability to run linux based OS. This Raspberry Pi is necessary for use with SDR, because SDR is an embedded hardware, and cannot work by itself. For SDR itself, we choose HackRF from GreatScottGadget. This SDR is a low cost but powerful enough to prototype the communication system of satellite. This historical

reality is mentioned to make the point that nanosats are not necessarily a novel idea. Why then is there such an interest in nanosats? The cost of a spacecraft is historically tied to its mass. A low mass spacecraft will be a low cost spacecraft. Also, there continues to be an expectation that small launch vehicles with nanosat capability and very low cost will soon be available. Designers have started to respond to these promises with new technology and more efficient designs to meet the low cost model projecting great capabilities at bargain prices. Seeing the potential for missions enabled by pushing this trend to the limit, the science community has already identified the need for multiple small, inexpensive spacecraft

III. PROPOSED METHOD DESCRIPTION

The flowchart shown in figure 1 clearly describes the flow of process. When the Picosat is deployed through a help of helium balloons or rockets. At initial the satellite moves away from the ground so the altimeter and GPS value increases, as well the position will be monitored. In the beginning, nanosatellite projects were focused on educational aspects. In the meantime, the technology matured and now allows to test, demonstrate and validate new systems, operational procedures and services in space at low cost and within much shorter timescales than traditional space endeavors. Nanosatellites is demonstrating impressively that demanding scientific requirements can be met with small, low-cost satellites. The approach is in general different from traditional space projects with their strict product/quality assurance. Temperature and pressure data will be collected with help of sensors. Microprocessor is the heart of the project which does the image and data transferred through antenna. The microprocessor used in picosat is Raspberry pi 3 and Raspberry pi 3 in the ground station processing. Raspberry pi zero is smaller, cheaper and faster processing speed preferable for small satellites. UV sensor monitors environmental data of atmosphere. PI cam is used for image capturing of the earth surface. The image and sensor values are transmitted to ground station through Lora transmitter. The final values are plotted and stored in the memory or database. Image processing is done for clear analyzation of the pictures.
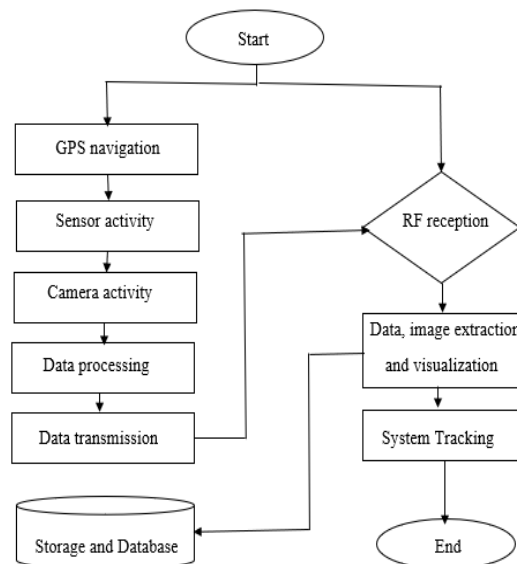

Fig1 : Flow chart of automated trolley for shopping

IV. IMPLEMENTATION

The block diagram Figure 3.1 and Figure 3.2 shows that the developing system has picosat and ground station modules. Picosat consist of Raspberry pi zero processing board for collecting, processing the data's in transferrable form to ground station through transmitters. The sensors BME280, MPU6050, UV sensors are used for collecting data's of stratosphere. The data parameters from the sensors will be temperature, humidity pressure, axis of the satellite to ground, position in the atmosphere, ultraviolet radiation level in the atmosphere and altitude. The picosat will be embedded with raspberry pi supported camera for the stratosphere research purposes. These images are processed for transmission through antennas and received through ground station. Ground station consist of raspberry pi ¾ microprocessor board and LoRa receiver. The microprocessor will the main controlling device throughout the process, data sent by the satellite is received through the receiving antenna, processed or viewed in required format using API's. Data collection and analysis are crucial for optimizing the use of natural resources and developing sustainable economies. An analysis of human impacts on agriculture, forests, geology, and the environment is crucial to enhancing the living standards of the population. CubeSats are compact and light, which makes them a low-cost solution that is easy to load onto spacecraft. Furthermore, the emergence of micro-launchers around the world has lowered the price of launching small satellites in orbit.
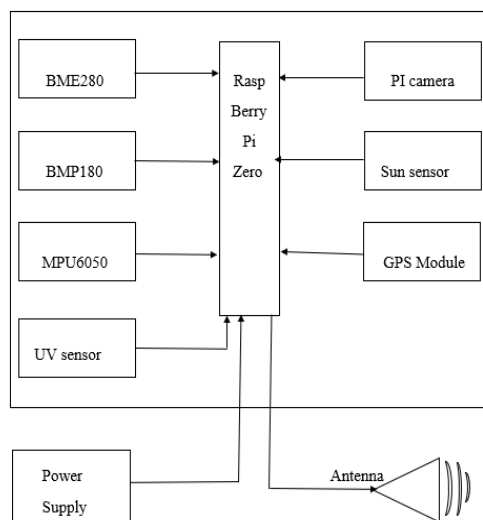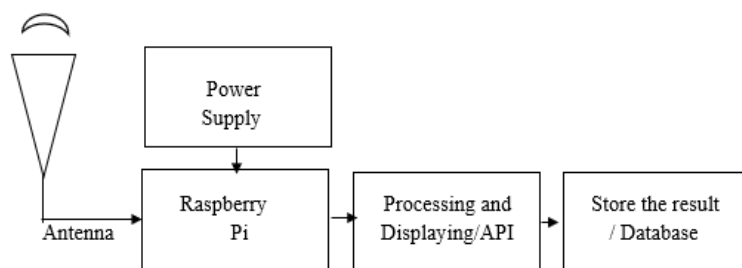
Fig. 2: Block Diagram of trolley

Fig. 3: Circuit Connection

The block diagram Figure 2 and Figure 3 shows that the developing system has picosat and ground station modules. Picosat consist of Raspberry pi zero processing board for collecting, processing the data's in transferrable form to ground station through transmitters. The sensors BME280, BMP180, MPU6050, UV sensors, sun sensors are used for collecting data of stratosphere. The data parameters from the sensors will be temperature, humidity pressure, axis of the satellite to ground, position in the atmosphere, ultraviolet radiation level in the atmosphere and altitude. The picosat will be embedded with raspberry pi supported camera for the stratosphere research purposes. These images are processed for transmission through antennas and received through ground station. Ground station consist of raspberry pi ¾ microprocessor board and LoRa receiver. The microprocessor will the main controlling device throughout the process, data sent by the satellite is received through the receiving antenna, processed or viewed in required format using API's.

V. DETAILS OF THE PROPOSED SYSTEM MODULES

A. Software required

RASPBIAN OS:

Raspberry Pi OS (formerly Raspbian) is a Debian-based operating system for Raspberry Pi. Since 2015, it has been officially provided by the Raspberry Pi Foundation as the primary operating system for the Raspberry Pi family of compact single-board computers. The first version of Raspbian was created by Mike Thompson and Peter Green as an independent project. The initial released build was completed on July 15, 2012. Raspberry Pi OS is highly optimized for the Raspberry Pi line of compact single-board computers with ARM CPUs. It runs on every Raspberry Pi except the Pico microcontroller. Raspberry Pi OS uses a modified LXDE as its desktop environment with the Openbox stacking window manager, along with a unique theme. The distribution is shipped with a copy of the algebra program Wolfram Mathematica and a version of Minecraft called Minecraft: Pi Edition (note that Minecraft: Pi Edition is no longer installed as of the Debian bullseye update) as well as a lightweight version of the Chromium web browser.

PYTHON:

The Raspberry Pi Foundation specifically selected Python as the main language because of its power, versatility, and ease of use. Python comes preinstalled on Raspbian, so you'll be ready to start from the get-go. You have many different options for writing Python on the Raspberry Pi. Python is a computer programming language often used to build websites and software, automate tasks, and conduct data analysis. Python is a general purpose language, meaning it can be used to create a variety of different programs and isn't specialized for any specific problems. Python is best for programming Raspberry Pi Board. Reason is Operating System Raspbian comes preloaded with Python, the official programming language of the Raspberry Pi and IDLE 3, a Python Integrated Development Environment. Also, it's very easy to get started, and the Python ecosystem is very friendly to beginners.

B. HARDWARE REQUIRED

RASPBERRY PI 3:

Raspberry Pi 3 is tiny single board computer, introduced by Raspberry Pi Foundation, that comes with CPU, GPU, USB ports and i/o pins and capable of doing some simple functions like regular computer. This tiny computer was developed with the purpose of making computer learning process easy so an average student can get benefit and anticipate what an advanced computer can do Raspberry Pi 1(first generation Model B) came into play in 2012, and soon got a renowned reputation in terms of ease of use and availability. Raspberry Pi 3 Model B comes with a quad core processor that shows robust performance which is 10 times more than Raspberry Pi 1. And speed exhibits by Raspberry Pi 3 is 80% more than Raspberry Pi 2. It has a processing speed ranging from 700 MHz to 1.4 GHz where RAM memory ranges from 256 to 1GB.The CPU of this device is considered as the brain of the device which is responsible for executing numbers of instructions based on mathematical and logical operation.

The Board has four USB ports that are used for communication and SD card is added for storing the operating system. **Power source connector** is a basic part of the board that is used to provide 5 V power to the board.

LORA 01 ANTENNAS:

LoRa technology was developed by a company called Semtech and it is a new wireless protocol designed specifically for long-range, low-power communications. LoRa stands for Long Range Radio and is mainly targeted for M2M and IoT networks. This technology will enable public or multi-tenant networks to connect a number of applications running on the same network. LoRa Alliance was formed to standardize LPWAN (Low Power Wide Area Networks) for IoT and is a non-profit association which features membership from a number of key market shareholders such as CISCO, actility, Microchip, IBM, STMicro, SEMTECH, Orange mobile and many more. This alliance is key to providing interoperability among multiple nationwide networks. These are +20dBm LoRa packet radios that have a special radio modulation that is not compatible with the RFM69s but can go much farther. They can easily go 2 Km (1.24 mi) line of sight using simple wire antennas, or up to 20Km (12.4 mi) with directional antennas and settings tweaking's. Packet radio with ready-to-go Arduino libraries

MPU6050:

MPU6050 is basically a sensor for motion processing devices. It is the world first six dimension motions tracking device. It was designed for low cost and high performances smartphones, tablets and wearable sensor. It is capable of processing nine-axis algorithms, it captures motion in X, Y and Z axis at the same time. MPU6050 is used in different industrial projects and electronic devices to control and detect the 3-D motion of different objects. In today's post, we will have a look at its working, pinout, protocol, it's interfacing with Arduino, features, applications, etc.

BME280:

The BME280 is an integrated environmental sensor by Bosch that measures humidity, pressure and temperature which is able to give users a comprehensive and holistic measurement of the environment. It is designed with

an 8-pin metal-lid LGA package for low power consumption, long term stability and high EMC robustness. This sensor features a fast response time to support performance requirements and also high accuracy. It is also optimized for low noise and high-resolution performance. Since the atmosphere pressure reading is affected by altitude and temperature, we have added compensation features in the library. Hence, Grove - Barometer Sensor (BMP280) would be more reliable on providing precise temperature, atmospheric pressure values and approximate altitude.

GYROSCOPE:

HMC5883L is a 3-axis digital compass used for two general purposes: to measure the magnetization of a magnetic material like a ferromagnet, or to measure the strength and, in some cases, the direction of the magnetic field at a point in space. Communication with the HMC5883L is simple and all done through an I2C interface. There is an on board regulator. The breakout board includes the HMC5883L sensor and all filtering capacitors. The power and 2-wire interface pins are all broken out to a 0.1" pitch header. Uses famous HMC5883L magnetometer chip. Supports 3.0V to 5.0V IO levels on I2C SCL and SDA pins.

IP CAMERA:

The world of IP surveillance cameras can be tricky to navigate. With so many technical aspects and such variety in choice, it's hard to decide which camera is best for you. An image sensor is the part of your IP camera that takes light traveling through the camera lens and converts it into electrical signals. There are two main types of image sensors: CCD (charged coupled device) and CMOS (complementary metal-oxide sensor).

UV SENSOR:

UV sensors measure the power or intensity of incident ultraviolet (UV) radiation. This form of electromagnetic radiation has shorter wavelengths than visible radiation, but is still longer than x-rays. UV sensors are used for determining exposure to ultraviolet radiation in laboratory or environmental settings. UV sensors are used in many different applications. Examples include pharmaceuticals, automobiles, and robotics. UV sensors are also used in the printing industry for solvent handling and dyeing processes. In addition, UV sensors are also used in the chemical industry for the production, storage, and transportation of chemicals.

VI. RESULT

The outcome of the project is to collect the stratosphere data, process and transmit to earth station. Having a technology which is delivering high results at lower cost and faster time is going to dramatically change our business. Low cost will enable launch of many of these satellites in a constellation model. Therefore, we will have the capability of doing things at various times of the day. Nano-satellites may not have the same performance capability as high-performing traditional satellites, but they will surely open up the markets, applications, and new arena of businesses for the industry. Data of the atmosphere and earth surface will be in image and sensor values. This project leads to get knowledge of events happening in stratosphere, predict or visualize the image using processing techniques.

VII.   FUTURE SCOPE OF THE PROJECT

In the future works working span of the satellite can be increased by add on features. The developing system runs with batteries hence the power source can be replaced with solar panels. The present system has few limitations. Durability of the sensors may be minimum. Continuous power supply is required for the system, proper internal connection should be present. Continuous monitoring of the satellite is carried out, so that locating and extraction of the landed satellite after the mission. Satellites typically communicate with locations on the ground to receive commands and send data back. Establishing reliable communications generally requires dedicated ground stations, which in turn require hardware and expertise. Developers of nano-satellites, however, may not have the expertise or resources necessary for establishing a dedicated ground station. The nanosatellites are developed to serve as introduction and training of new aerospace fields. To develop a nanosatellite would venture into aerospace research and application of technologies providing the possibility to established the basis to implement large projects using local knowledge and technologies. The experimental science of designing, implementing, and putting a nanosatellite orbit involves the use of engineering parts and technologies in such a way of knowledge areas as communication, telemetry, and remote sensing, also other subjects such as automation, and remote control. As scope for the future work, we can look into this limitation and resolve or eliminate or minimize in-order to build up the efficient system. This can be carried as future work.

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Ramps: Defence Robot for Border Security Using Raspberry-Pi

Ms. Rebecca Fernandes[1], Akash[2], Manjunath[2], Prasad[2], Sayeesh Shet[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

The system proposed in this project consists of a single unit, which will monitor the environment in various hazardous conditions and provide live feedback. Basics of robotics like sensors and actuators, gives an overview on robotic construction. The proposed system is also able to capture real-time images which are useful for surveillance for a specific person or area. Controlling of Robot is done using a Raspberry Pi processor. This robot is more comfortable for military applications such as surveillance of interested area. It will provide tactical advantage during hostage situations or in hostile grounds. It is capable of walking on any surface and providing monitoring over an area. With the help of live sensor output transmission, the surveillance become more effective and it detect the temperature, Humidity, Movements of Human. These will prove important in applications like robots for civil use and military robots.

Keywords—Robot, Boarder Security, Raspberry-Pi, GSM

I. INTRODUCTION

The implementation of this project is to resolve the problem of replacing a human army with wireless controlled Omni directional monitoring robot with video support that completely controlled with wireless network. The project is to detect an object that is located at some distance within the range of RF transmitter with wireless camera. This vehicle is equipped with a metal detector can detect any land mine on its way, and wireless camera which will transmit the live pictures and videos remotely. This robot is also having a metal detector sensor, which will sense the presence of any mine in the survey area. It also having a magnetic field detector which will detect any presence of the magnetic field. A moisture sensor is also placed on it, which will detect the presence of any moisture or we can say water in the survey area. This is the powerful technique which is used to at the terrestrial site to check if any water contents are present. It is also having a light sensor, which will sense the intensity of the light. When this intensity will fall below a certain value, it will automatically make the IR lights on to make the camera night vision. One more powerful tool is GSM module. If by mistakenly the robot will move out of range of RF signal, then we will make the GSM module to work and make a call to the robot to get back in the range of RF. This unit is helpful and useful for surveillance of an

area in defence grounds for enemy, spying purpose where the human reach is not recommended or avoided. The unit is small handy portable and can reach places easily. At present the surveillance of International border areas is a difficult task. The border guarding forces are patrolling the border seriously, but it is not possible to watch the border at each and every moment. An essential requirement of this situation is a robot which automatically detects trespasser in the border and report nearby board security control unit. Many of the military departments now utilize the robots to carry out risky jobs that cannot be done by the soldiers. In this present work, a Raspbian operating system based spy robot platform with remote monitoring and control algorithm through Internet of Things (IoT)has been developed which will save human live, reduces manual error and protect the country from enemies. The spy robot system comprises the Raspberry Pi (small single-board computer), night vision pi camera and sensors. The information regarding the detection of living objects by PIR sensor is sent to the users through the web server and pi camera capture the moving object which is posted inside the webpage simultaneously. The user in control room able to access the robot with wheel drive control buttons on the webpage. The movement of a robot is also controlled automatically through obstacle detecting sensors to avoiding the collision. This surveillance system using spy robot can be customized for various fields like industries, banks and shopping malls.

II. SURVEY ON SURVEILLANCE ROBOT METHODOLOGY

Raspberry Pi based automated robot [1] S M Ashish, Madhurya Manjunath, Ravindra L, Mohammed Nadeem, Neelaja K [2018] proposed a concept about a Raspberry Pi based automated robot which fulfils the purpose of surveillance. The robot provides autonomous movement around the facility where it is deployed and will move around the obstacles in its way by detecting them. It detects any kind of human emotions in the facility and alerts the registered users through SMS alert. It also captures the image of the commotion by using a Pi camera. Human controlled Spy robot [2] T. Saravanakumar, D. Keerthana, D. Santhiya, J. Sneka, D. Sowmiya [2018] The main objective of this paper is to develop a virtual environment for detecting suspicious and targeted places for the user without any loss of human life. It is based on the development of a robot vehicle for observing/spying suspicious objects. It can continuously monitor the objects. The robot can move in every direction (left, right, forward and backward). It is used for video surveillance and remotely controls the particular place using Wi-Fi as a medium. The webcam which is placed on the robotic unit will capture the video and it transmits lively to the remote end. The major application of this paper can be analyzed using an HTML web page which can be used to control the movement of the robot. L293D is a quadruple dual H Bridge motor driven IC.

Border surveillance and intruder detection using wireless sensor networks [3] D. Arjun, P. K. Indukala and K. A. U. Menon, "Border surveillance and intruder detection using wireless sensor networks represents the aim is to devise a multi-sensing system which is developed by combining different techniques of surveillance and intruder detection, for varying border scenarios such as, flat surface movement or water-body movement. Different sensors for human intruder detection such as, geophone, infrared and surveillance cameras are discussed.

Design and construction of a land wheeled autonomous mini-robot (LWAMR) for in-door surveillance Juan [4] G. Parada-Salado, Luis E. Ortega-García, Luis F. Ayala-Ramírez, Francisco J. Pérez Pinal [2018] presented a

concept on design and construction of a land wheeled autonomous mini-robot (LWAMR) for in-door surveillance. The LWAMR can be autonomous by using a position, speed and distance sensor. In addition, it is capable of sending images and video in real-time by using a spycam, which is controlled by a servomechanism.

III. PROPOSED METHOD

Figure 1 shows the methodology of the Robot movement. The Robot will move in particular direction based on IR sensors output, if left IR sensor gets active robot turns right and if Right sensor gets active robot turns left if both IR sensors are active Robot keep moving straight.
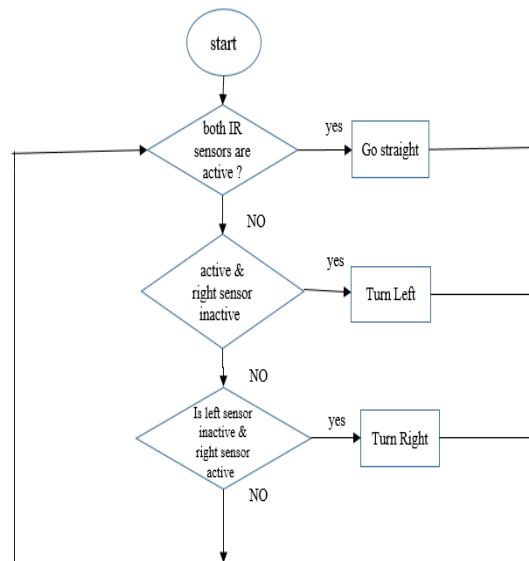

Fig 1: Flow chart for Robot Movement

Fig 2 shows flowchart for Gas, Temperature sensor upon reading the data of these sensors if any data present it displays the output if no it is again read the sensor data. Gas sensor senses the concentration of gases in atmosphere and it will be sent to cloud. PIR sensor is used to detect the human presence. Temperature sensor is used to measure the temperature of environment. System consists of two units mainly a robotic unit and a IOT unit. The Robotic unit consists of a microprocessor, the microprocessor here is the raspberry pi forming the central control of the system which is connected to a cloud wirelessly. The system is driven by a motor and the power supply is provided by a 12v battery. The robot is designed to communicate with the user using portable units like laptops or smartphones. A web page is built with for observing the outputs and to analyze. The range of communication between the handheld devices and the robot is increased by connecting them to the internet using Wi-Fi technology. Fig 1.5.1 shows the flowchart of robot movement. The Pi board is mounted above the chassis and underneath the structure, 4 DC motors rated 150 rpm each is adhered. The motors are powered by a 9V battery source each and attached to wheels. A L293D Motor Driver is embedded with the Raspberry Pi to drive the DC motors. Raspberry Pi is coded with Python scripting language in relation to the circuit connections to control the robot in all directions. A Pi camera is interfaced with Raspberry Pi to give a live

video feed. System is equipped by different sensor each of different use, The IR sensor is used to sense the presence of obstacles and it automatically redirects its way in the obstacles, the PIR sensor detects the presence of living objects in and around all these are captured by a pi vision camera. The software part is the web application which displays the status of the IR, PIR sensor and the images captured by the pi camera is displayed on the screen on the webpage. The web application has an added advantage of storing the images captured and gives the detailed history of the pictures captured before.
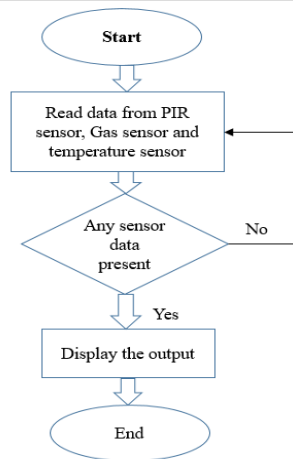
Fig 2: Flow chart for Gas and Temperature sensor

In Fig 3 Ultrasonic sensor and servo motor is used to build a radar, Ultrasonic sensor is placed on servo motor, Ultrasonic starts by sending the echo pulse and wait for echo back if echo is received back at receiver, then an object is detected then we will find the distance and speed of the object, if no object detected then servo motor start to rotate. After detecting object, the speed and distance is sent to cloud. Which can be accessed by the army base station.

Fig 3: Flow chart for Radar

IV. IMPLEMENTATION

Block diagram for system is given in below Fig 4.

Fig 4: Block diagram for the system

1. Raspberry Pi 3B+ (RPi): Raspberry pi is microprocessor which is used for processing the inputs. The Raspberry Pi is the cheapest board, it doesn't have a case, and is simply a credit-card sized electroni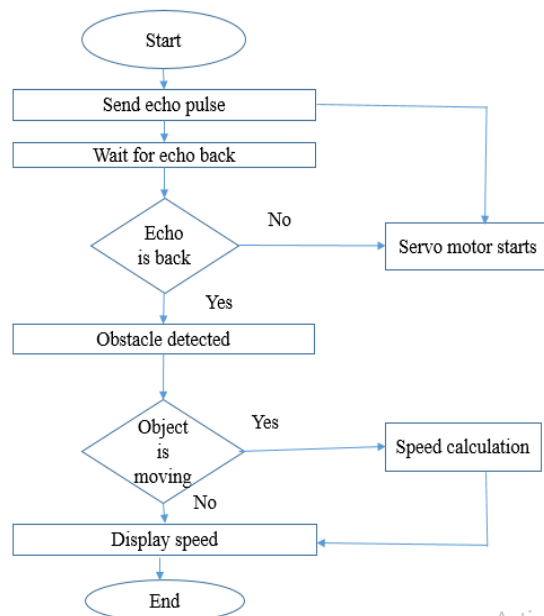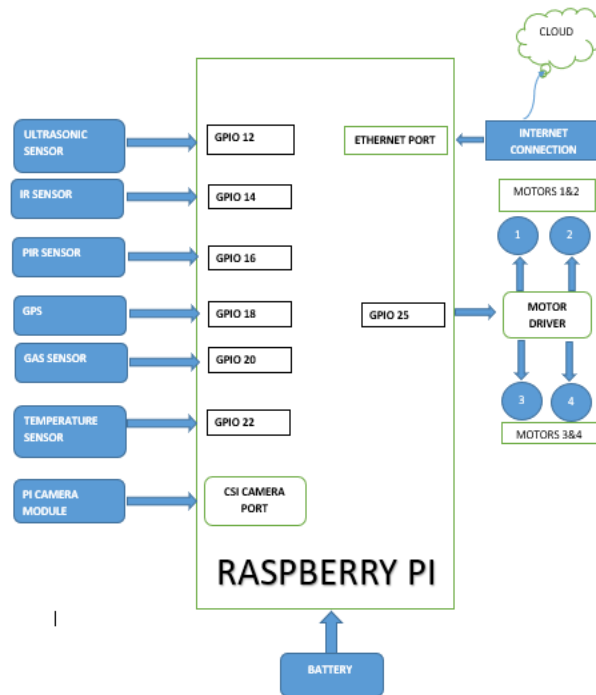c board of the type which might be inside a PC or laptop but much smaller. It acts as the controlling core of the system.

2. Pi Camera: The Pi camera module is a portable light weight camera this supports raspberry pi. It communicates with Pi using MIPI camera serial interface protocol. It is normally used in Image processing Machine learning or in Surveillance project.

3. Ultrasonic Sensor: Ultrasonic sensor use to transforms the electrical energy into acoustic waves or sound waves and conversely. An ultrasonic wave is also an acoustic wave signal which is travelling at a frequency more than 18kHz. The generation of ultrasonic waves at 40 kHz frequency is done by HC SR04 ultrasonic sensor.

4. IR sensor: An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment

5. PIR sensor: A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view.

6. Gas sensor: Gas sensors (also known as gas detectors) are electronic devices that detect and identify different types of gasses. They are commonly used to detect toxic or explosive gasses and measure gas concentration.

7. Temperature sensor: A temperature sensor is a device used to measure temperature. This can be air temperature, liquid temperature or the temperature of solid matter.

8. GPS: GPS sensors are receivers with antennas that use a satellite-based navigation system with a network of 24 satellites in orbit around the earth to provide position, velocity, and timing information.

9. Motors: An electric motor (or electrical motor) is an electric machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding. This interaction generates a force in the form of torque which is applied to the motor's shaft.

V. DETAILS OF THE PROPOSED SYSTEM MODULES

A. HARDWARE required

1. Raspberry Pi Model 3B+ Microprocessor

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64- bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT The dual band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market. The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.

2. PI Camera Module

Raspberry Pi Camera module is used to take pictures and high-definition video and the CSI (Camera Serial Interface) interface connects the Pi Camera module with the controller board directly. The Pi camera has a resolution – 5 MP with HD Video recording in 1080p @30fps, 720p @60fps, 960p @45fps and so on. It can also capture wide, still (motionless) images of resolution 2592x1944 pixels. The images are flipped horizontally or vertically and also a change in image quality parameters such as brightness, contrast, saturation and sharpness and access advanced camera features to improve image effects. These features of camera are used to capture the image of smugglers infiltration in dense forest.

3. Ultrasonic sensor

It detects the objects or any obstacles present while moving. It is also used to measure the distance between the object and the robot by sending ultrasonic waves. These waves have frequencies that are beyond the normal hearing frequencies. It consists of two transducers one is the transmitter and the other is the receiver.

4. IR sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. An IR sensor can measure the heat of an object as well as detects the motion. Usually in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect this radiation.

5. GPS Module

Global Positioning systems are capable of precisely locating objects by utilizing the RF signals from the satellites. GPS module is needed in the project to update the location to the Firebase platform whenever the

threshold temperature set is exceeded. U-blox NEO-6M GPS module is interfaced with the Raspberry Pi to achieve the desired operation.

6. Passive Infrared Sensor

Passive Infrared Sensor (PIR sensor), identifies the changes in the radiation which is generated by warm-blooded motion objects The PIR sensor made of two slots, which is sensitive to IR. When the sensor is idle, both slots identify the same amount of IR which is radiated from the room or walls or outdoors. The human or animal interference causes a positive differential change. When the interference has crossed the sensing area a negative differential change occurs.

7. LM73 Temperature sensor

Texas Instruments LM73/LM73-Q1 Temperature Sensors are integrated, digital-output temperature sensors featuring an incremental Delta-Sigma ADC with a two-wire interface that is compatible with the SMBus and I2C interfaces. The host can query the LM73/LM73- Q1 at any time to read the temperature. These devices occupy very little board area. The LM73 operates over a –40°C to 150°C temperature range and provides ±1°C accuracy from – 10°C to 80°C. While the LM73-Q1 operates over a –40°C to 125°C temperature range and provides ±1.45°C accuracy from –10°C to 80°C.

8. Gas Sensor

This is MQ-9 Carbon Monoxide, Methane, and LPG Gas Sensor Module can be used to sense Carbon Monoxide and Methane Gas. Sensitive material of the MQ9 gas sensor is SnO2, which with lower conductivity in clean air. It makes detection by the method of cycle high and low temperature, and detect CO when the low temperature (heated by 1.5V). The sensor's conductivity is higher along with the gas concentration rising. When a high temperature (heated by 5.0V), it detects Methane, Propane, etc. combustible gas and cleans the other gases adsorbed under low temperature.

9. DC Motor

Four DC motors are connected to the Raspberry Pi to convert the electrical energy into mechanical energy and rotate the wheels. The motors used in the system operate at a speed of 150 rpm.

10. Servo Motor

A servomotor (or servo motor) is a simple electric motor, controlled with the help of servomechanism. If the motor as a controlled device, associated with servomechanism is DC motor, then it is commonly known as a DC Servo Motor. If AC operates the controlled motor, it is known as an AC Servo Motor. A servomotor is a linear actuator or rotary actuator that allows for precise control of linear or angular position, acceleration, and velocity. It consists of a motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

11. Motor Driver

A motor driver IC based on the concept of H-Bridge is utilized. The DC motors of the robot are driven by a motor driver utilizing an external 9V supply. This driver receives the signal from the processor and controls the speed of the motors.

B. SOFTWARE REQUIRED

1. Raspberry Pi OS

Raspberry Pi OS (formerly Raspbian) is a Debian-based operating system for Raspberry Pi. Since 2015, it has been officially provided by the Raspberry Pi Foundation as the primary operating system for the Raspberry Pi family of compact single-board computers. The first version of Raspbian was created by Mike Thompson and Peter Green as an independent project. Raspberry Pi OS is highly optimized for the Raspberry Pi line of compact single-board computers with ARM CPUs. It runs on every Raspberry Pi except the Pico microcontroller. Raspberry Pi OS uses a modified LXDE as its desktop environment with the Open box stack window manager, along with a unique theme.

VI. RESULT

The essential point of the surveillance robot is that it has the various capabilities of detecting and sending the signals to the authorized user from different environments. This project is very beneficial and convenient for the places where human access is impossible and life threatening. This proposed design used for security purpose can operate effectively in order to collect various types of information that required by users
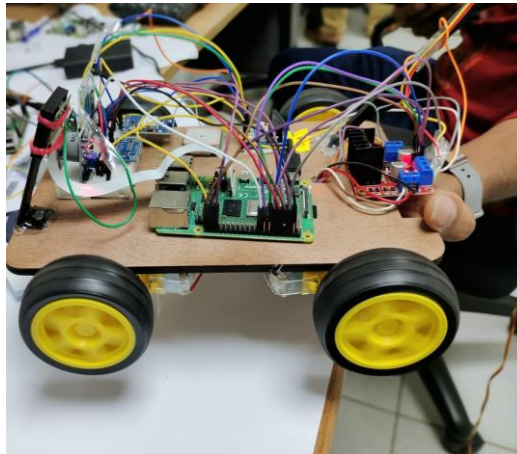
VII.   FUTURE SCOPE OF THE PROJECT

To fully exploit the potential of advanced technology, i.e., IoT in the coming years, more research would be done in both protocol development, energy efficiency, more sensors integration, and integration of long wireless communication modules. The present work can be extended by adding unusual event detection in order to recognize the activities of unknown or known person. As algorithms used in image processing are illumination affected, advanced algorithm can be deployed to insulate the robot from light effects.

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Receptionist Robot Using Raspberry Pi

Ms. Pavithra S G[1], Supreeth[2], Sumanth R Bhat[2], Sushmitha G Nayak[2], Shridevi Prabhu S[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Service robots are playing an increasingly relevant role in society. Humanoid robots especially, those equipped with social skills could be used to address a number of peoples' daily needs This project is based on the development of a receptionist Robot, which is placed in a company reception as replacement for human receptionist and interacts with the clients. The robot can communicate with the visitors orally using speech recognition and corresponding speech output. It is used to communicate with people according to the person's command, trying to make the user think he is chatting with another human being. The chatbot application helps the visitors/customers to access the company related information. Visitors will just have to ask the questions to the bot that will be used for chatting. This system reduces work of company administration providing information to visitors and also reduces the workload on the staff to answer all the queries of the visitors.

I. INTRODUCTION

The duty of a receptionist is to assist people in a friendly and pleasing manner. Nevertheless, human receptionists are unable to maintain their composure, focus and efficiency at a consistent level at all times. As a result, the quality of service provided by human receptionists can deteriorate due to many factors including service time and the number of service requests. The proposed idea is to develop a voicebot which acts as a receptionist. Voicebots are programs that mimic human conversation using artificial intelligence (AI). It is designed to be the ultimate virtual assistant, entertainment purpose, helping one to complete tasks. Voicebot is a conventional agent which is capable to communicate with operators by using natural languages. The underlying principle of every voicebot is to interact with a human user (in most cases) via speech and behave as though it were capable of understanding the conversation and reply to the user appropriately. A Voicebot is a software tool that utilises natural language processing (NLP) for human machine interaction (HMI) and Machine Learning (ML). "The complexity of a chatbot is directionally proportional to the scope of the domain". An open domain requires a larger knowledge base, whereas, a closed domain has a more specific knowledge base that was developed to achieve a specific goal. The robot is placed behind a receptionist desk with a

information of the company. Visitors can approach the robot and ask about the products in the company, so it will explain it to the visitors. This project is an example on how to successfully develop a robot with social interaction. Robots are used for performing tasks as helpers in activities of daily needs. working as a receptionist is one way of employment. The way receptionist robot should appear and behave should be done carefully, in order to receive people in a positive manner. The motivation for this project is to show how a receptionist robot should be designed to be employed according to the visitor needs. Receptionists do works that is useful as support for common people, therefore these works can also be performed by the humanoid robots.

II.   LITERATURE SURVEY

M. Dahiya [1] A Tool of Conversation: Chatbot. This project addresses the design and implementation of a Chatbot system. It also studies another application where Chatbots could be useful and techniques used while designing a Chatbot. The application of a Chatbot can be seen in various fields in the future. This paper covers the techniques used to design and implement a Chatbot. Comparisons are made, findings are discussed. In addition comparison has been made with other Chatbots.

Harsh Pawar [2] College Enquiry Chat Bot using Knowledge in Database. This project is build using Microsoft Bot Builder, which is using Microsoft cognitive service. This system is web application which provides answer to the query of the student. Students just have to query to the bot and bot will answer to student question. User can ask the query in any format and get appropriate response on the basis of patter matching algorithm.

Kumar Shivam, Khan Saud [3] Chat bot for college website. The goal of this project was to resemble a human being in the way they interact, trying to make the user think he is chatting with another human being the chat bot application helps the student to access the university related information from anywhere with the internet connection. The main objective was to develop an algorithm that will be used to identity answers related to user submitted questions.

Peters, Florian [4] Master thesis: Design and Implementation of a chatbot in the context of customer support. The objective was to design a scalable and easily maintainable multilingual chatbot solution that can interface with the company's existing customer support software. It serve as the first communication layer in the company's customer service and provides a way for users to send free-form text messages to help them with the most common issues they encounter regarding the company's products. In short, it replicates the menial tasks performed by customer service agents on a daily basis.

III. METHODOLOGY

A Voicebot is a communication simulating computer program. Previously Voicebots solely supported a single adjacency pair, also known as a one-shot conversation. However, modern Voicebots can sustain multiple adjacency pairs, remembering states and contexts between conversations and have the capability to associate data in different adjacency pairs which is related. This is the bot's ability to preserve the conversation.
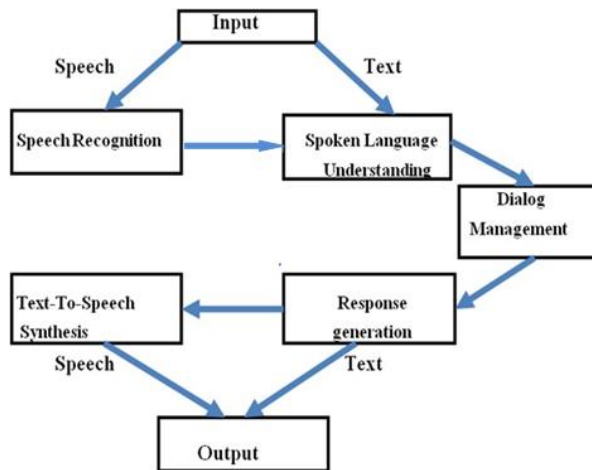
Fig: Standard architecture of Chatbot

Input can be supplied to the Voicebot in the form of speech. The Input is sent to the dialog management system which is the NLU in this case, which determines an appropriate response and amends the voicetbot's state accordingly to carry out the required action. The voicebot will produce text and speech responses in the form of both text and speech.
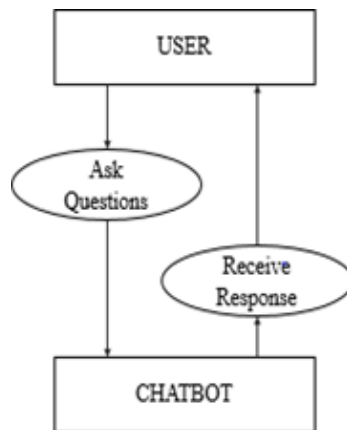
Fig: Use case diagram of voicebot

The aim of our Proposed System is to develop a web based bot Application, which provides answer to the query of the student very effectively. Students just have to put their query to the bot which is used for chatting.
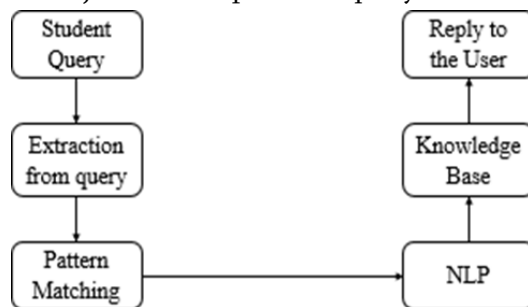
Fig: Data flow diagram of chatbot

The system will use the artificial intelligent algorithms to give appropriate answers to the user. If the answer is found invalid, then some system to declare the answer as invalid can be incorporated. These invalid answers

can be deleted or modified by the admin of the system. The student will not have to go to the college for enquiring something. Student can use the chat bot to get the answers to their queries. This system may help students to stay updated with the college activities.

The incremental build model is a method of software development where the product is designed, implemented and tested incrementally (a little more is added each time) until the product is finished. This model combines the elements of the waterfall model with the iterative philosophy of prototyping.

IV. FUTURE SCOPE

To improve the current functionalities of "Receptionist Robot" in the future, the scope of the voicebot can be increased by inserting data for all the departments, training the bot with varied data, testing it on live website and based on that feedback inserting or training data to the bot. The database can be created containing all the information and data for voicebot can be extracted from the database. The additional privileged of adding videos related to the college, converting it into the android app, using voicebot as a remainder app.

Some of the new features which can be added to the bot are:

1. Integration with multiple channels such as phone call, SMS, and various social media platforms like Skype, Facebook and Twitter.
2. Handling context aware and interactive queries in which bot will be aware of the context of an ongoing conversation.
3. Integration with services such as password reset and course.
4. The project can be further extended to be able to recognize and detect human with 100% accuracy

V. CONCLUSION

The present context of work has brought out an application of robotic receptionist. This project addresses the issues, disadvantages of the primitive systems for receptionist and application-oriented management system. This project is simulated in the first phase. With this project implemented, there will be change in the outset of applying any technology according to its efficiency and reliability. This project proves to be working efficiently, cost effective and with low power features. This model is scalable infinitely and can prove the extensibility of the application

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Gesture Controlled Advanced Wheelchair for Physically Challenged

Mr. Gangadhara[1], Karthik B K[2], Abhishek[2], Abhijna[2], Anlish Feudal Soans[2]

[1]Assistant Professor and Head of the Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Wheelchairs are a way of reincarnating the purpose of life in the lives of disabled people. A smart hand-glove controlled wheelchair is very important for the physically challenged people. They cannot move anywhere like a normal person. For this reason, they always depend on the other people. But the smart glove-controlled wheelchair can remove this problem and help them to move anywhere. Effective and efficient ways of delivering a cost-effective and affordable wheelchair to the common masses. Replacement of the popular joystick stick controlled wheel chair with a hand-glove control system for easier manoeuvring by bending the fingers. Intended users control the system by wearing an instrumented glove fitted with accelerometer sensors for controlling the movement and direction of the wheelchair. Uni-directional wireless communication exists between the instrumented gloves and the controller which is sandwiched between the user's seat and the wheels. After processing the controller send the command in the form of digital signal to the motor driving IC and the motor driving IC control the movement of wheelchair. It also aims at making a cost-effective chair so that more hi-tech wheelchairs are made use of, widely, by people with disabilities.

I. INTRODUCTION

This project is an advance approach of changing the physical gesture of hand into the electrical signal and then to process that signal into digital signal of appropriate magnitude and to be transmitted through the transmitter. This project provides an instrumental solution to the people who have difficulty in moving or their body part has paralyzed, or they have lost their limb in an accident. This wheelchair is going to bring a paradigm shift between man and machine. Where this machine will be working on the user commands, we can also say its human machine interface. With the growth of technology there has always been an effort to use the technology for the betterment of mankind. Time and again the technocrats of the world had proved their metal in bringing the comfort to the people who are in need with the help of technology. Also, to build a Hand Gesture Wheelchair which has sound technology but low in cost is the primary concern. Today in this modern era around world's 10 percent, around 650 million people are suffering from physical disability. In order to

make their life bit easier we decided to make a hand gesture-controlled wheel chair which will be working on the gesture of their hand. The wheel chair is wireless. It means a person can control his wheelchair from a wireless gloves. The disabled people always find difficulties in moving from one room to another and even to do that the handicapped person was dependent on someone else who will push the wheelchair manually and take the handicapped person from one place to another. Now with the Hand Gesture Controlled Wheelchair the handicapped person is independent and he need not to ask for help from any other person to move his wheelchair. Just with the movement of his hand the handicapped person is able to move from one place to another without needing anyone's assistance which also makes him self-dependent.

II. LITERATURE SURVEY

[1] Smart wheelchair based on eye tracking: Nutthanan Wanluk, Sarinporm Visitsattapongse, Aniwat Juhong, Chuchart Pintavirooj.

This project is a smart wheelchair based on eye tracking which is designed for people with loco motor disabilities. The add-on-controlled module can be used with any electrical wheelchair. The smart wheel chair consists of four modules including imaging processing module, wheelchair-controlled module, SMS manager module and appliance-controlled module. The image processing module comprises of a webcam installed on the eyeglass and C++ customized image processing software. The captured image which is transmitted to raspberry Pi microcontroller will be processed using Open CV to derive the 2D direction of eye ball. The coordinate of eyeball movement is then wirelessly transmitted to wheelchair-controlled module to control the movement of wheel chair. The wheelchair-controlled module is two dimensional rotating stages that installed to the joystick of the electrical wheelchair to replace the manual control of the wheelchair. The motion of eyeball is also used as the cursor control on the raspberry Pi screen to control the operation of some equipped appliance and send message to smart phone.

[2] Android Phone controlled voice gesture and touch screen operated smart wheelchair: Shraddha Uddhav Khadilkar, N. M. Wagdarikar

 Wheelchairs are used by the people who cannot walk due to physical illness, injury or other disability. Now a days development promises a wide scope in developing smart wheelchair. This paper is to describe an intelligent wheelchair using smart phone is develop to control the rotation of wheel chair based upon voice and gesture movement for the physically challenged persons. In build voice and gesture function are used to control the wheelchair as well as by using smart phone reading SMS, E-mail, News. The sensor used are 8 in which 2 of them are IR sensors the remaining are for temperature, smoke detection, light detection sensors. This system that allows the user to robustly interact with the wheelchair at different levels of the control and sensing. The system is divided into 3 main units Voice recognition through Android, Gesture recognition through Android, Motor control through signal conditioning. The system is based on grouping an android phone with a AVR micro-controller and sensors.

[3] A Smart Wheelchair System with Social Media update: K. Bhanu Prakash Reddy and K. Kiran Kumar

To develop a smart wheelchair for blind and disabled persons. Methods and Analysis: The wheelchairs being used patients are not user friendly. In modern days, it is difficult for a person to attend a patient throughout the

day. The proposed wheelchair can be self-manoeuvred easily by the patient using hand or head gestures. Apart from it, the wheelchair is aided by a voice guided indoor positioning system. Findings: We incorporated an IOT service device so that the status of the patient is regularly updated on a web server. This smart wheelchair is connected to the cell-phone of the guardian as well as the social media profile of the patient so that the patient can get help as soon as there's a mishap. Improvement: The wheelchair has ability to detect obstacles across the path of the patient and it can divert its path from the obstacle so as to avoid collision.

[4] Smart wheelchair: Hameed Sarmad, Shoukat Muhammad Hamza, Khan Abdur Rafay, Haroon Khwaja Mobeen.

The main objective of this paper is to control a wheel using hand gesture by the means of smart phones, for this purpose android application is created. An efficient system will provide a user with good outcome so for that android platform is chosen because it provides open tools for this operation. Motor drivers are controlled via Arduino controller. In this configuration Arduino app is connected via android application using master-slave. HC-005 Bluetooth module is used which is slave and smart phone which is master. In this paper the testing is done for the wheel chair movement using built in voice, for this a user voice is recorded for the movements forward, backward, left, right and stop. There are two main aspects which include voice system accuracy and other is wheel chair velocity. The voice is recorded in a quite environment so that noise can be reduced and then user voice is recorded. If the user words are match with the frequency of the words which are stored in the system, then it will according to it. Automated Smart Wheelchair is designed and fabricated for disabled persons which is operated with android application. This app can be download and can be used as a controller for the wheelchair. Smartphone built gyroscope feature will help the user to tilt the phone and according to this the wheelchair will operate for example if user tilt 30 degree to the right, then wheelchair will turn right and for the forward motion the phone will be tilt from the front side. For obstacle avoidance IR sensor is used if an emergency occurs the Wheelchair will stop.

III. METHODOLOGY

ADXL-345 is a MEMS device which converts the gesture motions made by the user into electrical data which is sent to Atmega328p based Arduino board. The microcontroller then processes the input received and drives the motors in corresponding direction, to move forward both motor rotate in forward direction and vice-versa for reverse direction, to rotate right, the right motor stops and left motor moves in forward direction and vice-versa for left rotation. In case of any presence of objects in the path movement path of wheelchair the ultrasonic sensor senses it and sends the input the microcontroller which in turn stops the movement of wheelchair thereby avoiding collision with the object. Fig1 shows the flow chart of the gesture-controlled wheelchair.
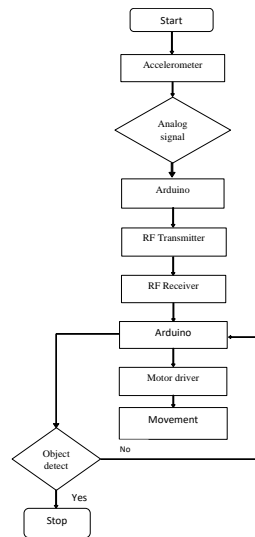
Fig1 flow chart of the gesture-controlled wheelchair

IV. BLOCK DIAGRAM

Transmitter:
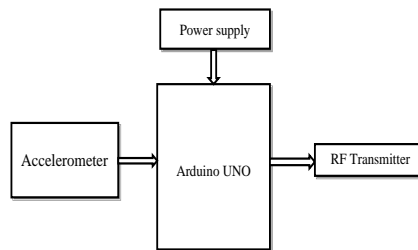
Receiver:
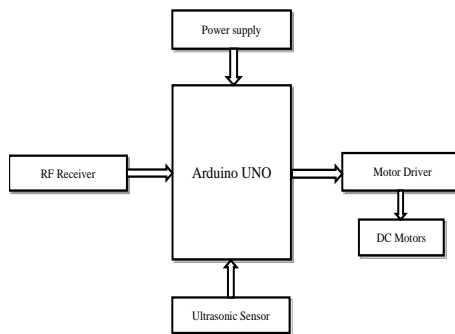
Fig2. Block diagram

In this Hand Gesture Controlled Wheelchair an ADXL345 accelerometer is used as a sensor which will be giving analog signal on moving it in X, Y, Z axis respectively. A Radio Frequency transmitter of 434MHz frequency is used to transmit the signal wirelessly. After the signal is sent wirelessly the receiver receives the signal and the data received through receiver is sent to microcontroller as an input. On receiving the input

signal, the microcontroller compares the data which is pre-installed in the controller. If the input data matches the preinstalled data, then the signal is given to relays and then the wheelchair starts moving. We chose ADXL345 accelerometer as the sensing device because it records even the minute changes.

V.   DETAILS OF THE PROPOSED SYSTEM MODULES

a.   Arduino uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and Analog input/output (I/O) pins that may be interfaced to various development boards and other circuits. The board has 14 digital I/0 pins, 6 Analog I/0 pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external battery. It also has 16 MHz ceramic resonators, a USB connection jack, an external power supply jack, an ICSP (in circuit serial programmer) header and a reset button. Its operating voltage is 5v, input voltage 7 to 12v (limit up to 20v).

b.   Accelerometer Sensor

An accelerometer sensor is a device that senses the different types of accelerations or vibrations. The accelerometer works on the movement or the vibration of the body. It can sense even the vibration on a micro-scale. It senses the vibration and converts that vibration into the piezoelectric effect. A piezoelectric effect occurs when energy is generated due to pressure and stress. That energy then gets converted into the electric voltage. That voltage is used to get velocity and orientation. It can also measure static forces like gravity or dynamic forces which are in phones and laptop devices. The XYZ type accelerometer uses the gravitational force to compare the position of the Devices.

c.   RF Transmitter and Receiver

The RF transmitter receives serial data and transmits it wirelessly through its RF antenna. The transmission occurs at the rate of 1 Kbps – 10 Kbps. RF receiver receives the transmitted data and it is operated at the same frequency as that of the transmitter. The Transmitter module consists of three pins namely Vcc, Din and ground RF receiver module has four pins namely Vcc, Dout, Linear out and Ground.

d.   DC Motor

A DC motor is an electrical machine that converts electrical energy into mechanical energy. In a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation.

VI. WORKING DIRECTION OF WHEELCHAIR

Direction of hand gesture	Movement of left Motor	Movement of right Motor
Forward	Forward	Forward
Backward	Backward	Backward
Right	Forward	Stop
Left	Stop	Forward

Fig 3: Direction motor with respect to direction of hand gesture

VII.   FUTURE SCOPE

- Automated wheel chair can be operated by a wireless remote which can reduce the wiring arrangements.
- Instead of using acceleration motion we can use eye retina using optical sensor to move wheel chair accordingly.
- We can use voice command IC's to interface our voice signal with micro-controller.
- This system can be extended by including GSM which sends an SMS during emergency.
- Research are going on development of handicap wheel chair using nervous system of human.

VIII.   CONCLUSION

The gesture detection wheel chair is designed with two Arduino processor and controlled left, right, forward, and backward movement. Unlike traditional design the present method is successful in carrying paralysed people without meeting any error. Automated wheel chair can be used to help handicap people and the present work is aimed to help the paralysed people who can only move one side of their body or partially paralysed and help them to be able to move. In the present work the wireless system is successfully developed to move the wheel chair in various direction i.e., Forward, Backward, Left, and Right, or Stay in Same Position and also stop automatically when any obstacle is detected.

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Home Automation Using Telegram App

Mr Kiran A R[1], Mr Sheikh Rehbar[2], Mr Muhammed Fahid[2], Mr Tejus P P[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Student 8th Semester, Department of Electronics and Communication Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

This paper presents a low cost and flexible home control and environmental monitoring system. It employs an embedded micro – web server in esp32 microcontroller, with IP connectivity for accessing and controlling devices and appliances remotely. These devices can be controlled through a web application or via Bluetooth Android based Smart phone app. The proposed system does not require a dedicated server PC with respect to similar systems and offers a novel communication protocol to monitor and control the home environment with more than just the switching functionality. To demonstrate the feasibility and effectiveness of this system, devices such as light switches, power plug, temperature sensor, gas sensor and motion sensors have been integrated with the proposed home control system. Therefore this system has been successfully designed and implemented in real time

Index Terms—Telegram Application, 2 Channel Relay, Bulb Holder, Bulb,Esp32es

I. INTRODUCTION

The home is often referred to as smart when it comes to a variety of smart devices that you can simply control remotely by setting yourself the way you want to make housekeeping mechanical. It can also be integrated into a single network. It provides all devices with internet access which increases the chances of such a home network. For example, you can now see what's going on in your house and watch security cameras on your smartphone or computer. IoT applications allow you to connect devices to each other and allow them to communicate without your participation. Think of it this way: as soon as your car leaves the parking lot near the office, the conditioner starts to cool down your house so that after a hot day you can get into a cool house. provide energy saving and safety. Home automation also helps the elderly and disabled people as they do not have to move from one place to another to turn on or off electrical appliances.

This paper explains how household items can be controlled via a smart phone remotely from anywhere and also prevents unauthorized users from controlling household items. Social media controlling home automation using nodemcu ESP 8266 is a project where a person can control his home appliances using his telegram chatbot..Nowadays the internet of things (IOT) becomes the most important topic in the engineering and

technology. It gives the ability to control the physical devices with the internet. It can control the devices with the secure security and high efficiency

II. LITERATURE SURVEY

[1] Increasing productivity of rice plants based on IoT (Internet of Things) to realize Smart Agriculture using System Thinking approach,Muhammad Galang Satrio Wicaksono, Erma Suryani, Rully Agus Hendrawan,,The Internet of Things refers to the application of modern technologies to boost land productivity. Temperature, soil quality(pH),rainfall,pests, and humidity are all characteristics of the internet of things. The present issue is farmers' inability to determine planting and pest management.An IoT will be developed to build smart agriculture by employing system thinking to boost agricultural land production

[2] Understanding the role and capabilities of Internet of Things-enabled Additive Manufacturing through its applications Reem Ashima, Abid Haleem, Mohd Javaid, Shanay Rab
The author of this study emphasised the significance of effectively utilising internet-based innovations in additive manufacturing (AM) into its practical consequences in a variety of application domains. Manufacturing industries must incorporate the most recent internet-based technologies into additive manufacturing, particularly for lean and optimised manufacturing and acknowledged competency with sophisticated printing technology

[3] Designing of internet of things for real time system Majd S.Ahmed .The internet of things is essential for transforming any system into an intelligent one. There are several platforms for the Internet of Things that have been created. In this study, the author presented a broad overview of the Internet of Things, its operating mechanism, resource limitations, attributes of Internet of Things nodes, and mixed traffic communications. Current advancements need the connecting of recent time gadgets to the internet, which develops the recent time Internet of things and provides a better user experience through strong connection and effective use of the devices of the next   generation [3]

[4]. Smart home and internet of things: A bibliometric study, Smart governance of home through IoT. Wonyoung Choi, Jisu Kim, Sang Eun Lee, Eunil Park, J. Rajasekhar, M. Trinath Basu, N. S. S. Sowjanya.The Internet of Things allows access to information worldwide, at any time, on any device, and has transformed all areas by solving a wide range of societal problems using real-time data from networked devices. Among these sectors, smart homes are one of the most prominent areas where the Internet of Things has had a big impact [4]

[5] Smart home automation using IFTTT and google assistant S.V. Aswin Kumer, P. Kanakaraja, A. Punya Teja, T. HariniSree, T. Tejaswni,.The project as a whole focus and relies on voice-based device control based on Google Assistant. The primary goal of this voice automation is to minimise power consumption and increase productive use of electricity. This application allows us to control or operate devices from anywhere in our internet range, creating an interface between application devices and Google Assistant
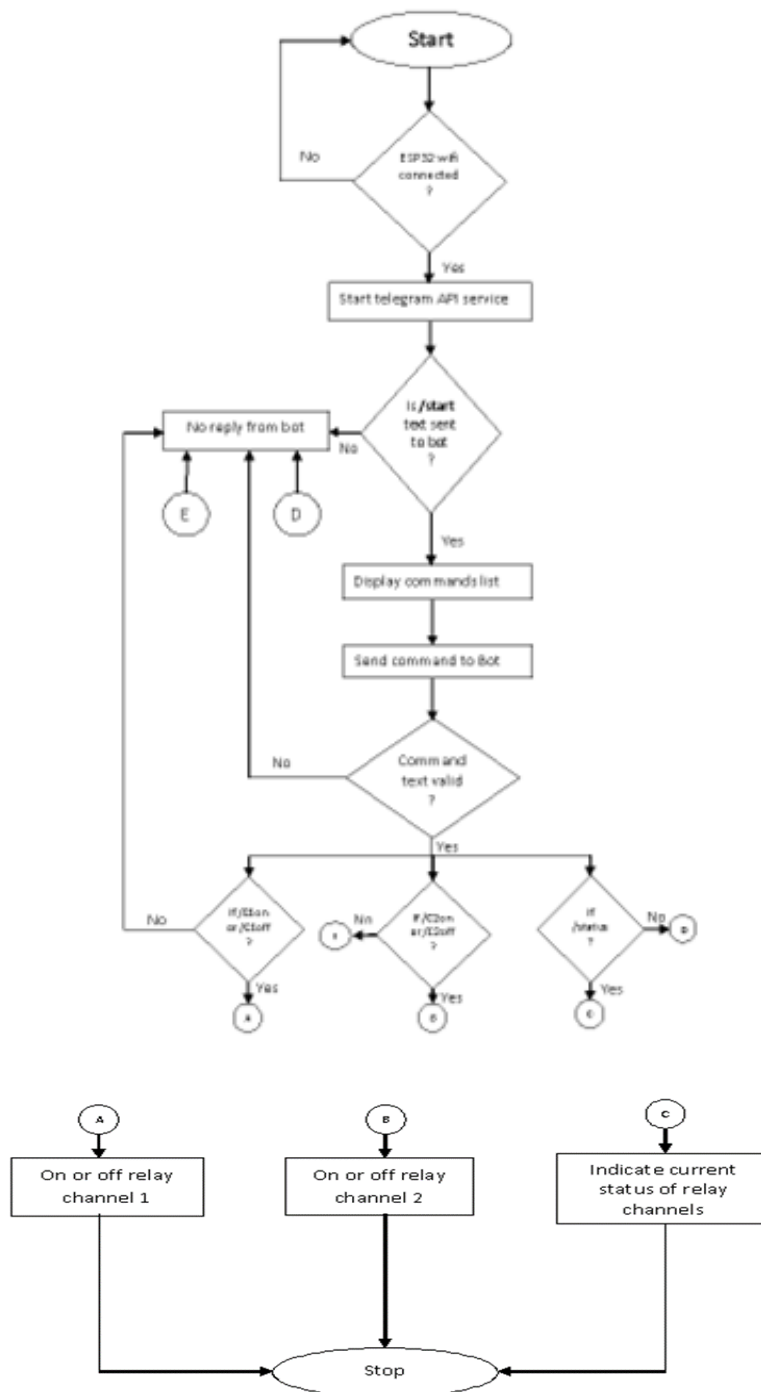
III. METHODOLOGY

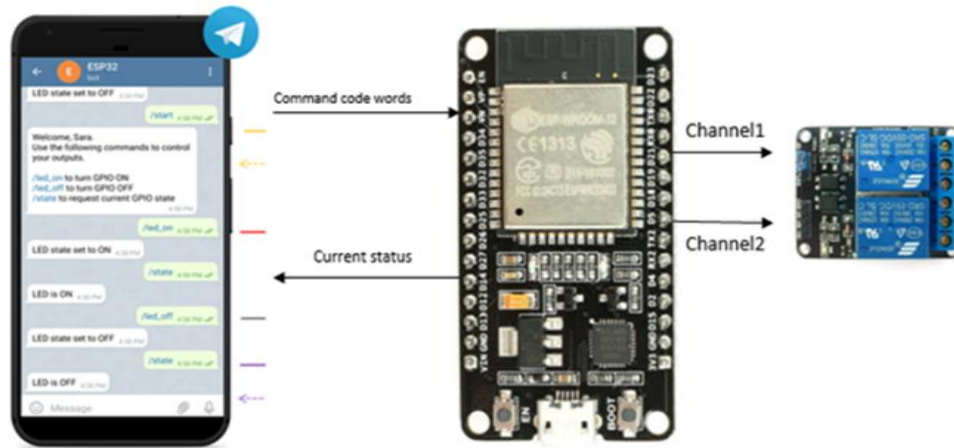Fig.1.1: System flow of telegram home automation

Fig.1.2:Functional Interfacing Diagram

Telegram Messenger is a cloud-based instant messaging and voice over IP service. Telegram allows you to create bots that you can interact with. Bots are third-party applications that run inside Telegram. Users can interact with bots by sending them messages, commands and inline requests. We can control the bots using HTTPS requests to Telegram Bot API. The ESP32/ESP8266 will interact with the Telegram bot to receive and handle the messages, and send responses. We can start a conversation with the bot by sending /start command which sends a welcome message to the user with built-in user defined commands. When we send the message /C1on to the bot, the ESP board receives the message and turns respective GPIO on which in turn turns on the channel 1 of the relay. Similarly, when we send the message /C1off, it turns GPIO off deactivating channel1. We can send the /status message to receive the current status message indicating channel on/off status

- Telegram app is used to send commands to the node MCU to perform various task here to turn on and off the ac mains operated bulb. Also a back response is received in the telegram app.
- Esp8266 node MCU is used to control various appliances here a bulb and is also the heart of the system. It accomplishes connection to internet in order to route commands through telegram app.
- Relay module is the must for isolation since we are dealing with two different voltage levels i.e.5V dc and 240V ac. Since a very low dc voltage is applied to ESP node MCU which if comes in contact with high voltage ac voltage may permanently damage it and also cause electric hazard to the user relay module has a property of isolation by means of electromagnetic induction thus allowing switching of higher voltage appliances using a low
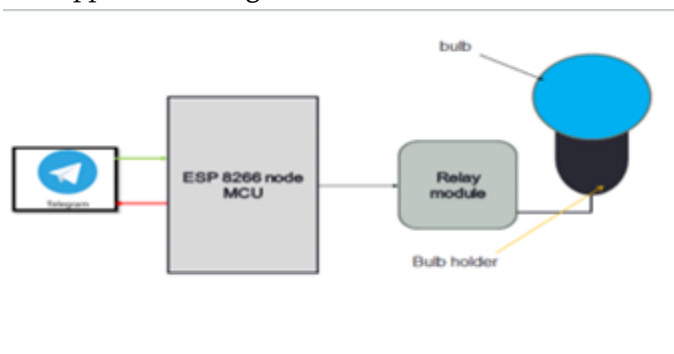
Working: Upon turning on the system the ESP 8266 node MCU gets connected to the specified network using its inbuilt WI-FI antenna. After establishing connection to the internet the ESP8266 will go into hibernation mode and waits to receive any commands from the user through telegram application. Upon receiving a specific command here "lights ON" and "lights OFF" from the telegram application ESP 8266 node MCU will perform certain task as defined by user, here upon receiving the command "lights ON" the node MCU will turn on a zero watt ac mains operated bulb through a relay module. Similarly upon receiving the command "lights OFF" the node MCU will turn off the bulb. Similarly upon sending each commands a back command will be received to the user in the telegram application regarding state of the end operated devices.

IV. CONCLUSION

In a intense study of Internet of Things, I found it to be hypothetical based on its purpose of application. It means IoT provides a lot of automation by connecting things. Connecting things has been made easy by the various sensors and embedding them them to the devices. In my instance of application with telegram messenger, I have used bots to communicate with the connected things in a house. Later by the statistical report given by the bot any user can take the decision on automation of house. With the emerging technologies, I have been successful in exploring the connectivity of various things in a house and also as a network specialist I also reported the pros and cons of connecting things. In future I would see the connected things at a different applicative arena, where it could be used in all contingency situations. It is found that IoT can be implemented and integrated with any software application. So this thesis is just an instance of IoT's implementation using a messenger application.

V. FUTURE SCOPE

Western countries widely accepted Smart home systems, India also becoming modernisation in adapting technological innovations. Hence, this proposed system has vital role in upcoming days.
Provides more convenient to use, no need to install any additional application on mobile phone and it also serves in saving energy consumption or energy wastage

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Generation of Electricity Using Solar and Waste Materials to Power Smart Streetlight System

Mrs. Jayashri P[1], Purushotham[2], Maneeth[3], Vikshith[4], Akshay kharvi[5]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, Yenepoya Institute of Technology
NH-13, Thodar, Moodbidri Taluk- 574225, Karnataka, India

[2]Final Year Students, Department of Electrical and Electronics Engineering, Yenepoya Institute of Technology
NH-13, Thodar, Moodbidri Taluk- 574225, Karnataka, India

ABSTRACT

The economic growth of the country depends on a great deal of electrical energy. The increase in energy production by renewable resources and conserving the electric power plays the vital role in sustainability of the energy. In order to maintain continuous and pollution free electric power we have to rely on the renewable energy resources. In this project the working of automated solar tracking panels along with it generation of electricity by burning the waste materials to power the smart streetlight system is demonstrated. The solar tracker helps to harness more energy from the radiation, the electricity generated from the waste materials helps to increase the power production and reduces the waste materials. The smart streetlight system utilizes the produced energy and conserves it by automatically switching off the LED lights at daylight and it will glows with full brightness if there is vehicle or human movement on road else the brightness of the light will be lower. This system will reduces the power consumption and proves the sustainability. The key features of the system are easy to maintain, reliable and durable.

Keywords: Automated solar tracker, Waste material power generation, Smart streetlight system

I. INTRODUCTION

The supply of environment friendly electricity is major concern of the society. The conventional are the main sources for energy production to the world. These are harmful for the environment due to their high pollutant nature during refining and also during application. The production and utilization of nonconventional fuels is not harmful for the environment. Producing electric energy using waste materials helps to reduce waste disposing on the ground and increases contributes to the electric generation. This project will demonstrate the working of automated solar tracking panels. Large quantity of energy is transmitted from the sun each day and fixed solar panels has the tendency to get little magnitude of it. So employing the solar trackers will solve this problem by harnessing more energy. The project also demonstrates smart street lighting system which will automatically illuminate the lamp at darkness and also increases the brightness if any object approaches the streetlight. This streetlight uses the power generated from the solar panels and waste materials.

II. METHODOLOGY

Automatic solar tracker

This system LDR sensor which is used to feedback from solar panel .When sunlight falls on LDR sensor it sends voltage signal to the controller .The arduino recognizes the feedback voltage .Then it sends the control signal to actuate the dc servo motor .So that the incident sunlight is always perpendicular to the solar panel to increase the energy absorption.

Heat generation from waste materials

The waste materials are subjected to burn in the fire box and the radiation produced is utilized to convert into electricity using the solar panels. The waste materials are subjected to burn in the fire box. The solar panels are glass coated to prevent damage to the panel due to excess heat.

Smart streetlight system

LDR sensor is implemented to sense the light. At the darkness LDR won't get enough light and helps to turn ON the LED lamps. Motion sensor is used to detect any movement of objects within its coverage area, if it senses any movement it sends the signal to the control circuit to increase the brightness of the lamp. Step down converter is used to convert the battery voltage into rated voltage of the lamps. Smart street light system has LDR sensors
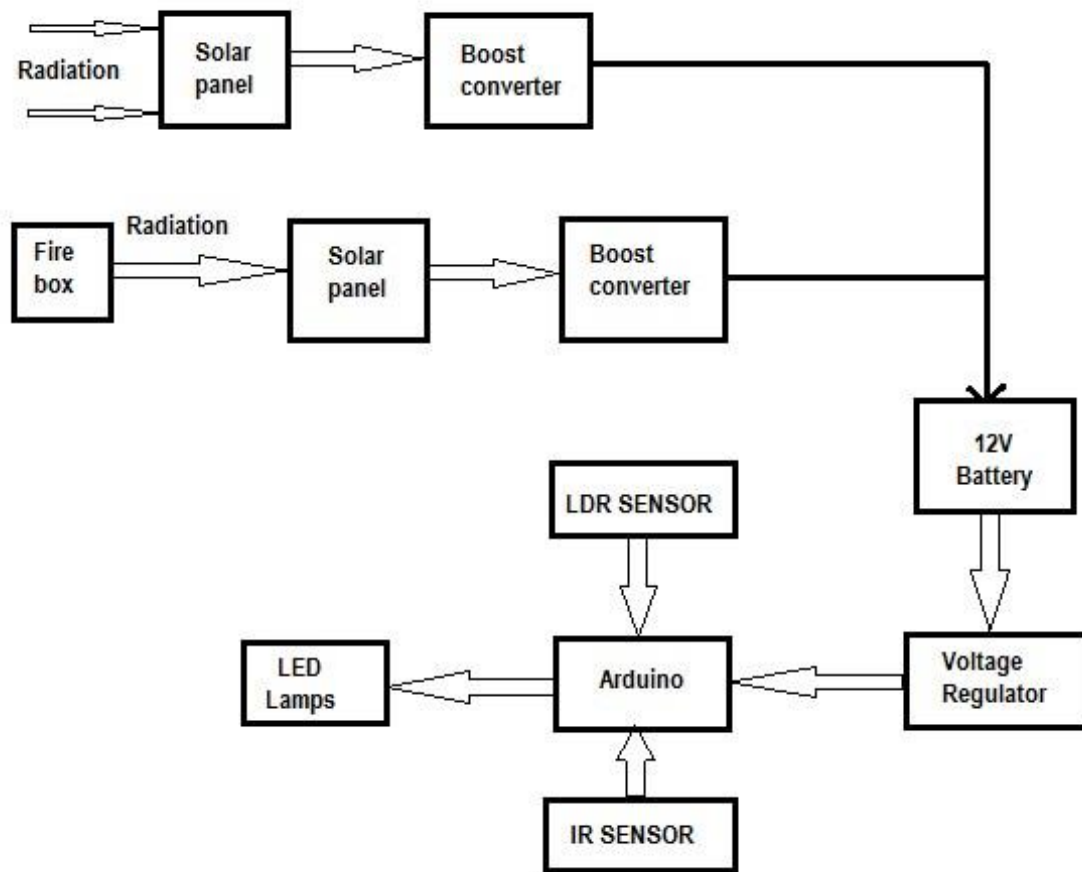
BLOCK DIAGRAM

III. CONCLUSION

Generating waste materials from waste materials helps to reduce the waste materials in the environment. The solar tracking panels are slightly expensive compared to the mounted solar panels but it will pay back at less time. The smart street light system helps to reduce energy consumption.

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Demonstration of Advanced Detection of Drowsiness

G.B. Praveen[1], Nagaraj[2], Swapna[2], Nisha[2], Rashid[2]

[1]Assistant Professor, Department of E & E, YIT, Moodbidri, Karnataka, India

[2]Student, Department of E & E, YIT, Moodbidri, Karnataka, India

ABSTRACT

In recent years, driving has become an important part of our day-to-day life, especially in urban areas sleepiness-related accidents are occurring infrequent. Road accidents are apparently a global hazard in our country. Drowsiness and Fatigue of drivers are amongst the significant causes of road accidents. Every year, they increase the amounts of deaths and fatalities injuries globally. This project is designed for driver drowsiness detection to prevent accidents from happening because of driver fatigue and sleepiness in updated version. These factors lead to the development of Intelligent Transportation System (ITS). If the accident caused by abnormalities of the driver, it can be prevented by placing abnormality detecting system within the vehicle.

I. INTRODUCTION

Driver fatigue is one of the three commonest causes of motor vehicle accidents and the effect of driver fatigue has been underestimated in the past due to difficulties in identifying fatigue as the cause of a crash. The problem of driver fatigue of course moves far beyond just road vehicles to all modes of transportation, being an important factor in rail, sea and air accidents as well.

Driver fatigue commonly causes "fall asleep" motor vehicle accidents. These tend to be more severe or fatal compared with other road accidents. This is because they often involve a single vehicle running off the road at high speed, they tend to occur on higher speed roadways, and braking or other preventative measures may be absent. If truck drivers are involved, the potential to cause death or serious injury to other road users is greatly increased.
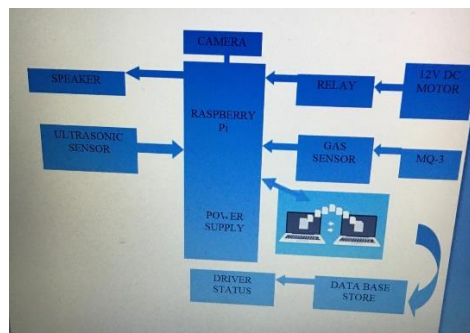
It is commonly known that drowsiness and driving is not a good combination. To be a good driver it is necessary to be perceptive, alert and focused on the task and it is difficult to combine these qualities with drowsiness. Another characteristic that is a bad combination with driving is distraction. Both these disturbances have the same effect on the driver in the sense that they have a negative effect on the perception, reaction time and focus, to name a few things. Drowsiness and distraction are parts of the human behavior, which makes the problem with drowsiness and inattentive driving difficult to completely eliminate. A similar case is alcohol which also has a negative effect on the driving abilities, but can (theoretically) be removed from the roads.

Sleepiness and Drowsiness: Sleepiness, also referred to as drowsiness, is a basic physiological state that affects humans among others and it originates from changes of the alertness during each 24-hour sleep-wake cycle. This is caused by the internal body clocks, which programs us to be asleep twice a day in the middle of the night and between 14:00-16:00 in the afternoon. Sleepiness is a stage when the body needs to sleep and is defined as "the inclination to sleep". Sleepiness should not be confused with fatigue, which is the consequence of physical Laboure or a long experience, and is defined as "disinclination to continue the task at hand".

Distraction: Distraction is a shift in attention from the primary task to another task (secondary task). In behavioral models, human is modelled as information processing resource who has a maximal limit of information that can be processed. In these models' distraction is modelled as surrounding disturbances taking processing resources from the main task. Distraction can result in reduced performance of the primary task. There are several degrees of distraction, but no fixed scale. This is a problem when detecting a degree of distraction, because it is difficult to say that one thing "steals" more attention than another. Usually, distraction is measured as the reduction of performance of the primary task. Another important part in the distraction is the drivers "willingness to engage" in the secondary task. How much the person engages in the task affects how distracted the person is. Distraction happens all the time in the daily life but the usual effect of the everyday distraction is very harmless. It results in a shift in attention from one thing to another for a brief or longer moment. This usually has little effect on the primary task other than a delay. An example of this is a person reading the newspaper when he hears a car alarm go off. The result of this is that he stops reading for a while, but soon he continues reading with only a slight delay. Sometimes this delay in the primary task may have a serious impact on a person, when he is driving for example.

Physiological signal detection techniques: This approach is to measure the physiological changes of drivers from bio signals, such as the EEG, EOG and ECG or EKG. Since the sleep rhythm is strongly correlated with brain and heart activities, these physiological bio signals can give accurate drowsiness/sleepiness detection. However, all the researches up to date in this approach need electrode contacts on drivers' head, face, or chest. Wiring is another problem for this approach. The electrode contacts and wires will annoy the drivers, and are difficult to be implemented in real applications.

II. BLOCK DIAGRAM

WEBCAM

Webcam software enables users to record a video or stream the video on the Internet. As video streaming over the Internet requires much bandwidth, such streams usually use compressed formats. The maximum resolution

of a webcam is also lower than most handheld video cameras, as higher resolutions would be reduced during transmission. Once a picture (or frame) is captured by the webcam, it creates a JPEG file of the still image. When the webcam has a low frame rate (15 fps or below), the webcam can only transmit a series of these JPEG still images.
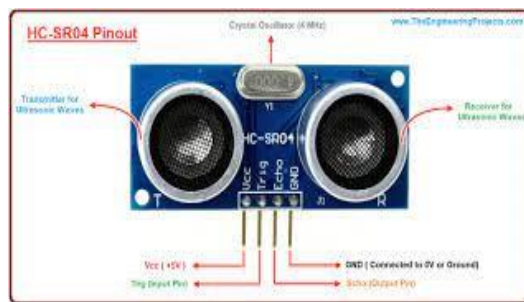

Figure 1: webcam

ULTRASONIC SENSOR

Figure 2:Ultrasonic sensor

An transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear).

GAS SENSOR

All the presented types of gas sensors are currently found in applications, e.g., the detection of flammable gases by pellistors or chemo resistive sensors (surface active-SMOX) or controlling the exhaust catalysts in internal combustion engine cars using potentiometric or amperometric sensors based on solid-state ion conductors. With the increasing importance of smart and connected systems, gas sensors will gain importance as they can provide chemical information from the surrounding environment, i.e., directly from or via the gas phase.

Figure 3

The emerging of Industry 4.0 and the Internet of Things pose new requirements on the sensors' sensitivity, selectivity and stability as well as their suitability for certain applications, e.g. miniaturized systems for small sizes and low power consumption, or highly robust sensor which operate in harsh environments. All these requirements are demanding tasks for the development of sensor technology on various levels, including new materials, new approaches to design and manufacture sensor devices, develop sensor systems and analyze the data obtained by sensors.

VIBRATION SENSOR

The vibration sensor is also called a piezoelectric sensor. These sensors are flexible devices which are used for measuring various processes. This sensor uses the piezoelectric effects while measuring the changes within acceleration, pressure, temperature, force otherwise strain by changing to an electrical charge. This sensor is also used for deciding fragrances within the air by immediately measuring capacitance as well as quality.

The working principle of vibration sensor is a sensor which operates based on different optical otherwise mechanical principles for detecting observed system vibrations. The sensitivity of these sensors normally ranges from10 mV/g to100 mV/g, and there are lower and higher sensitivities are also accessible. The sensitivity of the sensor can be selected based on the application. So, it is essential to know the levels of vibration amplitude range to which the sensor will be exposed throughout measurements.

DC MOTOR

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems.

A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.
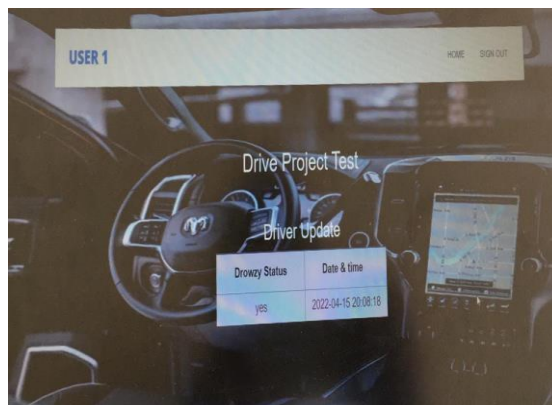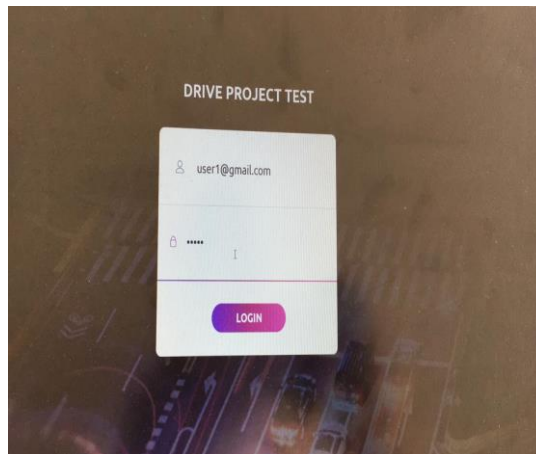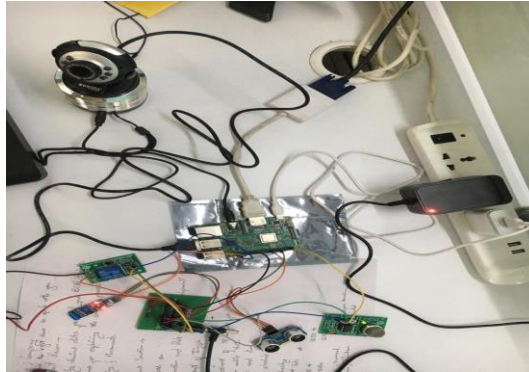
III. WORKING PRINCIPLE

Locating the eye region roughly, the edge feature analysis method means, making use of the vertical gray-scale projection curve of the image determined the left and right borders of the face according to the convex peak width, then making use of the horizontal gray-scale projection curve of the gotten region determined roughly the up and down border of the eye's location region. The region that corresponds to a face is a convex peak with a certain width by observing the vertical gray-scale projection curve of a number of different single-face images.

The left and right borders of the convex peak generally represented the left and right borders of the face. When the left and right borders of the face are established, take the region of the face between the left and right borders as the study object, and then make the horizontal gray-scale projection curve of the image, something will be found by observing. the primary problem is selecting the appropriate template prior to the template matching. In the follow-up algorithm, it is necessary to use the relative position between two eyes to locate the two eyes from a number of similar points, so long as to ensure that there are two real eye-points among a number of similar eye-points. In order to reduce the two eyes' sensitivity to the eye template and improve the robustness, the system adopts the synthetic eye template of the two eyes in order to select the similar eye-points, it is desirable first to establish the similarity metric. The general way is doing the relevant operation to the local image and the image template, the cross-correlation coefficient obtained in this way is regarded as the similarity metric. Two parameters are used to describe the synthetic template: template height M, width template N. There in, N is the synthetic eye template, the size is $M \times N$; T is the average of the eye template image; $r\ S\ T$ is the average of the local image that matches with the template in the expected face recognition image; (x, y) is the coordinates of search points in the face image. In order not to miss the real eye point, the way is selecting roughly a similar eye point collection including the two real eye points, and then obtains the two real eye points through prior knowledge calibration. n is an optional coefficient.

This system adopts the improved target tracking algorithm when it traces the eyes. The essence of target tracking is that it carries on the pinpoint while recognizing target in the image sequence. the target tracking algorithm realized in this system divides into two parts: the primary algorithm and the modified algorithm. The primary algorithm is based on the template matching technology, namely, after pinpointing the eye point to the first frame image, it selects this eye point in the image as the tracking object and extracts appearance information of this eye point as the new eye template, in the following sequence image, it will match the candidate image region and this new eye template, then take the most similar image region as the position that this eye point in the current image. The modified algorithm adopts the method of selecting candidate image region. It reduces the match times greatly, and then reduces the computation complexity of the system. The system uses the image gathering card for gathering image, and the rate is 25 frame per second, while the pilot driving, the head's amount of exercise is very small, therefore the position difference between the two neighboring frame images is very small, namely, it can obtain the roughly position of the eye point in the next image after pinpointing real eye point. After adopts the target tracking algorithm, the system does not need to carry on an eye pinpointing for every frame image in the image sequence, but only repositions the eye point to

the image which loses the tracking object, thus it improves operating efficiency of the system greatly and satisfies real-time request of the system too.

IV. RESULT

In this project detection of drowsiness including the spectacles condition is also possible. Obstacles are being sensed by the ultrasonic sensor, alcohol content is being sensed by the gas sensor, any vibration across the device is also sensed by the vibration sensor. The entire process data is fed to the server and is hosted on the server and it is displayed in the web page to the user by importing the user credential.

V. CONCLUSION

The system is capable of accurate positioning eye point. Using four parameters of eye states can effectively detect the driver's fatigue status. In order to improve the accuracy grade, our system should be using some other methods as a supplementary means, such as

- ➢ Road tracking.
- ➢ Head position.
- ➢ The rotation rate and the grip force of the steering wheel, which are the main directions to improve our system accuracy.
- ➢ DDDS offers a non-intrusive approach to detect drowsiness without the annoyance and interference, processing, judges the driver's alertness level on the basis of continuous eye closures.
- ➢ In future, this prototype can be extended to give alarm before sleeping by calculating the heart beat measure without physical disturbance i.e., non-intrusive method using modified ECG methods. Usually in ECG method key points of body (For example chest, head, wrist etc.,) are stocked with wire. In the extended method, sticking wire may be avoided.
- ➢ In the extended method, sticking wire may be avoided. This will lead us to a way to find out the optimum level of drowsiness. Further, this prototype will be extended to monitor the reflect ray from eye using nano camera.
- ➢ If the reflection ray is absent, then eye is closed otherwise eye is opened. we believe that this will create a better opportunity to detect drowsiness.

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Animal Tracking System

Mrs. Thripthi B Shetty[1], Aneesa MA[2], Naziya Shirin RN[2], Sidrathulmunthaha MS[2], Sana Nilufar[2]

[1]Assistant Professor, Department of E & E, YIT, Moodbidri, Karnataka, India

[2]Student, Department of E & E, YIT, Moodbidri , Karnataka,India

ABSTRACT

The goal of this project is to track the location of Animal in the zoo or national parks. The GPS receiver sends the location, animal temperature to the controller and it is interfaced with the IOT kit. Pets need special treatment and special care. Due to nowadays busy life style, this task is not as simple as it used to be. Using the technology of IoT, pet owners, zoo keepers can remotely track the animals activity and location, monitor the animals health condition. Furthermore, the data collected from each sensor are processed and displayed on a smartphone application. Temperature sensor detects the temperature of the animal. Also, heart beat is monitored at regular intervals to check its health. PIR sensor detects when a human or other animal approaches. When the sensor detect motion, a text message is sent to the owner via nodemcu.

I. INTRODUCTION

At this time the wild animals are more prone to trafficking so they are now endangered. So, in every country there are wildlife animal reserves and national parks where these animals can live freely in the forest however these are monitored by human beings. Also, now days these wildlife national parks have become popular for a tourist area. Now day's wild animal becoming less in number because of Forest destroyed by human civilization. It is important to save the life of wild animals in the sanctuaries. Every year wild animals are tracked and killed by people. These animals also undergo some disease. Animal location, movement, and body temperature of the animal can alert the officer of wildlife/national parks. If there are some wounds on the animal body and because of wounds temperature of animal rises, then the system can send SMS to the forest officer so he/she can give immediate attention. Also, if an animal goes out of the wildlife area then the system can send the SMS to the forest officer so he/she can give immediate attention. If someone tries to kill the animal movement of the animal can drastically change to its limit and send SMS to the officer. This system gives animals' information to the officer. The objectives of this project are to track the animal, to sense the temperature and motion and to alert the user with SMS. GPS wildlife tracking is a process whereby scientific researchers or conservation agencies can remotely observe relatively fine- scale movement or migration patterns of wild animal using the Global Positioning System and optional environmental sensors This kind of technology is very useful to protect the endangered animal like One-horned rhinoceros (Eksinge gainda), Red panda (Habre), Bengal tiger (Pate Bagh) etc. GPS and GSM based animal tracking system

is a combination of GPS module, GSM module, Arduino microcontroller, temperature sensor and accelerometer sensor which can track the wild animals from any remote area to the authority, which helps in keeping track of animals health, death and much vital information required for ecological research. Here this system is attached to the Animals body to which GPS satellite sends the longitude and latitude value to the GPS receiver which then sends the information to the microcontroller, then microcontroller sends required message to GSM module which then sends the message to the registered number. By this process authority will be in contact with the animals for the required information.

II. LITERATURE REVIEW

P. A. Lemnell [1] filed a patent in US named "Animal Tracking System" which can indicate the direction and behaviour of animal such as hunting dog. RF transmitter and receiver was used for data transmission [1].

Due to rapid poaching of Elephant in Malaysia. Research is carried out in the University of Nottingham "Tracking endangered elephants with satellite technology". Once the GPS collar is fitted the elephant's whereabouts can be tracked in the field using VHF radio signal or at any location with an internet connection to access the GPS locations transmitted by the collar via satellite phone. The project is also looking at non-invasive techniques to extract DNA and hormones from elephant faces, developing cost-effective strategies to mitigate human-elephant conflict and improving our understanding of elephant ecological function in tropical rainforests [2].

H. Rebeecca et al. did a case study in northern Australia demonstrating "the potential for combining GPS collars and satellite images in a WSN to monitor behavioural preferences and social behaviour of cattle" [3].
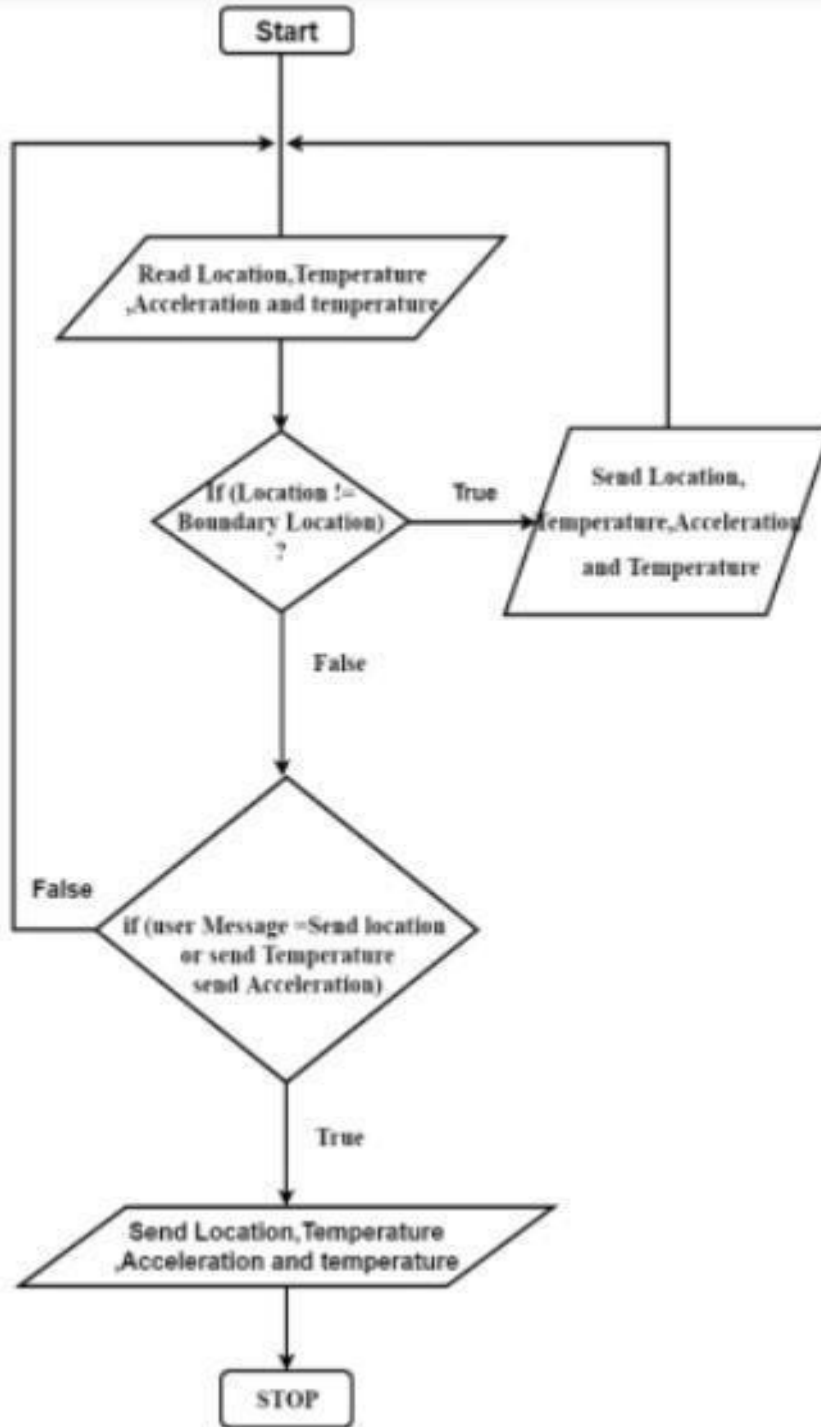
III. BLOCK DIAGRAM

The project consists of sensing part and monitoring part. Three sensors are used, namely temperature sensor and PIR sensor and heart rate monitor. The temperature sensor will be always fixed at the surface of animal. It continuously monitors the temperature of animal. Any variation in the temperature level will be displayed on the LCD. PIR sensor detects the human presence near the animal. It detects the human movement by infrared radiation exposed by humans. The GPS device is connected to arduino which is used to monitor the animal's location. After getting all the information about the animal location and the temperature and any object movement, it will be displayed on an android application and laptop.

Fig: Block diagram of the system

A. Flowchart of the system

```
                        ┌──────────┐
                        │  Start   │
                        └──────────┘
                             │
         ┌───────────────────┴────────────────────────┐
         │                                             │
         ▼                                             │
   ╱─────────────────────────╲                         │
   │  Read Location,Temperature│                        │
   │  ,Acceleration and temperature                     │
   ╲─────────────────────────╱                          │
         │                                              │
         ▼                                              │
      ◇ If (Location !=                    Send Location,
        Boundary Location)  ── True ──▶   Temperature,Acceleration
        ?                                 and Temperature
         │
       False
         │
         ▼
      ◇ if (user Message =Send location
        or send Temperature
        send Acceleration)  ── False ──┐
         │
        True
         │
         ▼
   ╱─────────────────────────╲
   │  Send Location,Temperature│
   │  ,Acceleration and temperature
   ╲─────────────────────────╱
         │
         ▼
     ┌──────────┐
     │  STOP    │
     └──────────┘
```

B. Components used

a) Temperature sensor

Temperature sensor is a device used to measure temperature. This can be air temperature, liquid temperature or the temperature of solid matter. There are different types of temperature sensors available and they each use

different technologies and principles to take the temperature measurement. The sensor used here is LM35. Voltage range is 4v to 30v. Range of temperature is between –55℃ to +150℃. It is easily suitable for remote application.
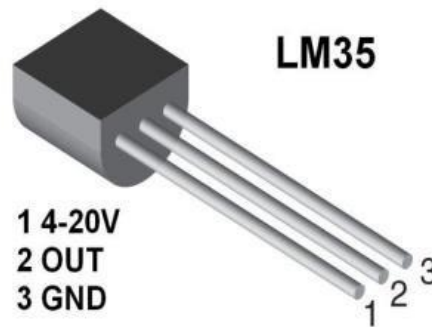

Fig: LM35 sensor

b)   Heartbeat sensor

Heartbeat Sensor is an electronic device that is used to measure the heart rate, i.e., the speed of heartbeat. This sensor has two surfaces, the light emitting diode and ambient light sensor is connected. Similarly, on the second surface, the circuit is connected for the noise cancellation and amplification. Operating voltage of this sensor is +5V or +3.3V.

Fig: Pulse sensor

c)   PIR sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors allows to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low- power, easy to use and don't wear out. For that reason, they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors. Sensitivity range: up to 20 feet (6 meters).

Fig: PIR sensor

d) GPS module

GPS modem is to retrieve and longitude and latitude of the location. This GPS modem communicates using serial communication with the microcontroller. GPS modem sends a bunch of data to the microcontroller. This bunch of Data contains many parameters which include longitude and latitude.

Fig: GPS module

e) Arduino UNO

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins 6 analog inputs, a 16 MHz quartz crystal, a USB Connection, power jack, an ICSP header and a reset button.
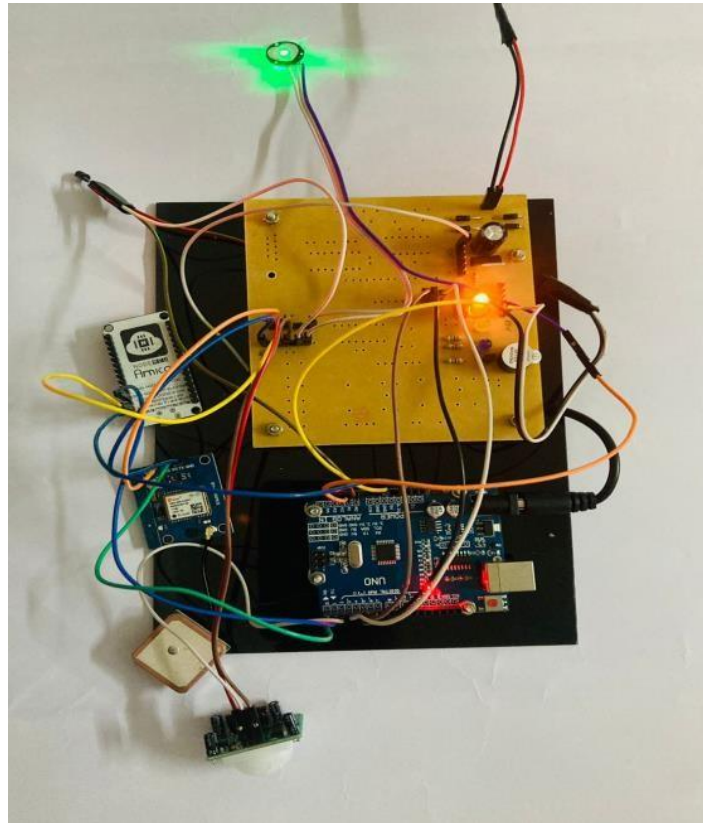

Fig: Arduino UNO
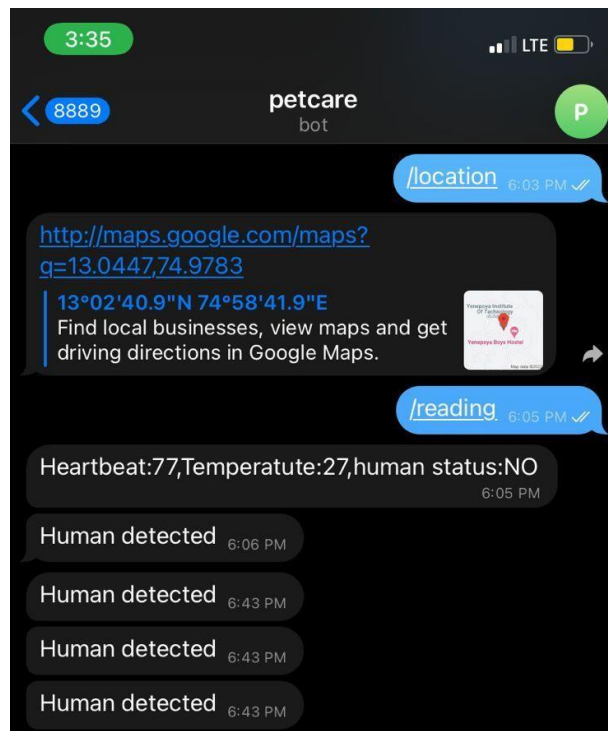
C. Expected results

Fig: Working model

Fig: Readings in application

IV. CONCLUSION

As per the literature survey done, there is need for a novel system that combines both animal health tracking and movement monitoring which has not been implemented so far. And, hence it is best to integrate two existing modules developed in different platform and technology to a single module and platform. This model will work as a strong backbone in case of analysing any health-related issues for an animal.

V. ACKNOWLEDGMENT

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Smart Medicine Dispenser

Mr. Prasanna Kumar[1], Anmol M[2], Harshith[2], Praveen Kumar[2], Sharath TS[2]

[1]Assistant Professor, Department of E & E, YIT, Moodbidri. Karnataka, India
[2]Student, Department of E & E, YIT, Moodbidri, Karnataka, India

ABSTRACT

This paper give s a Smart Medicine Dispenser (SMD) model. The principal motivation behind this framework is to be help the patient, fundamentally seniors are, take their prescriptions on it me in a simple manner without a chance of missing pills, additionally decrease the gamble of over or a under dosing coincidentally. Doesn't taking drugs accurately can have genuine results like deferred recuperation, sickness and even demise. The savvy medication gadget (SMD) could tackle such issues by illuminating and making the patients aware of take the suitable portion with impeccable timing. Additionally, it gives direct correspondence between the patients and the parental figures as it will quickly advise the guardian on the off chance that the patient lost his/her medicines. Likewise, SMD gives the client a touch interface system accessible an application on their cell phone which will permitted to remotely oversee and control pill timetables and utilization information.

Catchphrases — Microcontroller; Dispenser, Smart Medicine; Pillbox; Android Application;

I. INTRODUCTION

Medicine supply is a developing worry all through the medical services industry with specialists, medical care frameworks, and different partners (insurance agency) senior and junior patients prescription has a major issue of medications abuse [1]. It probable for them , neglect to take as much time as necessary. Particularly, the individuals who take various drugs simultaneously. Additionally, they could take wrong measurement incidentally which might prompt sad results, for example, passing [2]. This is an obvious evidence that it is a boundless issue and obviously connected with unfriendly tolerant results and higher medical care costs. Likewise, a review has been finished by gathering of teachers University of Washington about medicine adherence in three home medical care offices one hundred 47 more established members taking at least three meds, which brought about 30.6% members were under follower and 18.4% members were over disciple with no less than one drug [3]. The primary reason for Smart medicine dispenser framework is to help the patients, basically seniors, take as much time as necessary in a simple manner without the chance of missing pills. It can likewise decrease the gamble of over or under dosing incidentally. The savvy medication gadget (SMD) could tackle such issues by illuminating and making the patients aware of take the proper portion with perfect timing. In area II, we present a few related works of the drugs containers. The approach of the Smart Medicine Dispenser (SMD) is depicted in area III.

Some results acquired from SMD are introduced in segment IV followed by an end in area V There are a few kinds of pill gadgets accessible in the market that have been delivered by various organizations comprising of implicit caution to inform the clients without having on the web information base to save the clients and pills, or having remote access usefulness. To express a couple: - An electronic pill gadget acknowledged utilizing pic microcontroller with console and a LCD that allows the client to plan his/her pills physically on a plate. It apportions the pills and produces a sound caution to alarm the patient. Likewise, a SMS is shipped off the parental figure telephone number on the off chance that the pill wasn't taken [4]. - A pill distributor was made utilizing a blend of infrared sensors and Arduino microcontroller with alert framework to assist the patients with taking their pills at the right time. The caution framework was carried out utilizing a popup notice on cell phone [5]. – Another pill allocator that is made utilizing Arduino microcontroller that apportions just a single pill at a time to prevent glut. Then, at that point, it informs the client by means of SMS that the pill is fit to be taken. Likewise, it was associated with an android application that is utilized by the overseer to alter the dates and seasons of the pills to be apportioned [6].

The proposed SMD framework takes mechanized gadget to a higher level as it has a few functionalities that are excluded from some other computerized distributors. A record is accommodated every patient and no other person can get to it with the exception of the patient and the guardian on the off chance that the qualifications were given to him/her. Likewise, a few insights are furnished about the pills taken with their cautions and the all-around existing ones. Online data set of the clients, pills and their alerts are likewise an incredible element that aided in the plan of the venture. The alerts can be altered and made utilizing an android application somewhat through cell phones

II. BLOCK DIAGRAM

The block diagram consists of input like keypad and RFID reader. And output like LCD Display and GSM modem.

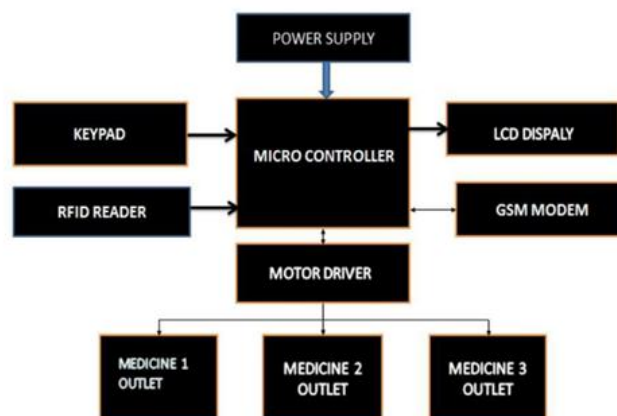Micro controller controls the functions of the smart medicine dispenser.

Fig. 2 Block diagram of proposed system

Fig 1: Smart medicine dispenser

Power SupplY:

The first, prescribed and simplest method for fueling the Raspberry Pi is through the Micro USB port on the unit. The suggested input voltage is 5V, and the suggested input current is 2A. At The Pi Hut, our standard power supply for the Raspberry Pi is 5.1V @ 2.5A.

Keypad:

A numeric keypad, number cushion, numpad, or ten key, is the palm-sized, generally 16-key segment of a standard PC console, for the most part on the extreme right. It gives mini-computer style productivity to entering numbers.

Fig 2: Diagram of keypad

RASPBERRY PI:

The Raspberry Pi is an exceptionally modest PC that runs Linux, however it additionally gives a bunch of GPIO (universally useful information/yield) pins, permitting you to control electronic parts for actual registering and investigate the Internet of Things (IoT).

In spite of the fact that it's not got the GPU or CPU of even most spending plan PCs or work areas, the Pi 4 8GB can easily deal with most standard office efficiency. Composing, altering, and even photograph or video altering functions admirably.

Eliminate all links, and the SD card, and interface the gadget through USB link to your Windows PC. (Use USB-A to USB-A for the Raspberry Pi An and A+, miniature USB to USB-A for the Pi Zero models). If working, the gadget will be identified and an alarm will sound.

The Raspberry Pi is an extraordinary little machine- - - it's reasonable, profoundly convenient, and easy to use. In any case, when you initially get one, it tends to be interesting to sort out which projects you ought to take on first. These Raspberry Pi projects for novices are an incredible prologue to the equipment and programming capacities of the Pi.

LCD DISPLAY:

They work by utilizing fluid gems to create a picture. The fluid gems are installed into the showcase screen, and there's some type of backdrop illumination used to enlighten them. The genuine fluid gem show is made of a few layers, including a captivated channel and anodes

The LCD deals with the guideline of impeding light. While developing the LCDs, a reflected mirror is organized at the back. A terminal plane is made of indium-tin-oxide which is kept on top and an enraptured glass with a polarizing film is additionally added on the lower part of the gadget.

LCD (Liquid Crystal Display) is a kind of level board show which involves fluid precious stones in its essential type of activity. LEDs have an enormous and shifting arrangement of purpose cases for buyers and organizations, as they can be normally found in cell phones, TVs, PC screens and instrument boards.

source of power. As noted, detectors of radio signals serve as rectifiers

Fig 3: LCD DISPLAY

Liquid crystal displays are normally used for electronic games, as utilized for advanced camcorders and cameras for video projection and frameworks in electronic bulletins, as monitor for PCs, and TVs.

A Light emitting diode is level board display's that uses a variety of light-emitting diodes as pixels for video show. Their splendour are permits them to be used outside. Application of led are used in electronics devices, brake lights.

LEDs work on the guideline of Electroluminescence. Ongoing a current through the diode, minority charge transporters and greater part charge transporters recombine at the intersection. On recombination, energy is delivered as photons.

MOTOR DRIVER

Engine drivers goes about as a connection point between the engines and the control circuits. Engine require high measure of current while the regulator circuit deals with low current signs. So the capacity of engine drivers is to take a low-ebb and flow control sign and afterward transform it into a higher-momentum signal that can drive an engine

In DC engines, the speed is corresponding to the armature voltage and conversely relative to the field current. And furthermore, the armature current is relative to the engine force. Along these lines, by expanding or lessening the applied voltage, the speed of the engine is differed.

FIG: L298N Motor Driver

An electric engine is a gadget used to change power into mechanical energy inverse to an electric generator. They work utilizing standards of electromagnetism, which confirms that a power is applied when an electric flow is available in an attractive field.

Engine drives are circuits used to run an engine. All in all, they are ordinarily utilized for engine connecting. These drive circuits can be effectively communicated with the engine and their choice relies on the kind of engine being utilized and their appraisals (current, voltage).

Microcontroller:

The microcontroller utilized is the ATMEGA328P fabricated by ATMEL. It works at a clock recurrence of 60 MHz at 3.3 V D.C microcontroller controls all the activity. The capacity of the microcontroller here is to contrast the information signals and predefined values and interaction the resultant results.

ATMEGA328P a 8-bit microcontroller from ATMEL is utilized in this venture for controlling the sensors, radios, LCDs and GSM module. It involves a 16 MHz precious stone oscillator for the framework clock

We are putting away the count information on the transmitter side as well as the got information at the beneficiary side in the EEPROM memory of the microcontroller, so it isn't lost regardless of whether the power went off.

The Microcontroller gets the beat by connecting optical pickups from a conventional electromagnetic energy meter. Since the energy meter is working with a non-secluded supply, we are utilizing a seclusion circuit to get a heartbeat from the energy meter called pick isolator circuit utilizing a LDR. The LDR is associated with the „Cal LED‟ to take the count perusing to microcontroller.

III. CIRCUIT DIAGRAM

The wireless electricity bill reading using RF module circuit diagram is connected as below shown in the figure.
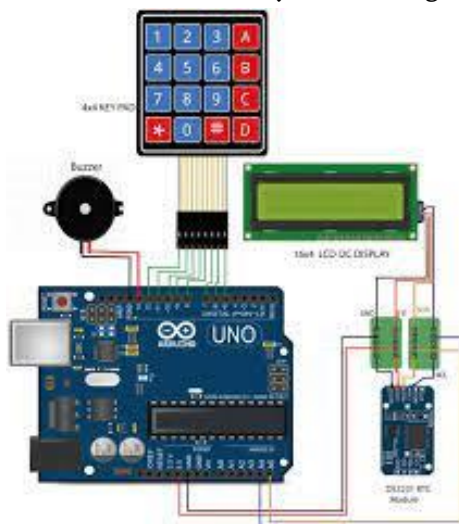
The Raspberry Pi will then, at that point, confirm assuming the order is legitimate by checking assuming that the order string begins with a "c", the person that comes after the "c" is the compartment number which will be utilized to set off the ideal holder as displayed.

IV. WORKING PRINCIPLE

Insights regarding the plan of the savvy medication the prerequisites to plan this gadget are gathered and afterward plan thought taken care. At long last, a plan interaction is proposed to plan programmed medication container.

The Programmable programmed medication allocator planned permits the overseer to dependably manage drugs to a patient without waiting be available each time the medicine is booked. The overseer pre-programs the SMD that permits it to set up to 21medications does through an ergonomically planned interface, using an alphanumeric keypad and LCD show.

The SMD can be pre-customized to rehash a similar cycle for one month. A caution is given to stack the medication if the quantity of pills/cases falls under an edge esteem that can be

The savvy prescription allocator communicates three sorts of information to the medicine checking server: the patient's drug state, gadget state, and the framework settings. The server dissects the drug state and creates the board tasks for refreshing the medicine plan if fundamental. The server likewise breaks down gadget state and framework settings and produces tasks for overseeing framework settings, installed programs, and functional blunders.

(i)   MCU: the MCU controls all framework capacities.

(ii)   Touch-touchy LCD: the fluid precious stone showcase (LCD) shows the medicine data. It is likewise utilized (by the client) to set boundaries, for example, the drug plan.

(iii)   Medication apportioning plate (MDT): the MDT contains the medicine to be taken. It administers the drugs when the client presses the Dispense Button at the appropriate time. The quantity of MDTs can be reached out to six to help various clients.

(iv)   Alarm module: the caution module advises the client by a ringer that the time has come to take drugs. After squeezing the Dispense Button, the ringer ends and the LED quits flickering.

(v)   Dispense button: the apportion button is utilized to administer the client's prescription. It just works once during each foreordained cycle period.

(vi)   Infrared sensor: the infrared sensor actually takes a look at the amount of the leftover prescriptions in the MDT. Assuming that the amount dips under the base level, it is accounted for to the drug checking server.

(vii)   Real-time clock: continuous clock is utilized to guarantee that gadget makes the client aware of take their drug at appropriate time. It is reason for the alert cycle.

(viii)   Communication module: correspondence module is utilized to speak with a MS or PC. RS232 Serial correspondence and a neighbourhood (LAN) are given.

V. RESULTS

The application was tried on different occasions, and showed almost no usefulness. The application was exceptionally less weight and has an extremely low web information use since the neighbourhood data set synchronizes with the internet-based data set just when a change occurs or while signing in. The data set

created by our tests was caught structure our cloud has and displayed in figure 13, 14, 15 and 16. Figure 17 shows the instant message got by the Caretaker on the off chance that a pill was not taken.

Equipment testing showed that the apportioning instrument remained completely exact after a full compartment turn, which is all that could possibly be needed since the client should top off the holders and henceforth recalibrate them.

VI. CONCLUSION

The paper summed up significant focuses about Smart Medicine Dispenser. Old and younger patients, particularly with constant and intermittent medication, will be the most advantage for Smart medicine dispenser, since will be extraordinarily expand their medication adherence which will safeguard a superior treatment adequacy or even rescues their lives.

Insurance agency will be definitely profit from the Smart medicine dispenser since it will assist their customers with carrying on with in a better way of life away from life threating mishaps brought about by neglecting to take as much time as necessary or with the right measurements, and in the event of skipped pill, the Caretaker will get alarmed in a split second through SMS.

At long last, the UI which is something similar on every one of the gadgets included machine is natural, simple to use, in any event, for old patients.

The plan permits the client to multiply more compartments or more number of medicine per serving

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Power Line Clearance Management System

Prasanna Kumar[1], Jeckson Pais[2], Prathvin Prathiksh[2], Shravya[2], Spoorthi Hegde[2]

[1]Head of Department, Department of Electrical and Electronics Engineering, YIT Moodbidri, Karnataka, India
[2]Final Year Students, Department of Electrical and Electronics Engineering, Yenepoya Institute of Technology,
Moodbidri, Mangalore, Karnataka, India

ABSTRACT

Technologies are always helpful for mankind in making life much easier and better for humans. The main objective of this project is to design a digitalized line clearance system which can reduce accident when the line workers work on that line. A lot of human error occurs in the time when we get to line clearance in substation sometimes it gets worst by human accident and hazardous in so in order to ensure these things our system one can overcome human error by using digitalized line clearance system. Our project is about designing a power line clearance system using microcontroller system, relay and several other devices. This project is created to improve this existing device to ensure line workers are not to mistaken in judging their line is cleared or not. The project is done by using microcontroller unit while the generated number for line clearance is shown by LCD.

Keywords — Reduce accident, Human error, Line workers.

I. INTRODUCTION

The objective of this project is to design a digitalized line clearance system which can reduce accident when the line workers work on that line. There are times when the line clearance number is given wrong by verbal and may lose some of life so in order to overcome that we are implementing this system. This system will solve all those problems. It can be installed at the Electricity Distribution stations.

The proposed system helps in providing Digitalized number which is generated by the Assistant Engineer(AE) to Junior Engineer(JE) and line man or line workers so that when and which the line should be given clearance. Giving line clearance in verbal is always a great problem for Assistant Engineer (AE) because of miscommunication or misunderstanding may lose someone's life.

To overcome the above problems and make drivers comfortable, we will introduce and work on Power line clearance management system.

II. PROBLEM STATEMENT

There is a need for a system that can help us to avoid the loss of life by human mistakes as currently it is not been such achieved. So, the system's task here is to display the generated number by AE to JE and line workers or line mans if It is same then line clearance is approved otherwise the line clearance is terminated.

III. LITERATURE SURVEY

"Tower Lines and Residential Property Values," by W.N. Kinnard. The Appraisal Journal, April 1967, 269–84 [1], was one of the first to do a thorough investigation into the effects of electric transmission lines on residential property value. All of these subdivisions, which were built between 1954 and 1964, intersected or abutted a tower line right-of-way. Property owners and people who affect residential sales were handed questionnaires to gauge their thoughts and opinions. The majority of homeowners said they didn't mind living near a tower line. Over 85% said they would make another purchase in the same place. Using vegetation to hide a tower or power line.

Morgan et al "Power line Frequency Electric and Magnetic Fields" 1985, 5:2, 139–49 [2] conducted a survey of 116 alumni of Carnegie-Mellon University to research the risk perception of 50/60 Hz electromagnetic fields from both high voltage transmission lines and electric blankets. The questionnaire consisted of two parts. In the first part, participants were asked to evaluate the risk of large power lines, electric blankets, and 14 other common hazards, such as automobiles, pesticides, caffeine, and cigarette smoking. Participants were then asked to rank the hazards from least to most risky and assign each a score based on how risky they viewed the hazards to be. The second part of the questionnaire provided additional information on electromagnetic fields, their possible health effects, and how fields from.

Solum, C.L ,"Transmission Line Easement Effect on Rural Land in Northwest Wisconsin. Right of Way", 1985, April, 14–8 [3] conducted an opinion study of the impacts of transmission line easements on rural land in northwest Wisconsin. He presented a questionnaire to landowners whose properties had been encumbered by a transmission line ranging from 69 kV to 161 kV. The 180 respondents owned encumbered property that fell into three categories: agricultural, recreational, or residential. When asked how the transmission line had affected their property, a majority of agricultural property owners responded that the line had no effect. The most frequently cited effect for agricultural property was the inconvenience of working around transmission structures in areas that were being actively farmed.

IV. METHODOLOGY

This project's goal is to detect and authenticate an electricity line failure. The main unit component for fault detection and relay trips Junction in this project is the transformer. The Arduino Uno serves as the main controlling unit, receiving data from the voltage sensors that detect the defect. The Microcontroller then addresses the generated number, which is shown on a Liquid Crystal Display.

This mechanism works in the following way: Relays detect a fault in the distribution line and trip the circuit, cutting off power to the substation. Then the Assistant Engineer (AE) sends a digitalized number to the Junior Engineer (JE) and the line man or line workers, indicating when and which lines should be cleared. If the produced number matches, the line should be cleared, and the line man or line workers should be permitted to work.

Following maintenance, line workers shall return the produced number to Assistant Engineer (AE) via Junior Engineer (JE) from the distribution substation.

If the numbers generated by the Junior Engineer (JE) and Line Workers are same, the Assistant Engineer (AE) permits power supplies from the substation to distribution lines to the area under maintenance.
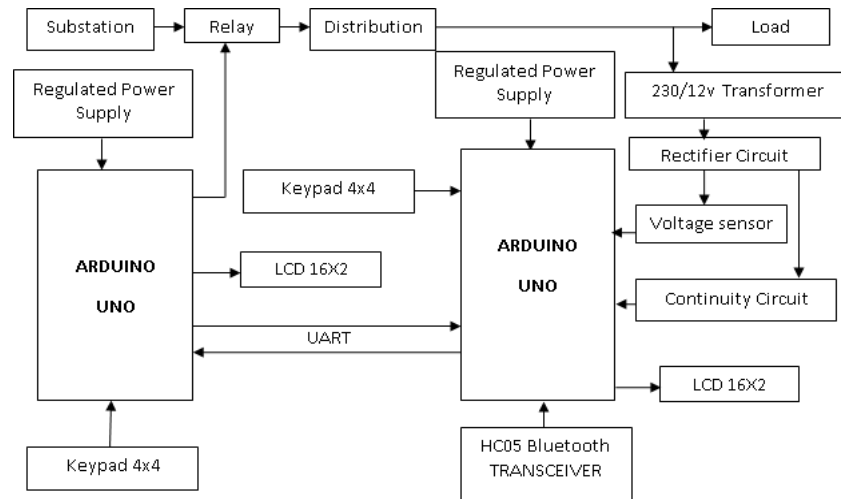

Fig II.1: BLOCK DIAGRAM

V. APPLICATIONS

The Applications of Power line clearance management system are
1. This system can be used in power stations
2. This system can be applicable in Industry when the fault occurs
3. This system is useful in electricity board such as MESCOM, BESCOM, and CESCOM.

VI. CONCULSION

In Conclusion, the objective of this project is to design is to detect electricity line fault & authenticate the line clearance is successfully achieved.

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Demonstration of Advanced Detection of Drowsiness

G.B.Praveen[1] , Nagaraj[2], Swapna[3] ,Nisha[4] ,Rashid[5]

[1]Assistant Professor, Department of E & E, YIT, Moodbidri, Karnataka, India
[2]Student, Department of E & E, YIT, Moodbidri, Karnataka, India

ABSTRACT

In recent years, driving has become an important part of our day-to-day life, especially in urban areas sleepiness-related accidents are occurring infrequent. Road accidents are apparently a global hazard in our country. Drowsiness and Fatigue of drivers are amongst the significant causes of road accidents. Every year, they increase the amounts of deaths and fatalities injuries globally. This project is designed for driver drowsiness detection to prevent accidents from happening because of driver fatigue and sleepiness in updated version. These factors lead to the development of Intelligent Transportation System (ITS). If the accident caused by abnormalities of the driver, it can be prevented by placing abnormality detecting system within the vehicle.

I. INTRODUCTION

Driver fatigue is one of the three commonest causes of motor vehicle accidents and the effect of driver fatigue has been underestimated in the past due to difficulties in identifying fatigue as the cause of a crash. The problem of driver fatigue of course moves far beyond just road vehicles to all modes of transportation, being an important factor in rail, sea and air accidents as well.

Driver fatigue commonly causes "fall asleep" motor vehicle accidents. These tend to be more severe or fatal compared with other road accidents. This is because they often involve a single vehicle running off the road at high speed, they tend to occur on higher speed roadways, and braking or other preventative measures may be absent. If truck drivers are involved, the potential to cause death or serious injury to other road users is greatly increased.
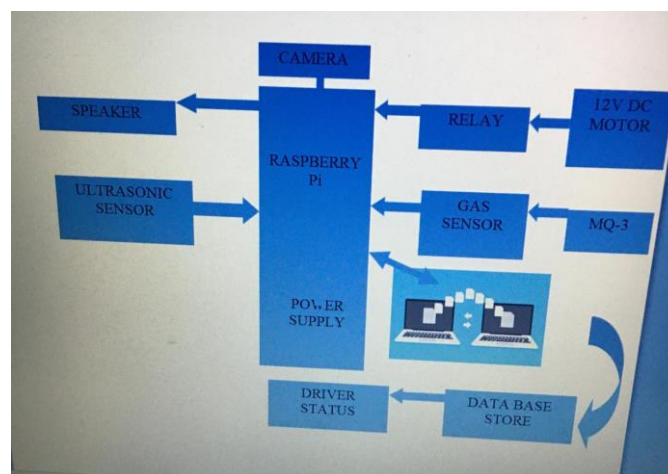
It is commonly known that drowsiness and driving is not a good combination. To be a good driver it is necessary to be perceptive, alert and focused on the task and it is difficult to combine these qualities with drowsiness. Another characteristic that is a bad combination with driving is distraction. Both these disturbances have the same effect on the driver in the sense that they have a negative effect on the perception, reaction time and focus, to name a few things. Drowsiness and distraction are parts of the human behavior, which makes the problem with drowsiness and inattentive driving difficult to completely eliminate. A similar case is alcohol which also has a negative effect on the driving abilities, but can (theoretically) be removed from the roads.

Sleepiness and Drowsiness: Sleepiness, also referred to as drowsiness, is a basic physiological state that affects humans among others and it originates from changes of the alertness during each 24-hour sleep-wake cycle. This is caused by the internal body clocks, which programs us to be asleep twice a day in the middle of the night and between 14:00-16:00 in the afternoon. Sleepiness is a stage when the body needs to sleep and is defined as "the inclination to sleep". Sleepiness should not be confused with fatigue, which is the consequence of physical Laboure or a long experience, and is defined as "disinclination to continue the task at hand".

Distraction: Distraction is a shift in attention from the primary task to another task (secondary task). In behavioral models, human is modelled as information processing resource who has a maximal limit of information that can be processed. In these models' distraction is modelled as surrounding disturbances taking processing resources from the main task. Distraction can result in reduced performance of the primary task. There are several degrees of distraction, but no fixed scale. This is a problem when detecting a degree of distraction, because it is difficult to say that one thing "steals" more attention than another. Usually, distraction is measured as the reduction of performance of the primary task. Another important part in the distraction is the drivers "willingness to engage" in the secondary task. How much the person engages in the task affects how distracted the person is. Distraction happens all the time in the daily life but the usual effect of the everyday distraction is very harmless. It results in a shift in attention from one thing to another for a brief or longer moment. This usually has little effect on the primary task other than a delay. An example of this is a person reading the newspaper when he hears a car alarm go off. The result of this is that he stops reading for a while, but soon he continues reading with only a slight delay. Sometimes this delay in the primary task may have a serious impact on a person, when he is driving for example.

Physiological signal detection techniques: This approach is to measure the physiological changes of drivers from bio signals, such as the EEG, EOG and ECG or EKG. Since the sleep rhythm is strongly correlated with brain and heart activities, these physiological bio signals can give accurate drowsiness/sleepiness detection. However, all the researches up to date in this approach need electrode contacts on drivers' head, face, or chest. Wiring is another problem for this approach. The electrode contacts and wires will annoy the drivers, and are difficult to be implemented in real applications.

II. BLOCK DIAGRAM

WEBCAM

Webcam software enables users to record a video or stream the video on the Internet. As video streaming over the Internet requires much bandwidth, such streams usually use compressed formats. The maximum resolution of a webcam is also lower than most handheld video cameras, as higher resolutions would be reduced during transmission. Once a picture (or frame) is captured by the webcam, it creates a JPEG file of the still image. When the webcam has a low frame rate (15 fps or below), the webcam can only transmit a series of these JPEG still images.

Figure 1: webcam

ULTRASONIC SENSOR

Figure 2:Ultrasonic sensor

An transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear).

GAS SENSOR

All the presented types of gas sensors are currently found in applications, e.g., the detection of flammable gases by pellistors or chemo resistive sensors (surface active-SMOX) or controlling the exhaust catalysts in internal combustion engine cars using potentiometric or amperometric sensors based on solid-state ion conductors. With the increasing importance of smart and connected systems, gas sensors will gain importance as they can provide chemical information from the surrounding environment, i.e., directly from or via the gas phase.

Figure 3

The emerging of Industry 4.0 and the Internet of Things pose new requirements on the sensors' sensitivity, selectivity and stability as well as their suitability for certain applications, e.g. miniaturized systems for small sizes and low power consumption, or highly robust sensor which operate in harsh environments. All these requirements are demanding tasks for the development of sensor technology on various levels, including new materials, new approaches to design and manufacture sensor devices, develop sensor systems and analyze the data obtained by sensors.

VIBRATION SENSOR

The vibration sensor is also called a piezoelectric sensor. These sensors are flexible devices which are used for measuring various processes. This sensor uses the piezoelectric effects while measuring the changes within acceleration, pressure, temperature, force otherwise strain by changing to an electrical charge. This sensor is also used for deciding fragrances within the air by immediately measuring capacitance as well as quality.

The working principle of vibration sensor is a sensor which operates based on different optical otherwise mechanical principles for detecting observed system vibrations. The sensitivity of these sensors normally ranges from10 mV/g to100 mV/g, and there are lower and higher sensitivities are also accessible. The sensitivity of the sensor can be selected based on the application. So, it is essential to know the levels of vibration amplitude range to which the sensor will be exposed throughout measurements.

DC MOTOR

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems.

A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.
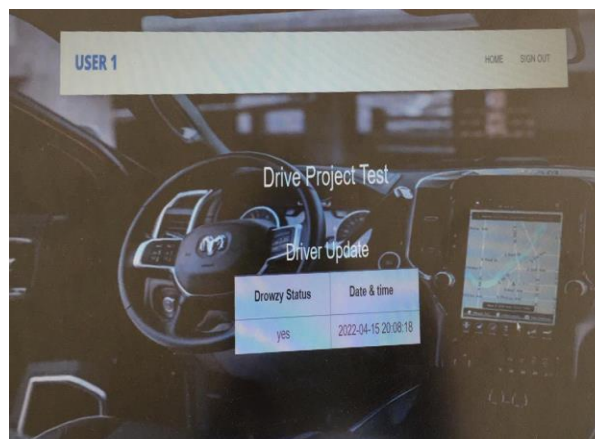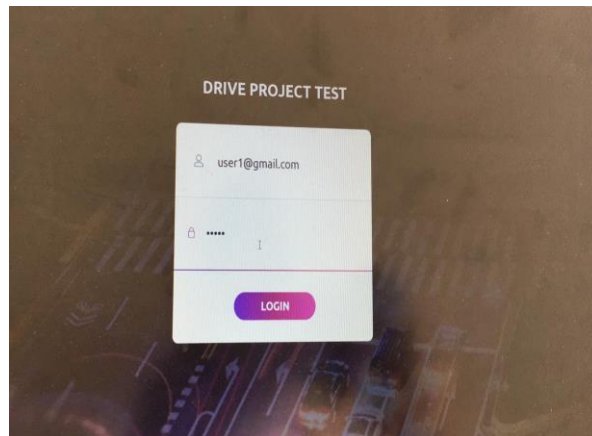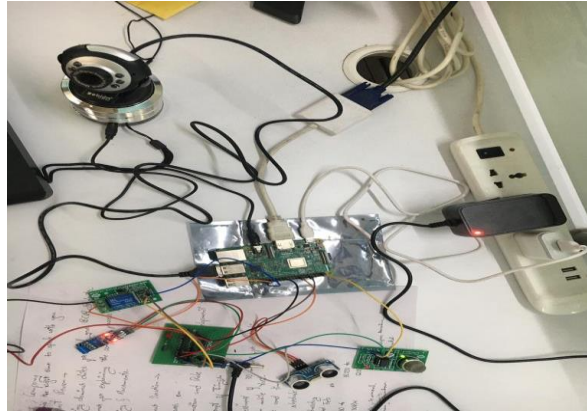
III. WORKING PRINCIPLE

Locating the eye region roughly, the edge feature analysis method means, making use of the vertical gray-scale projection curve of the image determined the left and right borders of the face according to the convex peak width, then making use of the horizontal gray-scale projection curve of the gotten region determined roughly the up and down border of the eye's location region. The region that corresponds to a face is a convex peak with a certain width by observing the vertical gray-scale projection curve of a number of different single-face images.

The left and right borders of the convex peak generally represented the left and right borders of the face. When the left and right borders of the face are established, take the region of the face between the left and right borders as the study object, and then make the horizontal gray-scale projection curve of the image, something will be found by observing. the primary problem is selecting the appropriate template prior to the template matching. In the follow-up algorithm, it is necessary to use the relative position between two eyes to locate the two eyes from a number of similar points, so long as to ensure that there are two real eye-points among a number of similar eye-points. In order to reduce the two eyes' sensitivity to the eye template and improve the robustness, the system adopts the synthetic eye template of the two eyes in order to select the similar eye-points, it is desirable first to establish the similarity metric. The general way is doing the relevant operation to the local image and the image template, the cross-correlation coefficient obtained in this way is regarded as the similarity metric. Two parameters are used to describe the synthetic template: template height M, width template N. There in, N is the synthetic eye template, the size is $M \times N$; T is the average of the eye template image; $r S T$ is the average of the local image that matches with the template in the expected face recognition image; (x, y) is the coordinates of search points in the face image. In order not to miss the real eye point, the way is selecting roughly a similar eye point collection including the two real eye points, and then obtains the two real eye points through prior knowledge calibration. n is an optional coefficient.

This system adopts the improved target tracking algorithm when it traces the eyes. The essence of target tracking is that it carries on the pinpoint while recognizing target in the image sequence. the target tracking algorithm realized in this system divides into two parts: the primary algorithm and the modified algorithm. The primary algorithm is based on the template matching technology, namely, after pinpointing the eye point to the first frame image, it selects this eye point in the image as the tracking object and extracts appearance information of this eye point as the new eye template, in the following sequence image, it will match the candidate image region and this new eye template, then take the most similar image region as the position that this eye point in the current image. The modified algorithm adopts the method of selecting candidate image region. It reduces the match times greatly, and then reduces the computation complexity of the system. The system uses the image gathering card for gathering image, and the rate is 25 frame per second, while the pilot driving, the head's amount of exercise is very small, therefore the position difference between the two neighboring frame images is very small, namely, it can obtain the roughly position of the eye point in the next image after pinpointing real eye point. After adopts the target tracking algorithm, the system does not need to carry on an eye pinpointing for every frame image in the image sequence, but only repositions the eye point to

the image which loses the tracking object, thus it improves operating efficiency of the system greatly and satisfies real-time request of the system too.

IV. RESULT

In this project detection of drowsiness including the spectacles condition is also possible. Obstacles are being sensed by the ultrasonic sensor, alcohol content is being sensed by the gas sensor, any vibration across the

device is also sensed by the vibration sensor. The entire process data is fed to the server and is hosted on the server and it is displayed in the web page to the user by importing the user credential.

V. CONCLUSION

The system is capable of accurate positioning eye point. Using four parameters of eye states can effectively detect the driver's fatigue status. In order to improve the accuracy grade, our system should be using some other methods as a supplementary means, such as

- Road tracking.
- Head position.
- The rotation rate and the grip force of the steering wheel, which are the main directions to improve our system accuracy.
- DDDS offers a non-intrusive approach to detect drowsiness without the annoyance and interference, processing, judges the driver's alertness level on the basis of continuous eye closures.
- In future, this prototype can be extended to give alarm before sleeping by calculating the heart beat measure without physical disturbance i.e., non-intrusive method using modified ECG methods. Usually in ECG method key points of body (For example chest, head, wrist etc.,) are stocked with wire. In the extended method, sticking wire may be avoided.
- In the extended method, sticking wire may be avoided. This will lead us to a way to find out the optimum level of drowsiness. Further, this prototype will be extended to monitor the reflect ray from eye using nano camera.
- If the reflection ray is absent, then eye is closed otherwise eye is opened. we believe that this will create a better opportunity to detect drowsiness.

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Water Pollution Monitoring RC Boat

Akshatha N.M[1], Akshay Baby[2], Abhijith P[2], Alphin Patric P[2], Anurag[2]

[1]Assistant Professor, Department of E & E, YIT, Moodbidri, Karnataka, India
[2]Student, Department of E & E, YIT, Moodbidri, Karnataka, India

ABSTRACT

In the traditional times water quality monitoring was a very big issue. People were collecting samples from the water bodies and then samples were taken to the laboratories. This resulted in more cost, more man power requirement and more time. The major issue was real time data could not be delivered. Traditional methods for Water Quality Monitoring had these disadvantages due to which modern methods are used now. In modern methods wireless sensor network is used which sends data wirelessly to the user from base station. It has far better performance as compared to traditional methods of water quality monitoring .It requires lesser cost, lesser manpower, lesser time and most importantly delivers data in real time. This method of water quality monitoring is far more efficient than traditional method. The model developed is used for testing water samples and the data uploaded over the internet are analyzed.The system also provides an alert to a remote user when there is a deviation of water.quality parameters from the pre-defined set of standard values. This device will surf on the water bodies and will provide the required measurement data for the given parameters and will also self analyse and inform accordingly.

Keywords- Water quality monitoring, water pollution, mobile labs,water quality.

I. INTRODUCTION

Ensuring the safety of water is a challenge due the excessive sources of pollutants, most of which are man-made. The main causes for water quality problems are over-exploitation of natural resources. The rapid pace of industrialization and greater emphasis on agricultural growth combined with latest advancements, agricultural fertilizers and non-enforcement of laws have led to water pollution to a large extent. The problem is sometimes aggravated due to the non-uniform distribution of rainfall. Water quality is affected by both point and non point sources of pollution, which include sewage discharge, discharge from industries, run-off from agricultural fields and urban run-off. Other sources of water contamination include floods and droughts and due to lack of awareness and education among users. The need for user involvement in maintaining water quality and looking at other aspects like hygiene, environment sanitation, storage and disposal are critical elements to maintain the quality of water resources. Poor water quality spreads disease, causes death and hampers socioeconomic progress. Around 5 million people die due to waterborne diseases around the world (Water Resource Information System of India, 2017). Fertilizers and pesticides used by farmers can be washed through the soil

by rain, to end up in rivers. Industrial waste products are also washed into rivers and lakes. Such contaminants enter the food chain and accumulate until they reach toxic levels, eventually killing birds, fish and mammals. Chemical factories also dispose of waste in the water. Factories use water from rivers to power machinery or to cool down machinery. Raising the temperature of the water lowers the level of dissolved oxygen and upsets the balance of life in the water (Central Ground Water Board, 2017). All the above factors make water quality monitoring essential.

II. METHODOLOGY

The water quality is measured using temperature,turbidity and pH sensors placed on the boat for real time water quality monitoring.Sensors are interfaced to the micro-controller, which is programmed preferably with python language.Sensor interfaced with the Arduino board measures the values from the water,if the measured value has high deviation from the acceptable level that is safe drinking water parameter ,an alert message is given to the user.The Arduino UNO board makes a comparison of the measured values from the sensor and the drinking water parameters and through a WiFi module that's connected to the internet and displays the result in the cloud and finally the alert message with the required data analysis is received at the end user.
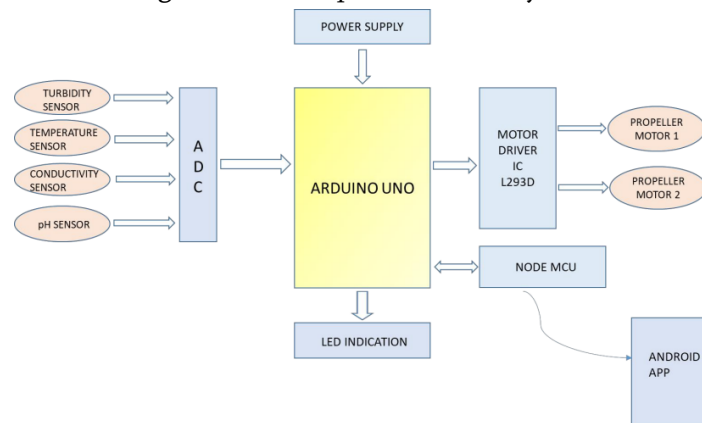

Fig 1:Block diagram of water pollution monitoring RC boat

pH sensor

The pH of a solution is the measure of the acidity or alkalinity of that solution. The pH scale is a logarithmic scale whose range is from 0-14 with a neutral point being 7. Values above 7 indicate a basic or alkaline solution and values below 7 would indicate an acidic solution. It operates on 5V power supply and it is easy to interface with arduino.The normal range of pH is 6 to 8.5.

Turbidity sensor

Turbidity is a measure of the cloudiness of water. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Turbidity blocks out the light needed by submerged aquatic vegetation. It also can raise surface water temperatures above normal because suspended particles near the surface facilitate the absorption of

heat from sunlight

Temperature sensor

Water Temperature indicates how water is hot or cold. The range of DS18B20 temperature sensor is -55 to +125 °C. This temperature sensor is digital type which gives accurate reading

Conductivity sensor

Conductivity is the measurement of the solution or substance's ability to carry or conduct an electric current. Conductivity sensors are used to measure conductivity in aqueous solutions to determine the purity or impurity of a liquid.

Arduino UNO

Arduino is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

Wifi module

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

Each ESP8266 module comes pre-programmed with an AT command set firmware. The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community

ARDUINO SOFTWARE

The arduino software (IDE) is an open source software, which is used to programme the Arduino boards, and is an integrated development environment, developed by Arduino . Allow to write and upload code to arduino boards. And it consist of many libraries and a set of examples of mini projects.

III. APPLICATIONS

1. Optimum water quality is a pre-requisite for high yield of crop production based on the crop to be cultivated, the sensors and probes can be used to identify impurities that can hamper it's growth.
2. Aquaculture refers to the breeding of aquatic organism like fishes, under a controlled environment. Quality of water plays an essential facilitating the growth of healthy fishes in large numbers so that they can be used as a livestock.

IV. RESULT AND DISCUSSION

It is identified that a suitable implementation model that consists of different sensor devices and other modules, their functionalities are shown in figure. In this implementation model we used ATMEGA 328 with Wi-Fi module. Inbuilt ADC and Wi-Fi module connects the embedded device to internet. Sensors are connected to Arduino UNO board for monitoring, ADC will convert the corresponding sensor reading to its digital value and from that value the corresponding environmental parameter will be evaluated. After sensing the data from different sensor devices, which are placed in particular area of interest. The sensed data will be automatically sent to the web server, when a proper connection is established with sever device.

V. CONCLUSION

Water-quality observing is utilized to caution about the rising water quality issues; to decideconsistence with drinking water principles and to protect water from becoming polluted by heavy metals. Water quality monitoring results help the administrators to decide whether water quality is showing signs of improvement or not.

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Fingerprint and RTC Based Biometric Attendance System

Ashitha,¹ Akhil Shetty², Hithesh A Acharya², Prajwal², Raviraj², Raghu²

¹Assistant Professor, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Karnataka, India
²Final Year Students, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Karnataka, India

ABSTRACT

We humans have successfully made the conventional aspect much easier and better by incorporating technology. Manually taking attendance is a time consuming process in schools and colleges, our system provides instant and automated attendance marking in such cases. Institutions / Organizations will benefit from this system by keeping track of attendance data in real-time, Signing into the system will take the form of a thumb impression. This system comprises of a biometric participation framework that permits for programmed participation stamping by utilizing fingerprints. Each student will enroll his/her unique fingerprint mark with an authorization of their claim as fingerprints that's utilized to record his/her attendance. Each authorized student who has enrolled their finger, their subtle elements are bolstered in it with their name / roll number. In unique mark (i.e., fingerprint) attendance framework circuit, Sensor module is utilized to confirm a genuine individual or student by taking their finger input within the system.

Keywords: Fingerprint Attendance System, Biometric Student Registration, RTC, Arduino.

I. INTRODUCTION

The Attendance systems are commonly used systems to mark the presence in collages, offices and schools. From manually marking the attendance in attendance registers to using high-tech applications and biometric systems, these systems have improved significantly. Fingerprint Module and Arduino to take and keep attendance data and records. By using fingerprint sensor, the system will become more secure for the users. Fingerprint sensor module captures finger's print image and then converts it into the equivalent template and saves them into its memory as per selected ID by Arduino and stores as unique ID of an individual.

Here 4 push buttons are used to enroll, Delete, UP/Down. ENROLL and DEL key has triple features. ENROLL key is used for enrolment of a new person into the system. When the student wants to enrol new finger then he/she need to press ENROLL key then LCD asks for the ID, where user want to be stored the finger print image. Now if at this time user does not want to proceed further then he/she can press ENROLL key again to go back. This time ENROLL key behave as Back key, i.e., ENROLL key has both enrolment and back function. Besides enroll key is also used to download attendance data over serial monitor. Similarly, DEL/OK key also has the same double function like when user enrolls new finger, then he/she need to select finger ID by using

another two keys namely UP and DOWN. Now user need to press DEL/OK key (this time this key behaves like OK) to proceed with selected ID. And Del key is used for reset or delete data from EEPROM of Arduino.

II. METHODOLOGY

A. Block Diagram

In Fingerprint Sensor Based Biometric Attendance System using Arduino, Fingerprint Sensor module is used to authenticate a person or employee by taking their finger input in the system.
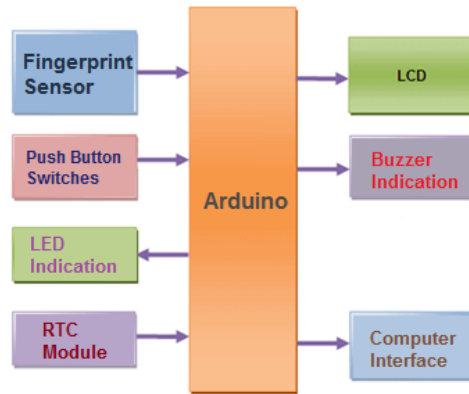

Fig. 1: Block diagram for Fingerprint & RTC based Biometric Attendance System

Here 4 push buttons are used to register new fingerprint or delete stored fingerprint or match stored fingerprint. The 4 push buttons are used as an input unit for these tasks. Similarly, RTC Module DS3231 is used for registering scanning/entering/existing time of the user.

The LCD displays the time record and every function happening via push button. Buzzer indicates different functions and happening whenever an interrupt is detected. The LED is used for power indication.
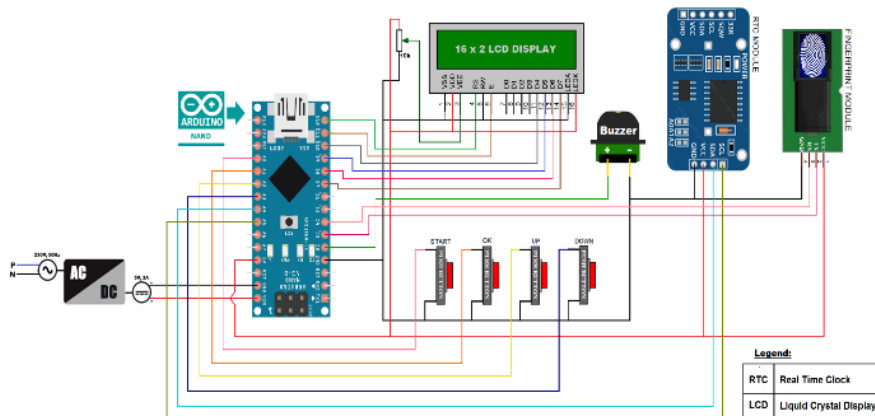
B. Circuit Diagram

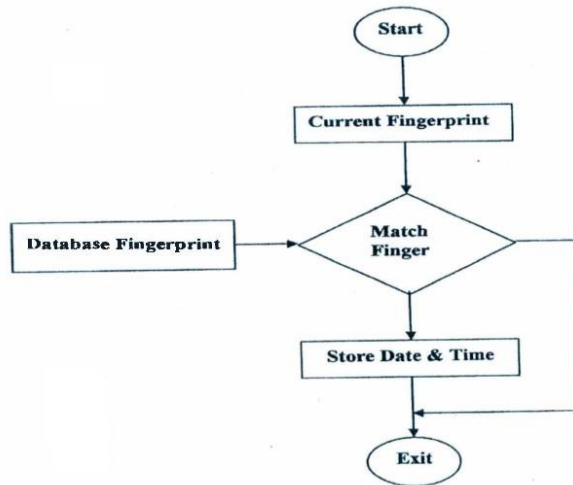Fig. 2: Connection/Circuit diagram for Fingerprint & RTC based Biometric Attendance System

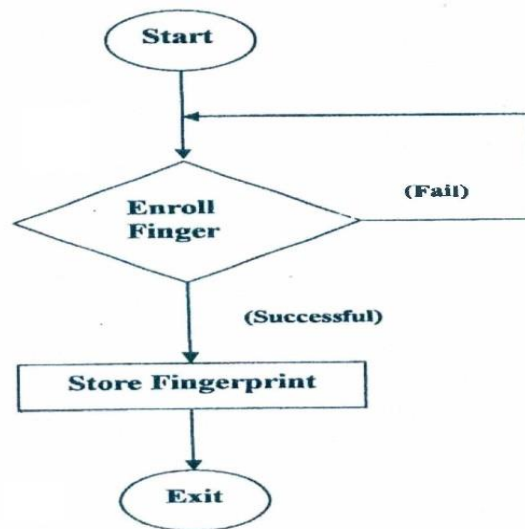Fig. 3: Flow chart of fingerprint matching (Attendance)

Fig.4: Flow Chart of Fingerprint

In this system, DS3231 RTC Module is used for time & date display. 1 LED is used for power indication, 1 buzzer for different function indication. 16*2 LCD is interfaced and displays everything whenever the finger is placed or removed, or registering attendance or downloading data.4 push buttons are used to control the entire system.

The functions of each button are:

1. Register/Back Button – Used for enrolling new fingerprint as well as reversing the back process or going back

2. Delete/OK Button – This Button is used for deleting the earlier stored fingerprint system as well as granting access as an OK selection.

3. Forward Button – Used for moving forward while selecting the memory location for storing or deleting fingerprints.

4. Reverse Button – Used for moving backward while selecting memory location for storing or deleting fingerprints.

● **Enrolling New Fingerprint:**

To enrol New Fingerprint, click on the Enrol button. Then select the memory location where you want to store your fingerprint using the UP/DOWN button. Then click on OK. Put your finger and remove your finger as the LCD instructs. Put your finger again. So finally, fingerprint gets stored.

● **Deleting Stored Fingerprint:**

To delete the fingerprint which is already clicked on DEL Button. Then select the memory location where your fingerprint was stored earlier using the UP/DOWN button. Then click on OK. So finally, your fingerprint is deleted.

● **Downloading Data:**

Simply click on Register/Back Button and reset the button together. At this movement, the serial monitor should be opened.

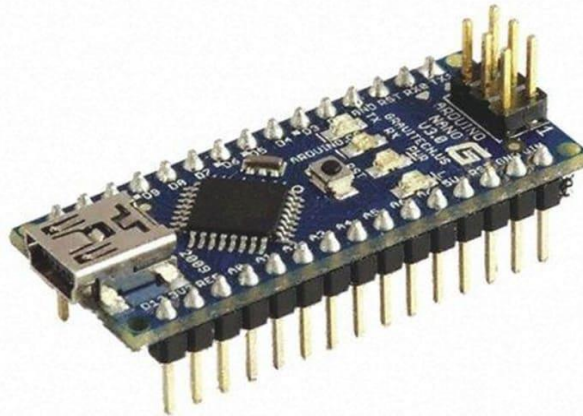## III. COMPONENT DESCRIPTION

A.   **Arduino:**

Fig.5: Arduino

Table 1: Arduino Specifications

Pin No.	Name	Type	Description
1-2, 5-16	D0-D13	I/O	Digital input/output port 0 to 13
3, 28	RESET	Input	Reset (active low)
4, 29	GND	PWR	Supply ground
17	3V3	Output	+3.3V output (from FTDI)
18	AREF	Input	ADC reference
19-26	A0-A7	Input	Analog input channel 0 to 7
27	+5V	Output or Input	+5V output (from on-board regulator) or +5V (input from external power supply)
30	VIN	PWR	Supply voltage

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3. x). Released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor.. It works with a Mini-B USB cable instead of a standard one. The Arduino Nano is equipped with 30 male I/O headers, in a DIP30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline.

B. Finger Print Sensor Module - R307:

Fig. 6: R307 Finger Print Sensor Module

R307 Fingerprint Module consists of optical fingerprint sensor, high-speed DSP processor, high-performance fingerprint alignment algorithm, high-capacity FLASH chips and other hardware and software composition, stable performance, simple structure, with fingerprint entry, image processing, fingerprint matching, search and template storage and other functions. This is an updated Improved Compatible version for the R305 Finger Print Sensor Module

Table 2: R307 Finger Print Sensor Module Features

Module Feature	Capacity/Condition
Storage Capacity (Fingerprints)	1000
3.3V Operation	Yes
USB Operation	Yes
Finger Detect Output	Yes

R307 is a finger print sensor module with TTL UART interface. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The FP module can directly interface with 3v3 Microcontroller. A level converter (like MAX232) is required for interfacing with PC.

The R307 fingerprint module has two interface TTL UART and USB2.0, USB2.0 interface can be connected to the computer; RS232 interface is a TTL level, the default baud rate is 57600 , can be changed, refer to a communication protocol ; can And microcontroller, such as ARM, DSP and other serial devices with a connection, 3.3V 5V microcontroller can be connected directly. Needs to connect the computer level conversion, level conversion note, embodiments such as a MAX232 circuit.

Features: -

Supply voltage: DC 4.2 ~ 6.0V

Supply current: Working current: 50mA (typical) Peak current: 80mA

Fingerprint image input time: <0.3 seconds

Window area: 14x18 mm

Matching method: Comparison method (1: 1)

Search method (1: N)

Characteristic file: 256 bytes

Template file: 512 bytes

Storage capacity: 1000 pieces

Security Level: Five (from low to high: 1,2,3,4,5)

Fake rate (FAR): <0.001%

Refusal rate (FRR): <1.0%

Search time: <1.0 seconds (1: 1000 hours, mean value)

Host interface: UART \ USB1.1

Communication baud rate (UART): (9600xN) bps Where N = 1 ~ 12 (default N = 6, ie 57600bps)

Working environment: Temperature: -20 ℃ - +40 ℃ Relative humidity: 40% RH-85% RH (no condensation)

Storage environment: Temperature: -40 ℃ - +85 ℃ Relative humidity: <85% H (no condensation)
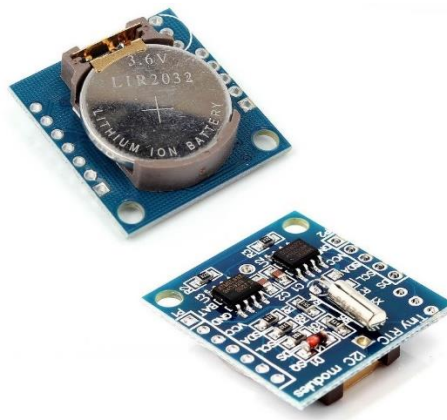
C.   DS1307 Real Time Clock (RTC) Module:

Fig. 7: DS1307 Real Time Clock Module

The DS1307 serial real-time clock (RTC) is a low power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially through an I2C, bidirectional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12- hour format with AM/PM indicator. The DS1307 has a built-in power-sense circuit that detects power failures and automatically switches to the backup supply. Timekeeping operation continues while the part operates from the backup supply.

Specifications and Features: -

DS1307 I2C real-time clock chip (RTC)

AT24C32 32K I2C EEPROM memory

Two wire I2C interface.

Hour: Minutes: Seconds AM/PM.

Day Month, Date - Year.

DS1307 based RTC.

1Hz output pin.

56 Bytes of Non-volatile memory available to user.

The DS1307 is accessed via the I2C protocol.

Compact design, 27mm * 28mm * 8.4mm

D. LCD Display:

Fig. 8: LCD display (2x16 line)

16×2 LCD is a basic 16 character by 2 line display Yellow/Green Backlight. Utilizes the extremely most common HD44780 parallel interface chipset (datasheet). Even more, it has JHD162A Compatible Pinout Diagram, and Command Interface code is freely available. Finally, you will need 7 general I/O pins (If used in 4-bit Mode) to interface to this LCD screen. It also includes an LED back-light.

This JHD162A 16x2 LCD display has the outline size of 80.0 x 36.0 mm and VA size of 66.0 x 16.0 mm and the maximum thickness is 13.2 mm. 16x2 LCD Displays are built-in controller HD44780 or equivalent. It is optional for + 5.0 V or + 3.0 V power supply. The LEDs can be driven by pin 1, pin 2, or pin 15 pin 16 or A/K. 16×2 LCD Display Support mostly All Digital Microcontrollers such as Arduino, 8051, PIC, AVR, ARM, MSP, COP8, STM, Raspberry Pi, etc.

IV. CONCLUSION

Biometric attendance system with RFID distance reader will revolutionize the attendance process in various fields. It will offer a better inexpensive method to reduce the conventional system drawbacks. Secure registration of attendance is offered by this system.

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Remote Controlled Smart Dustbin

Mr.Yogesh Rao[1], Mr.Abhijith Ani[2], Mr.Akarsh V.K[2], Mr.Gopakumar M. S[2], Mr.Muhammed Midhilaj[2]

[1]Assistant professor, Department of EEE, Yenepoya Institute of Technology, Thodar, Moodbidri D.K, Karnataka, India

[2]Department of EEE, Yenepoya Institute of Technology, Thodar, Moodbidri D.K, Karnataka, India

ABSTRACT

The project's main objective is to design a smart dustbin that will help keep the environment clean and eco-friendly. In this system, a Remote-controlled smart dustbin using ARDUINO UNO, along with an ultrasonic sensor, servo motor, GSM module, Bluetooth module, and motor drive is built. In this system, the dustbin lid will open when someone comes nearer to the bin, after placing the garbage the lid will close. It will alert the authority when the dustbin is filled. Segregation of waste material is carried out by the moisture sensor and IR sensor.

Keywords- Ultrasonic sensor, ARDUINO UNO, servo motor, GSM module, Bluetooth module

I. INTRODUCTION

The rate of increasing population in our country has increased rapidly and also the increase in garbage has increased environmental issues. The dustbin is a container that collects garbage or stores recyclable or non-recyclable, decompose or non-decompose. They are usually used in homes, office, etc, but in case they are full no one is there to clean them and the garbage are thrown out. The surrounding of a dustbin is also conducive to increasing the pollution level. Pollution due to a dustbin can produce bacteria and viruses which can produce life harmful diseases for humans.

Therefore, we have designed a smart dustbin using ARDUINO UNO, ultrasonic sensor which will sense the item to be thrown in the dustbin and open the lid with the help of the motor.

Therefore, a Remote-controlled smart dustbin using ARDUINO UNO, ultrasonic sensor, GSM module, Bluetooth module, and Motor Drive, will sense the item to be thrown in the dustbin and open the lid with the help of the motor. It alerts the authority when the dustbin is filled up to a specified level, so the authority can remove the waste. It also segregates the waste materials as wet and dry materials and dumps them into separate boxes provided.

It is a decent gadget to make your home clean, due to practically all offspring of home consistently make it grimy and spread litter to a great extent by electronics, rappers, and various other things. Since the smart dustbin is additionally intriguing and children make fun with it so it will help to maintain cleanliness in the home.

II. METHODOLOGY
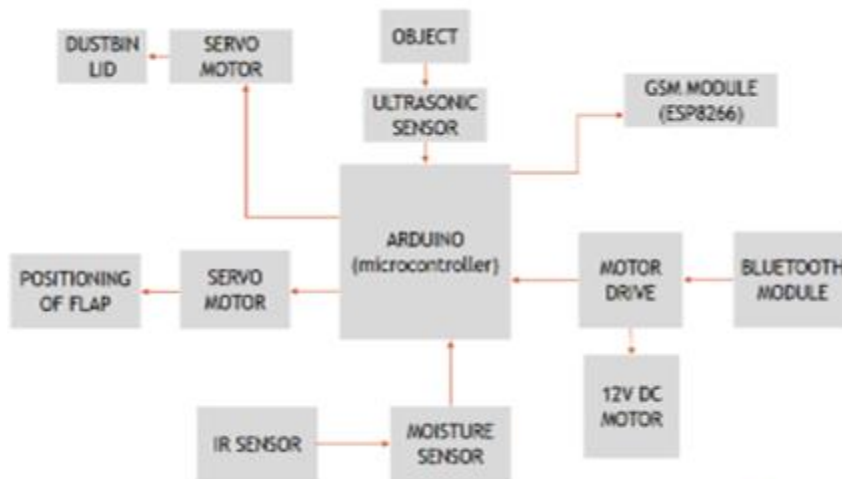
When an object get detects in front of the dustbin it sends a signal to the Arduino which acts as a Controller and automatically opens the lid. There are two types of sensors used here to detect the waste material and dump it in a specific box. The moisture sensor detects dry and wet materials. Then it sends the information to the Arduino modules to direct the servo motor to position the flap to dump the waste into the separate box provided. Ultrasonic is placed inside the dustbin to determine the level of garbage-filled. When the garbage level reaches the specified level then the ultrasonic sensor alerts the Arduino that the bin is full, then Arduino passes this message to the GSM module. GSM provides a data link to a remote network. Since the GSM module is provided with a SIM card that links the data to the user, the message is received to the authority that the bin is full. So, the authority can remove the waste quickly. To control the dustbin, an application connects with the Bluetooth module. The driving of the wheels provided to the dustbin is controlled by the motor drive while it gets information from the Bluetooth module.

1. ARDUINO UNO

Arduino is an 8-bit microcontroller board based on the ATmega328P. The operating voltage is 5V. It has 14 pins digital input-output pins (Of which can be used 6 as PWM output). The oscillator frequency is 1 MHz It contains everything needed to support the microcontroller simply connect it to a computer with a USB cable. It has 6 analog input pins. The Diagram of Arduino is as shown in fig. 2.1

Feature

- Operating voltage is 5v.
- DC per input pin is 40mA.
- Clock speed16MHz.
- DC for 3.3v pin is 50mA.
- SPAM 2 KB
- EEPROM 1KB

Fig 2.1

2.   ULTRASONIC SENSOR

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound. The Diagram of the ultrasonic sensor is shown in fig. 2.2.

Fig 2.2

3.   SERVO MOTOR

A servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. The Diagram of the servo motor is shown in fig 2.3.

Fig 2.3

4.   GSM MODULE

A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the view of the mobile phone network, they are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network. GSM modems

typically provide TTL-level serial interfaces to their host. They are usually used as part of an embedded system. A Diagram of the GSM module is shown in fig 2.4

Fig. 2.4

5. BLUETOOTH MODULE

HC-05 Bluetooth Module is an easy-to-use Bluetooth SPP (Serial Port Protocol) module, designed for a transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with the controller or PC. HC-05 Bluetooth module provides a switching mode between master and slave mode which means it can use neither receiving nor transmitting data. The diagram of the Bluetooth module is shown in fig4.5
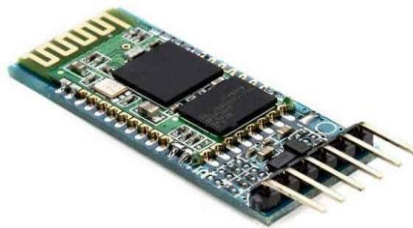

Fig.2.5

6. MOTOR DRIVE

This L298N Based Motor Driver Module is a high-power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L298 motor driver IC and has the onboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control. The diagram of the motor driver is as shown in fig. 4.6
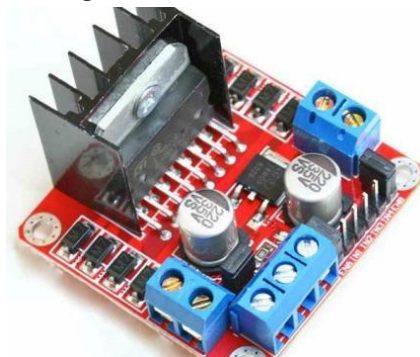

Fig. 2.6

7.   12V DC MOTOR

At our lowest voltage offering, the 12-volt dc motor is ideal for applications with a DC power supply requiring high starting and running torque. Our 12vdc motors are capable of operating at much slower speeds than our other DC motor voltages. The diagram of the 12v DC motor is as shown in fig. 4.7

Fig 2.7

8.   MOISTURE SENSOR

This sensor measures the volumetric content of water inside the soil and gives us the moisture level as output. The sensor is equipped with both analog and digital output, so it can be used in both analog and digital modes.

Fig 2.9

III. APPLICATION

- Used in the management of waste materials accordingly to the type of waste that is thrown off.
- Used in gathering places such as malls, offices, etc.
- Segregation makes recycling easier.
- To reduce pollution and maintains good public health.
- Can be used widely in hospitals since a large number of hazardous wastes are thrown out.
- Authority gets alert soon as the bin is filled and can be cleared without leaving a space for flies.

IV. CONCLUSION

There is the production of 62 million tons of municipal solid waste (MSW) each year in Urban India. 70% of which is collected and 20% gets treated. Hence this indicates the increase in requirement for efficient processing of the waste to maintain ecological balance. The model developed is efficient and durable since it requires less power for its operation and no human supervision. The model can also detect when the bin is full asking the authorities to come and collect. At the industrial level methods used for the segregation of waste are

hazardous to human health and also the process involves manual effort and also complete segregation is not obtained. By segregating waste at the root source, not only can waste be recycled but the beauty of the surroundings can be maintained.

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Wireless Charging Electrical Vehicle Technology

Sudhir P[1], Aksahy[2], Navaneeth[2], Rizwan[2], Ujwal[2]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Yenepoya Institute of Technology, Moodbidri, Mangalore Taluk- 574225, Karnataka, India

[2]Final Year Students, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Yenepoya Institute of Technology, Moodbidri, Mangalore Taluk- 574225, Karnataka, India

ABSTRACT

Wireless power transmission (WPT) is a rapidly developing technology with numerous uses. Without the use of connectors, power is transmitted from a power source to a power load. When physical wiring is neither practical or convenient, WPT can be used to power electrical devices. The mutual inductance principle is used in this technology. Electric vehicles are one of the potential applications in the automobile industry. This paper is about the creation and research of Modern wireless charging solutions for electric vehicles that transmit data wirelessly. The basic purpose is to use resonance coupling to convey electricity and to construct charging systems. An AC source, transmission coil, reception coil, converter, and electric load are all required for wireless charging.

Keywords – Wireless power transmission, voltage sensor, transmitter and receiver circuit.

I. INTRODUCTION

Automobiles have been used to transport people from one location to another for a long time.. Internal combustion (IC) engines are used to power these vehicles. Because of the rising number of automobiles, IC engines pollute the environment, and fossil fuels are used less. The latest automotive technology are assisting in improving fuel efficiency and lowering pollution. Hybrid automobiles, for example, are vehicles that utilise both internal combustion engines and electric motors to drive them, reducing pollution while retaining engine efficiency However, in the future, the focus will be on clean, green energy that creates no emissions. Design and construction of electric vehicles have sparked a lot of interest in the current sector. The main drawbacks of battery-powered vehicles are their high cost, limited range, and lengthy charging times. Consumers are constantly on the lookout for new solutions to make travel more efficient. As a result, every gas station now has a wired charging system. Wired charging has some drawbacks, including as plug points, charging station spacing, wire range constraints, and vehicle orientation changes to connect to the charger.

II. METHODOLOGY

The Wireless Power Transfer and Charging Module can be utilised for close wireless charging or power delivery in common electronic equipment. It consists of a transmitter and receiver as well as a coil and might be used to replace a Wireless Power Supply with a constant 5V output voltage and maximum 600mA output current. Its tiny size and insulating coil make it ideal for wireless applications. This module transfers electric energy between a transmitter and a receiver circuit using an electromagnetic field. Within the transmitter circuit, a 12V induction coil produces an alternating electromagnetic field. The second induction coil transforms power from the electromagnetic field into electrical current for the receiver circuit, which produces 5V – 600mA.There will be losses during any energy conversion from one form to another. The extent of the losses determines whether or not wireless charging is possible.
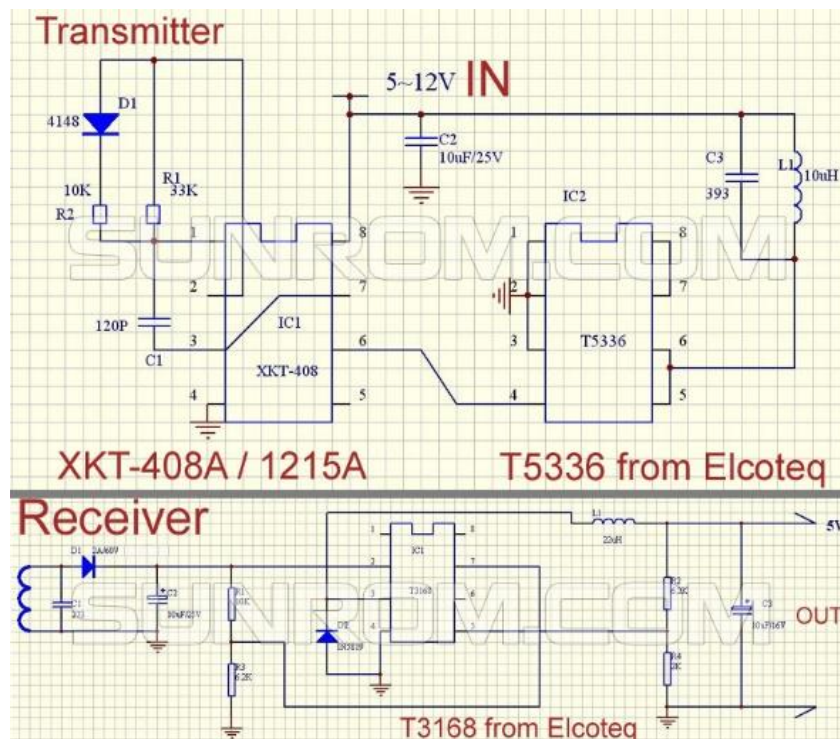
A.　Circuit Diagram

Fig1: Circuit diagram for transmitter and receiver side

For a long time, magnetic or inductive charging has been Several types of biomedical implants have been successfully powered using this technology. It is now the most secure and long-lasting method of delivering energy to the inside of the body. In these setups, a changing magnetic field is generated by oscillating current in an external wire coil, which induces a voltage inside an implanted coil. The current generated by this voltage can be used to charge a battery or immediately power the gadget. The spacing between the transmitter and receiving coils should be between 1 and 20 mm. When low current is appropriate in your application, To improve the transmission distance, increase the number of turns on the reception coil. The receiver's current capacity diminishes as the distance between them grows. With a separation distance of less than a quarter of a wavelength, efficiencies of up to 35% can be achieved.
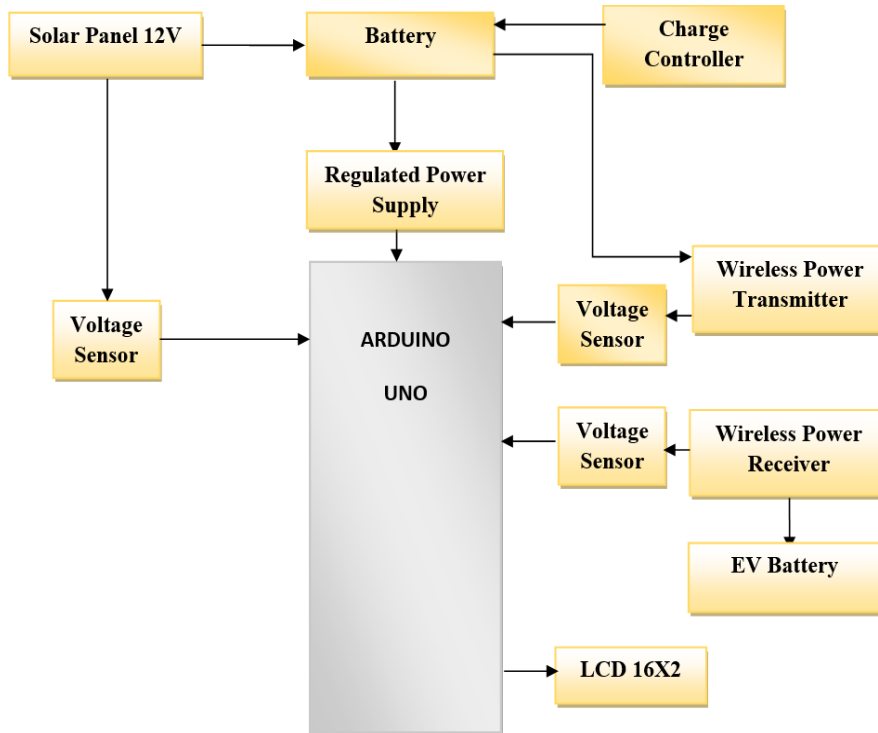
B.   Block diagram

Fig2: Block diagram representation of EV technology

III. DESIGN OF TRANSMITTER AND RECEIVER COIL

The fundamental equation governing power transfer is are given by

$V_1 = j\omega M I_2$ and $V_2 = j\omega M I_1$

The quality factor determines the level of correction as well as the secondary inductance. The secondary quality factor usually ranges from 2 to 10. The frequencies of the primary and secondary resonances are determined by

$$\omega_0 = \frac{1}{\sqrt{c_2 L_2}}$$

For equal number of primary and secondary turns

$L1 = L2$

The primary capacitance is decided based on the type of compensation used. For series-series topology

$$C_1 = \frac{C_2 L_2}{L_1}$$

The secondary to primary reflected impedance can be determined by

$$Zr = \frac{\omega^2 M^2}{z_2}$$

where z_2 is the secondary network impedance.

The flow of electricity from the main to the secondary is determined by

$$P = (\text{Re } Z r) I_1^2$$

At the resonance condition with unity power factor, the efficiency is

$$\eta = \left[\frac{\omega_0 M^2}{R_1(R_2 + R_{ac}) + \omega_0 M^2}\right]\left[\frac{R_{ac}}{R_2 + R_{ac}}\right]$$
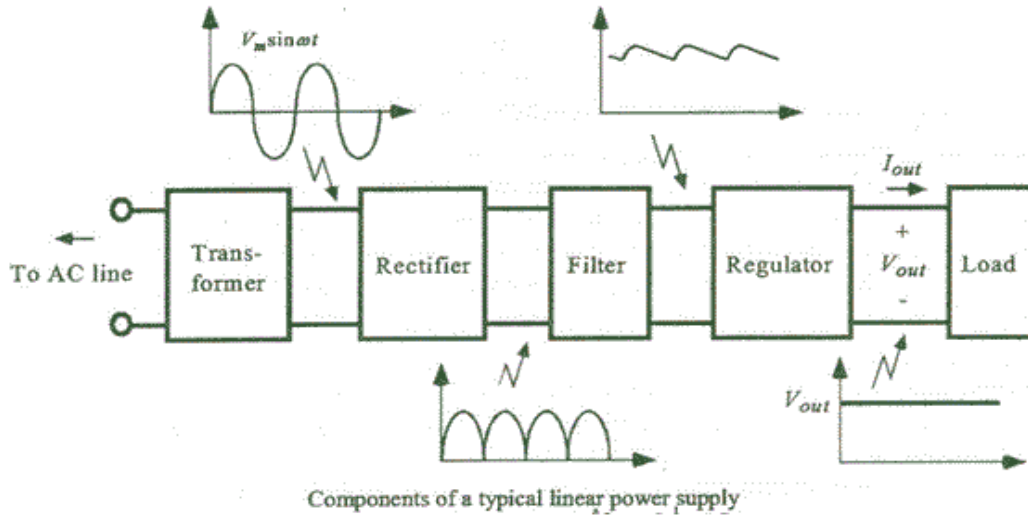
C. Regulated power supply

Fig3: Block diagram of regulated power supply
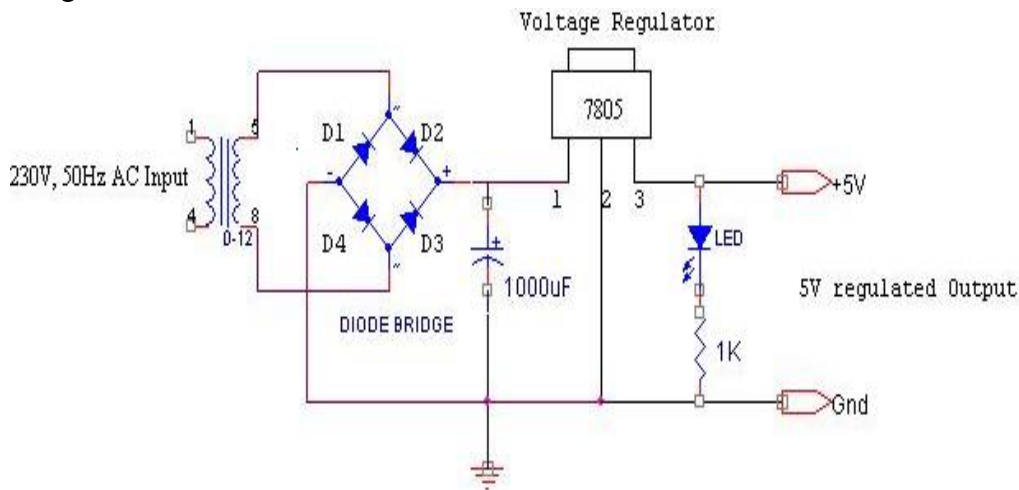
D. Schematic diagram

Fig4: Schematic diagram of regulated power supply

E. The essential components of a regulated dc power supply are as follows:

1. A step-down converter
2. An inverter
3. A direct current filter
4. A Regulator

F. Regulated power supply operation

An electronic circuit made up of diodes performs the rectification process. The conversion of an alternating voltage or current into a direct current (dc) amount is known as rectifying. A rectifier accepts ac as an input

and produces unidirectional pulsing dc as an output. A full wave rectifier or a bridge rectifier is typically used to correct both half cycles of the ac supply.

To make a bridge rectifier, four p-n junction diodes are connected in the way shown above. During the positive half cycle of the supply, the voltage induced across the secondary of the electrical transformer, VMN, is positive.

IV. SPECIFICATIONS

Transmitter Input Voltage	+12V DC
Maximum Transmitter Input Voltage	+13.5V DC
Receiver Output Voltage	+5V DC regulated fixed
Maximum Receiver Current Capacity	600mA (Based on distance)
Coil Inductance	30uH
Transmit Receive Distance	1-20mm
Transmitter Input Voltage	+12V DC

V. CONCLUSION

As EV technology, charging infrastructure, and grid integration facilities improve, EV popularity is expected to skyrocket in the following decade. Because it is spark-free, wireless charging has sparked a lot of interest in this context. Environment-unaffected and appropriate for autonomous operations Wireless charging has the ability to improve energy efficiency, lower environmental impact, lower life cycle costs, and improve convenience and operational safety.

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IOT Based Power Conductor Breakage and Accident Avoidance

Jayashri P[1], Arju M Nair[2], Sandeep S[2], P Sree Prasad[2], Vishnu M[2]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Karnataka, India

[2]Final Year Students, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Karnataka, India

ABSTRACT

Many times, there are articles in newspapers that Humans & Animals die due to electrical shock in remote areas or in agricultural areas as contact with broken & hanging live supply wires. Safety circuitry of Distribution Company is inadequate and due to this line remains live with broken wires. This paper describes a modification to existing power distribution system with remote telemetry unit for wire break detection and a power supply breaking mechanism. Any fault over these medium voltage lines is only governed by fuses and only if a short circuit occurs, the line get disconnected. These propose a modification to the existing power distribution system using Current Sensors, Arduino, IoT technology and WIFI modules which breaks the power supply and avoids electrical accidents due to overhead transmission lines breakage problems. Circuit breaker with shunt trip mechanism breaks the supply and avoid damages from electrical accidents due to overhead transmission lines conductor breakage problems which will operate on open circuit principle rather than short.

Keywords- Current sensors, Arduino, IoT technology, WIFI modules.

I. INTRODUCTION

Safety is a core factor in power system design and operation. Every possible measure is taken in this regard. But detection and prevention of high impedance faults still remains a challenge. This is mainly due to its low fault current which makes it unable to detect it through conventional over current protection devices. Though the fault current is small, still they are a clear danger to the public and property and need to be cleared immediately.

At present, the overhead power transmission and distribution system is not sufficiently safe for any disaster of physical breakage of overhead transmission lines and due to this many people die due to electric shock hazards. Medium voltage 440 volts line is distributed through 11kV/440V transformers which are not governed for any centralized protection. Any fault over these medium voltage lines is only governed by fuses and only if a short circuit occurs, will the line get disconnected.We propose a modification to the existing power distribution system using Current Sensors, Arduino and IoT technology,which breaks the power supply and avoids electrical accidents due to over head transmission lines breakage problems.

Presently there is no power supply breaking mechanism for distribution transformers. Substation comprises of primary distribution transformers of 33kV/11kV and 11 kV line is transmitted up to max. 6km and secondary

distribution transformers of 11kV/440V are used for end customers and the power lines are of 1 km to 1.5 km length from the secondary distribution transformers.

When any short circuit fault occurs over 11kV line substation Vacuum circuit breaker (VCB) trips by earth fault. And when earth fault gets cleared, only then can the vacuum circuit breaker (VCB) be charged. In case a short circuit occurs over medium voltage (MV) 440 volts line, only fuses of the distribution transformer are blown. At present there is no tripping or breaking mechanism for live open circuited hanging wires, and fuses operate only when supply gets ground path after short circuit (heavy flashover) and can cause accidents and fires. Also any mishaps on medium voltage (MV) line are not indicated to substation, and operator has no control over faulty line.

Overhead lines which are exposed to the outdoor are vulnerable to external and environmental interferences, such as adverse weather, fallen tree branches, and other potentially obstructive objects. Short-circuit faults on distribution lines can be readily detected and cleared by overcurrent and earth fault protection whereas open-circuit faults on distribution lines are challenging to detect.
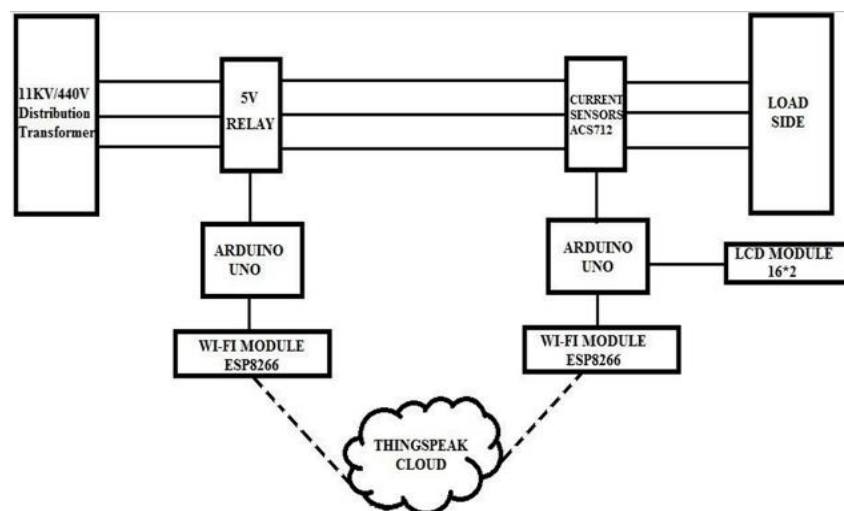
II. METHODOLOGY

Fig 1: Bock diagram of the proposed scheme

The 11kV/440V transformer provides supply to the load side. In India, there are no protective measures for open conductor fault detection. Also most of the times the line to ground fault doesn't cause circuit breaker to trip off. Our project has the capability to be a one stop solution for both open conductor fault as well as short circuit fault, based on how we program the arduino to interpret the output of the current sensor. This is the layout of our proposed project. Current sensors are placed on all the three phases of the distribution transformer, and its output is continuously fed to the input port of the arduino. The current sensor's output is a voltage between 2.5 V and 5 V depending on the current flowing through it. During normal operation, the power output of the current sensor will be above a base value, depending on the wattage of the load used, which has been found out through trial and error. During an open conductor fault, which is simulated using a

switch, the power output of the current sensor falls below the base value. The arduino has been programmed to display on the LCD screen the current status of each phase, based on the logic that if the power output is above the base value then that phase is 'ON' and that if the power output is below the base value, then the phase is 'OFF'.

The arduino sends the current phase status to the ESP8266 module on the load side, which is connected through a Wi-Fi connection to an online cloud, 'ThingSpeak'. The ESP8266 will establish a connection to the server only if there is a difference in the current and previous status value of at least one phase. The changed phase status values will be updated on the server at a minimum time gap of 20 seconds, and these values are plotted into points on the phase status chart by the cloud. A high of '5' on the chart denotes that that particular phase is 'ON' and a low of '1' denotes that that phase is 'OFF'. There are 3 phase status charts on the cloud, one for each phase.

The ESP8266 module on the distribution side maintains a continuous connection with the server and when the current status value differ from the previous status values, it extracts the appropriate value from the url of the cloud, and sends it to the arduino. If the arduino receives a 'HIGH' on a phase, then it does not act. When the arduino gets a 'LOW' on a phase, then it will send a pulse to the tripping coil of the respective relay so that it will trip, by changing the connection from the 'COMMON' terminal to the 'NORMALLY OPEN' terminal from the 'NORMALLY CLOSED' terminal. A push button has been provided for each relay to reset it after the fault on that line has cleared. The push button can also be used to trip the relay even in the absence of a fault, incase there is maintenance that has to be done to the distribution lines. We have also created an android app that can be downloaded onto any android phone, which can be used to monitor the three phase status charts on the cloud.

III. APPLICATION

- Used in transformers to avoid paper leakage.
- Used to determine if and in some cases where a break as occurred in transmission line.
- At natural disaster time, the workers can struggle to do their work. By applying this system, the workers burden is reduced as possible. A relay as auto trip the whole units, this can also reduce the works for authority.
- This system can move into next level generation of power line safety and protection. This prevention system also considered the workers of electrical power repair/installer. The coworkers can also identify problem.

IV. CONCLUSION

Open circuit detection of power line system at the last mile pole is very useful in avoiding transmission line breakage mishaps, compared to the short circuit fuse blowing mechanism which is currently used. The wireless communication between master and slave is possible by Wifi module and IoT. Also Wireless communication technology can be used over years without any maintenance. Current sensors detects open conductor fault and

the information is transferred to the master wifi module through IoT technology. Master sends tripping signal to the relays which isolates the broken live conductors from the supply.

The integration of breaking mechanism, wireless communication and open circuit detection will be quite effective in avoiding electrical accidents due to open hanging wires.The successful implementation of the system contributes to the improvement of supply reliability and reduction of hazards from downed conductor faults. This method is effective for both short circuit faults as well as open conductor (high impedance faults) faults. Hence accidents due to Downed conductors (line to ground faults) or open hanging wires can be avoided by adopting this technique.

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Face mask, Temperature Detection and Hand sanitizer system using Raspberry Pi

Mrs. Akshatha N M[1], Mohammed Faizal[2], Mohammed Mustafa Zameer[2], Semeer[2], Zakariya Mohammad[2]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, Yenepoya Institute of Technology, Thodar, Mijar P.O., Mangaluru Taluk- 574225, Karnataka, India

[2]Final Year Students, Department of Electrical and Electronics Engineering, Yenepoya Institute of Technology, Thodar, Mijar P.O., Mangaluru Taluk- 574225, Karnataka, India

ABSTRACT

The COVID-19 pandemic is causing a worldwide emergency in healthcare. The virus spreads mainly through droplets (saliva) which emerge from a person infected with the virus and poses a risk to others. The risk of transmission is highest in public places. According to the World Health Organization (WHO), the effective protection method is to wear a face mask in public areas. Keeping everyone's safety into consideration, each and everything is expected to be contactless. The model is a Computer Vision based automated system that focuses on real-time face monitoring of individuals to achieve a COVID-free environment. Automatic sanitization is performed when a person is wearing a face mask and their body temperature is within the threshold. If not, a buzzer will be engaged. In this project, we propose a method which uses TensorFlow and OpenCV to detect face masks on people. A bounding box drawn over the face of the person describes whether the person is wearing a mask or not.

Keywords - COVID-19, TensorFlow, OpenCV, face mask.

I. INTRODUCTION

The COVID-19, which originated primarily in Wuhan, China has rapidly spread to several countries, including India, the world's second-most populous country with a population of more than 134 billion people. With such a large population, India would have trouble preventing the spread of the coronavirus. Face masks and sanitizers are the most effective ways to minimize transmission [1]. The most powerful safety tool is wearing a face mask in public places and everywhere else. Individuals with high body temperature are not to be permitted to enter public places because they are at a high risk of infection and spreading the virus. At the entrances to any city, workplaces, malls, and hospital gates, temperature and mask checks are also necessary. As a result, a smart entry device that automatically monitors human body temperature and detects a mask at the door opening system along with hand sanitization is developed.

COVID-19 infected more than 300 million people across the world since the outbreak. The virus spreads through intimate contact, as well as in congested and overcrowded environments. With the aid of emerging

technologies such as artificial intelligence, the Internet of Things, and machine learning, we can combat and anticipate new illnesses [2]. Many nations have regulations requiring people to wear face masks in public. These rules and enactment were made in reaction to the rapid rise in cases and deaths in several areas [2][3]. In public spaces, however, monitoring big gatherings of individuals is getting increasingly challenging.

As a result, the face detection procedure is automated. A computer vision and deep learning-based facemask detection algorithm is presented in this paper. The suggested model may be used in conjunction with surveillance cameras to block COVID-19 transmission by detecting persons who aren't wearing face masks. With OpenCV and Tensor flow, the model integrates deep learning and traditional machine learning approaches.

The main aim of the model is to build a Raspberry pi-based safety device for covid-19 safety rules to reduce the spread of disease. It is designed to focus on indoor environment to ensure to and fro moment of the people. The body temperature is detected by using MLX90614 contactless temperature sensor and with help of pi camera and openCV it detects whether the person is wearing mask or not. The temperature sensor measures person's temperature using contactless IR sensor. This allows people to pass one by one. In case that if person's temperature exceeds average human body temperature, then raspberry pi3 generates signal to lock the door and gives the audible alert through buzzer. Otherwise, the door is opened to let the person in. All modules and sensor are interfaced to the raspberry pi3. For implementation of mask detection Haar Cascade algorithmand pi camera is used. When the user switches on the kit then pi camera capture the images, in case that image contain mouth or nose, it means that person is not wearing a mask properly and corresponding door will be kept closed. However, if the person image does not contain mouth or nose then raspberry pi3 generates signal to open the door and also trigger the sanitizer. Here relay works as a switch to on/off the sanitizer. The main controlling device is Raspberry pi3. Here DC motor is referred as door. The SD card is a key part of the Raspberry Pi; it provides the initial storage for the Operating System and files. The status will be displays on LCD module.

II. LITERATURE SURVEY

[1] H. Adusumalli, D. Kalyani, R. K. Sri, M. Pratapteja and P. V. R. D. P. Rao, "Face Mask Detection Using OpenCV", 2021, proposed a face mask detection system that employs TensorFlow and OpenCV to detect face mask on people. A boundary box is drawn over the face describes a person wearing mask or not, and also detects the name of the person and alert the person through email.

[2] Karthik M Hadagali, Priyanka M N, Rithika Reddy V B, Pradeep Kumar B S, Sandeepa G S, "Face Mask Detection and Thermal Scanner for Covid Care", 2021, proposed a Face Mask Detection and Thermal Scanner for Covid Care that employs a Raspberry Pi 3 Model B microcontroller and python. Providing a computer vision and deep learning-based facemask detection algorithm using OpenCV and Tensor flow.

[3] I. M. Sayem and M. S. Chowdhury, "Integrating Face Recognition Security System with the Internet of Things", 2018, implemented a model that pairs up Raspberry Pi to a camera module. During the operation, the system will recognize the face among the dataset, if the matching name is found it will grant access, and alternatively photo will be sending an email as warning.

[4] H. Tang and K. Hung, "Design of a non-contact body temperature measurement system for smart campus", 2016, presented a non-contact temperature measuring system to measure student's forehead temperature. The prototype uses temperature sensor, embedded system and database to prevent outbreak of diseases by proper monitoring.

[5] Puput Wanarti Rusimamto, Nurhayati Nurhayati, Eppy Yundra,Reza Rahmadian, Arif Widodo, Much Ade Dermawan", Automatic Hand Sanitizer Container to Prevent the Spread of Corona Virus Disease" 2020, developed Automatic Hand Sanitizer Container to Prevent the Spread of Corona Virus Disease .The prototype uses IR sensor,Arduino uno,mini water pump to spray the hand sanitizer.

III. METHODOLOGY

A. Face Mask Detection

Face detection is done with the help of classifiers. Thousands of photos with and without faces must be used to train a classifier. Haar cascade and AdaBoost is used as the learning algorithm. It selects a small number of key features from a large set and generates highly effective classifiers. A 'cascade' of rogressively complicated classifiers is used to eliminate any non-face parts in a picture, allowing more computation to be spent on promising object-like regions. Data (in the form of images) is input into the system after a massive amount of training. Each image's Haar features are extracted first by the classifier and are then stored in a database for further process. This system will recognise people wearing a facemask on an image/video stream using Deep Learning and Computer Vision techniques and libraries such as OpenCV, Keras, TensorFlow, and others. We'll concentrate on loading our face mask detection dataset from disc in this section. The photographs that we downloaded come in variety of sizes and resolutions. So, resize and crop the source image (256 x 256) and then subject it to RGB colour filtering.

B. Temperature Check

A non-contact infrared thermometer, the MLX90614 ESF is used to determine a person's body temperature. The thermometer feeds data to a Raspberry Pi, which is then displayed on an LCD.

C. Hand Sanitization

IR sensor detects the presence of hand and dispenses the sanitizer through mini submersible water pump. Relay is used for switching. The gate opens only if the person temperature is within limits and wearing a mask. If above conditions satisfied then,green LED glows, else red LED glows and gate doesn't open.
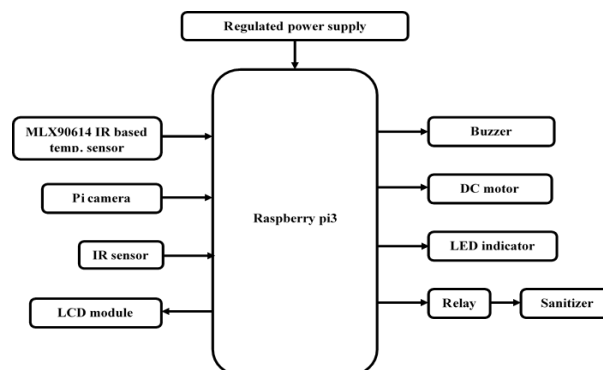

Figure 1 : BLOCK DIAGRAM

IV. APPLICATIONS

Device can be used in entry and exit point of following places:
- Airport, railway station, hospital, subway station and public places.
- School and colleges.
- Shopping centre , theatre , super market and malls.
- Office, factory, bureaux, museums and amusement parks
- Seminar rooms.
- Any location where safety measures should be followed.

V. EXPECTED OUTCOME

Raspberry pi3 based contact less body temperature measurement and face mask detector detects whether the person is wearing a mask or not using Pi camera and haar cascade. If the person is not wearing a mask then raspberry pi3 generates signal to lock the door gives the audible alerts through buzzer. If the person's temperature exceeds average human body temperature i.e 37^0C the raspberry pi3 lock the door and gives the audible alert through buzzer. Otherwise, the door is opened to let the person in and raspberry pi 3 trigger the sanitizer's automatically through relay for hands sanitation.

VI. CONCLUSION

With the help of this model, an automated solution is provided and no human intervention is needed to monitor the COVID -19 protocols. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit.

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Performance Investigation Distribution STATCOM In Distribution System

Hassaan Askiri[1], Rohit Kurian Jacob[1], Maria Steffi Nazareth[1], Thripthi D K[1], Dr. Sanath Saralaya[2]

[1]Department of Electrical and Electronics, St. Joseph Engineering College, Vamanjoor, Karnataka, India

[2]Assistant Professor, Department of Electrical and Electronics, St. Joseph Engineering College, Vamanjoor, Karnataka, India

ABSTRACT

Employment of non-linear loads has raised considerably in current trend of power distribution system. Power quality of system reduces because of such anticipated loads. Hence, Distribution Static Compensator (Distribution STATCOM), which is a customized power device connected in shunt is utilized to improve and enhance performance of the distribution system. Distribution STATCOM is used to minimize distortions or undesired outcomes and to support sustained voltage at terminals. It also persists voltage and current shape.

Keywords- Distribution Static Compensator (Distribution STATCOM), Voltage Control Model (VCM).

I. INTRODUCTION

Distribution system is considered to be the terminal phase which links the generating side to the load side of the power system. Electronic devices produce non-linear loads to the power system, which introduces harmonics and distortion (voltage swell and voltage sag) and increases the complexity of the distribution system. Problems regarding power quality is raised since renewable energy resources are introduced to the system. Hence, Distribution Static Compensator (Distribution STATCOM), which is a shunt connected power device is utilized to enhance the quality of power. Distribution STATCOM devised of VSC (voltage source converter), and a capacitor which is coupled on the DC terminal of the VSC. It provides the reactive power needed to the network. Power quality problems are lessened by reimbursing reactive power. The performance of this custom power device mostly relies on reference generation algorithm which is utilized to produce switching pulses. [1] During the integration of EV to distribution grid assuring a quality power exchange. A level 3 off-board EV charging is used to charge multiple EVs and also to reduce the time required to charge the same. [2] Too many EVs connected to the same grid can cause vulnerability. Impacts of EV integration with the distribution grid that mainly consists of residential loads is studied. The electric vehicle penetration is designed according to the highest number of consumers that can be coupled to every node of the residential feeder. The simulation for this study uses IEE 123 bus feeder. The outcome of the study presents those broad deviations of voltage occur at localized junctions having inflated EV penetration. It also displays the distance between the junction and the substation. For various penetration levels, nearer nodes show minor coin of deviation in voltage. n. The synergy

of EV and grid modelling are needed by the grid operators for higher EV integration.[3] When Distribution STATCOM is placed in an optimum position with an enhanced controller without a current sensor, the performance study is given. The Distribution STATCOM is placed using an ant colony optimization approach. After installing the Distribution STATCOM at an optimum position with an optimised size, the performance of the upgraded controller is evaluated. The voltage at the bus where the Distribution STATCOM is installed, as well as the DC voltage, were measured. [4] A revised current sensor-less controller developed for unbalanced load conditions will be used to evaluate the behavior of the Distribution static compensator. The controller's performance is evaluated in the context of voltage sag and swell. The terminal voltage and dc link are controlled by a proportional integral controller. The research takes into account six potential scenarios. The purpose of this investigation is to look at the voltage at point of common coupling. [5] Renewable energy sources powered charging station (CS) is necessary for the sustainability of electric vehicle. Photovoltaic panels and WECS are the primary energy sources for EV charging stations. A diesel generator set and grid energy are used as backup power to keep the EV functioning. In order to reach grid or DG mandated unity power factor, the charging station adjusts for regional reactive power and harmonics current requirement while charging electric vehicles and serving residential loads. Vehicle to home, vehicle to grid, harmonics elimination, vehicle to grid reactive power regulation, and synchronisation capabilities are among the other charging station characteristics investigated. [6] Because the automobile will coordinate with the distribution grid, ensuring high power quality, EV to distribution system synchronization is getting popular. One of the most important goals in establishing a user-friendly setting for electric vehicles is to minimize the charging time. As an outcome, a simulation model for synchronized charging / discharging of electric cars to the distribution grid is being created, as well as V2G and G2V applications. This device consists of a DC-DC dq frame converter control. There are two different types of converter systems that are mentioned. Different components of EV grid integration are analyzed, and a better converter scheme is employed in EV charging, with positive results. [7]In recent times, the use of EVs is increasing due to rising fuel prices, the various stringent government norms, and the impact of carbon emissions on the environment. The usage of EVs have both advantages and disadvantages. Only when the advantages outnumber the disadvantages, the use of such methods can help the user. The charging of EVs bring about various distortions in the power system. Most of the users prefer to charge their EVs using the house supplies overnight. Whereas as time passes the usage of fast charging will be more prevalent as these EVs will be used for long distance travel also. Hence the impact of these distortions on the grid will increase. Hence methods must be sought to reduce these distortions and increase the quality of power available in the grid. [8] The Distribution STATCOM is a specialized power device that ensures the system's power quality. The reference generation algorithm has the greatest impact on performance. Control algorithms such as Voltage Control Method (VCM) and Current Control Method can increase the performance of Distribution STATCOM (CCM). Both modalities have their own set of benefits and drawbacks. To keep the DC connection voltages at a consistent value, various control strategies are offered. Distribution STATCOM is also used to supply active power and reactive power by connecting energy source to the DC link of the system.[9]Exploration and development of EV charging and switching facilities to fulfil the different needs of EVs has become a critical issue for the global development of EVs. The impact of EV charging on the grid is primarily represented in three factors: charging time, charging load, and car count. The use of energy storage

and electric vehicles (EVs) can help to reduce the impact of additional loads on the power system. In some nations, V2H technology has been implemented, allowing for the rational use of electricity to be guided by peak and valley data. The high charging loads of the fast-charging stations results in increased peak load demand, reduced reserve margins, voltage instability and reliability problems on electricity distribution network. [10] The fast charging of EVs practically introduces a sudden load and when it is removed it suddenly takes out the load on the power system. This sudden variation of load can cause harmonics, poor power factor and cause change in magnitude of voltage. The three main components of Distribution STATCOM are a voltage source converter, a series of linking reactors, and a controller. A voltage source inverter is connected to a dc capacitor to produce a controlled ac voltage, which is the basis of the Distribution STATCOM. Real and reactive power transmission between the electrical network and the Distribution STATCOM is triggered by the voltage differential across this reactance. The Distribution STATCOM is linked to power networks that have a voltage-quality problem. All required voltages and currents are monitored and fed into the controller, which will then be checked against the orders. The controller then uses feedback control to create a series of switching signals that drive the primary semiconductor switches.

II. SYSTEM DETAILS

A case study was undertaken to analyse performance under various operating situations and the results are reported in this section.

For the case study, a lumped load distribution system is investigated.

A. TEST SYSTEM

Fig 2.1 shows the test system connected with the Distribution STATCOM and table 2.1 given below gives the parameters of the test system used for the simulation. The analysis of the test system without Distribution STATCOM is presented. For the analysis, 220V is taken as base value for the line voltage.
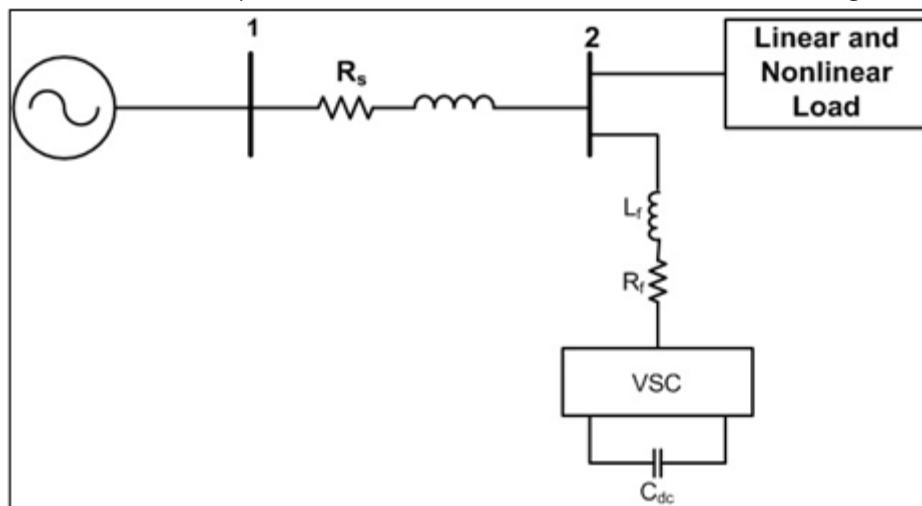

Fig 2.1 Test system with DSATCOM

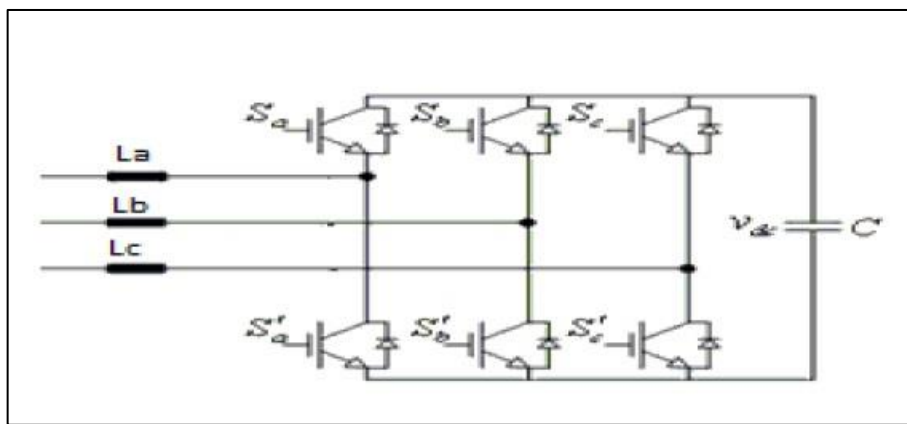| Parameters	Values	
System Frequency	50Hz	
RMS Line Voltage	220V	
Supply Line Resistance	0.85Ω	
Supply Line Inductance	2.5mH	
Load	Za	60+j62.73Ω
	Zb	40+j78.5Ω
	Zc	50+j50.24Ω
	Rectifier with RL Load	25Ω, 0.01H

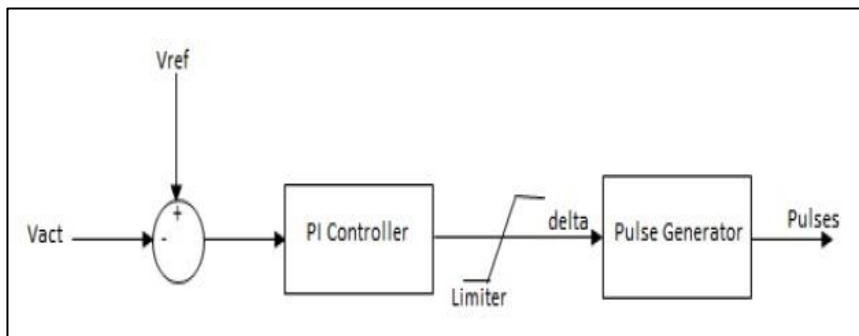Table 2.1 Parameters of Test System

Fig 2.2 Six Pulse Distribution STATCOM

Fig 2.3 Control Scheme

B. DISTRIBUTION STATCOM

This case study has six semiconductor switching devices   and uses a three-leg   VSC topology with a capacitor attached to it in a DC link as Distribution STATCOM.

A coupling transformer connects the three legs of the Distribution STATCOM.

The positioning of six pulse Distribution STATCOM is shown in Fig. 2.2.

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To connect Distribution STATCOM to the system, this study uses a three-winding three-phase transformer.

Cdc	700µF
Rf	0.2Ω
Lf	15mH

Table 2.2 Parameters of Distribution STATCOM

C. CONTROL METHOD

Control scheme utilized to control Distribution STATCOM is presented in Fig 2.3. Vact is the RMS voltage value at PCC. The measured RMS voltage Vact is compared with Vref. The value of Vref is taken as 1 pu. The Proportional Integral controller (PI) is used to get the phase angle delta by processing the error obtained by comparing the actual signal and reference signal. The resulting phase angle is utilized as phase angle for sinusoidal modulation signal. PWM generator of a modulation index 1 is used as the carrier wave which has sinusoidal wave of frequency of 50 Hz.

III. SIMULATION RESULTS

Table 3.1 shows the four situations that were evaluated. For 5 seconds, the system is simulated. The single line fault is added at 2 seconds and removed at 2.5 seconds. The three phase transformer is linked to the Distribution STATCOM. The performance of Distribution STATCOM is investigated, as well as the voltage profile at PCC.

A. Case 1- Without Distribution STATCOM and without Fault

Fig 3.1 shows the RMS voltage at the PCC when the system is not connected with Distribution STATCOM and without fault.
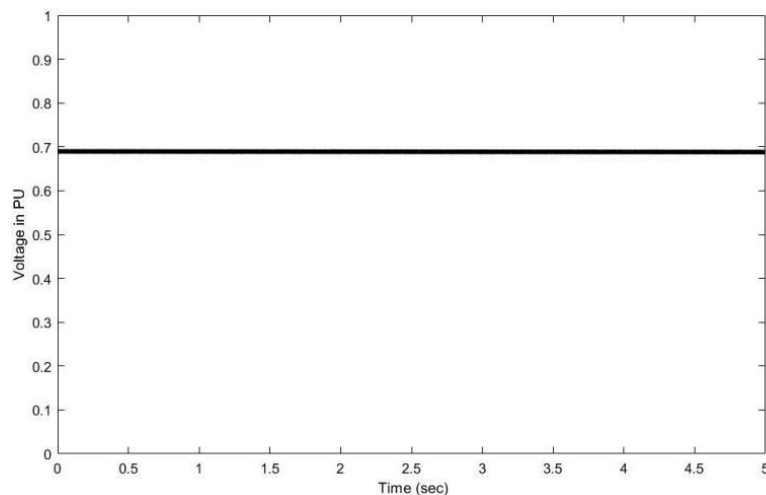

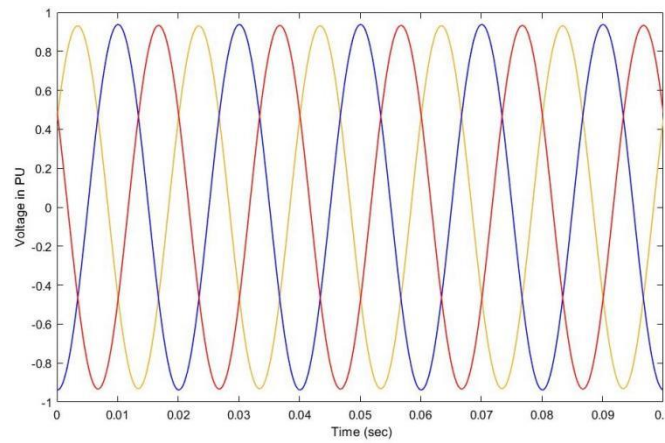Fig 3.1 RMS Value of PCC Voltage- without Distribution STATCOM and Without Fault

Fig 3.2 Instantaneous voltage at PCC- without Distribution STATCOM and Without Fault

B. Case 2- With Distribution STATCOM and without Fault

Fig 3.3 shows the RMS voltage at PCC when the system is connected with Distribution STATCOM and without fault.
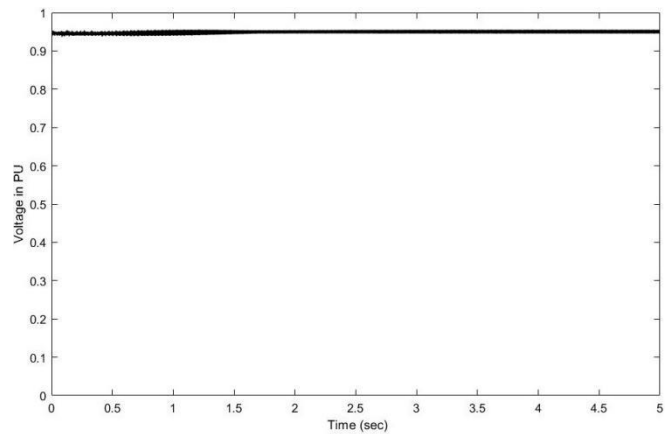

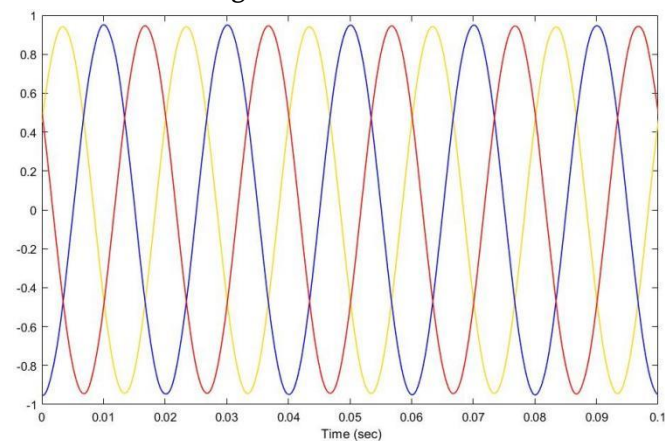Fig 3.3 RMS Value of PCC Voltage- with Distribution STATCOM and Without Fault

Fig 3.4 Instantaneous voltage at PCC- with Distribution STATCOM and Without Fault
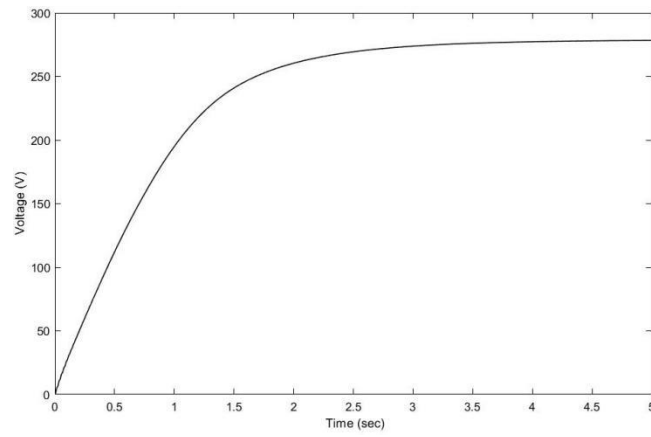
Fig 3.5 Dc link Voltage- with Distribution STATCOM and Without Fault

C. Case 3- Without Distribution STATCOM with Fault

Fig 3.6 shows the RMS voltage at PCC when the system is not connected with Distribution STATCOM and with fault.
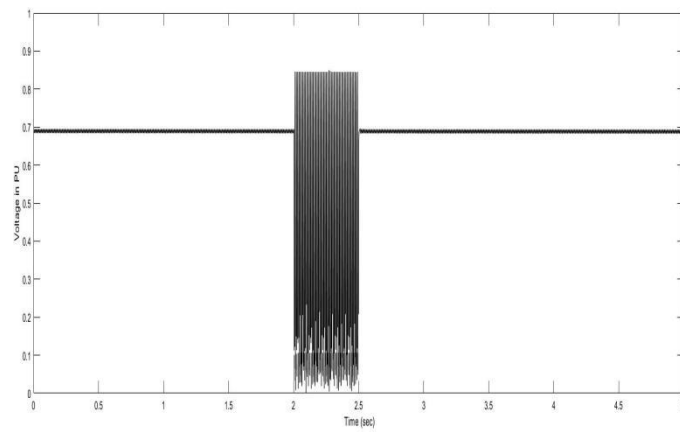

Fig 3.6 RMS Value of PCC Voltage- without Distribution STATCOM and With Fault
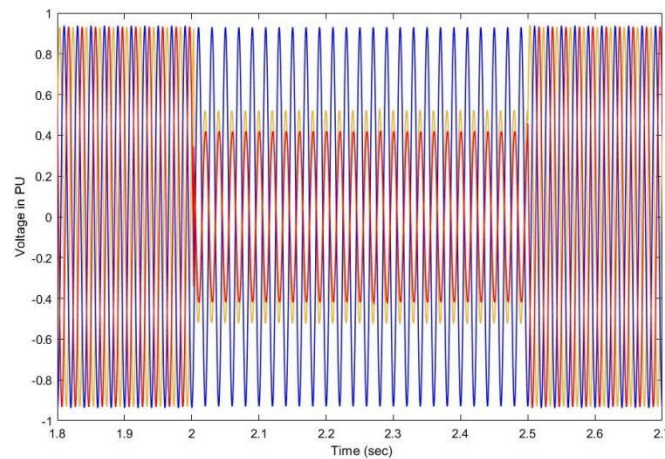

Fig 3.7 Instantaneous voltage at PCC- without Distribution STATCOM and With Fault
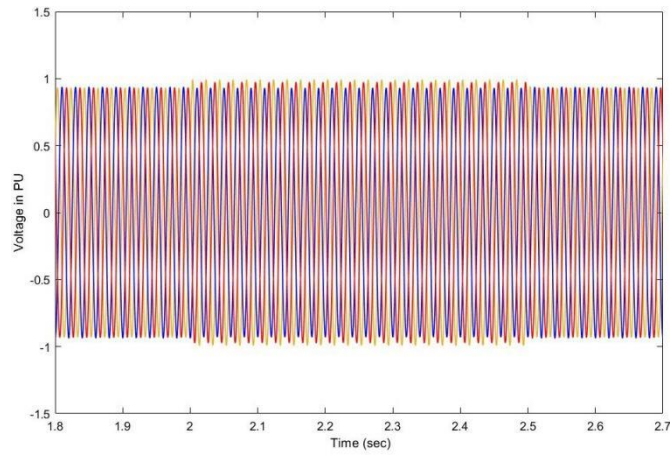
Fig 3.8 Instantaneous voltage before fault location- without Distribution STATCOM and With Fault

D. Case 4- With Distribution STATCOM with Fault

Fig 3.9 shows the RMS voltage at PCC when the system is connected with Distribution STATCOM and with fault.
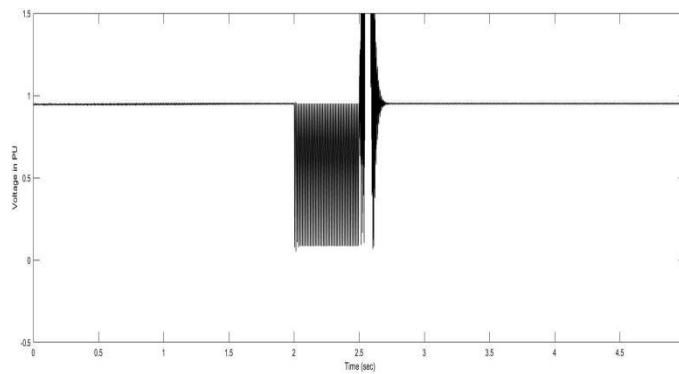

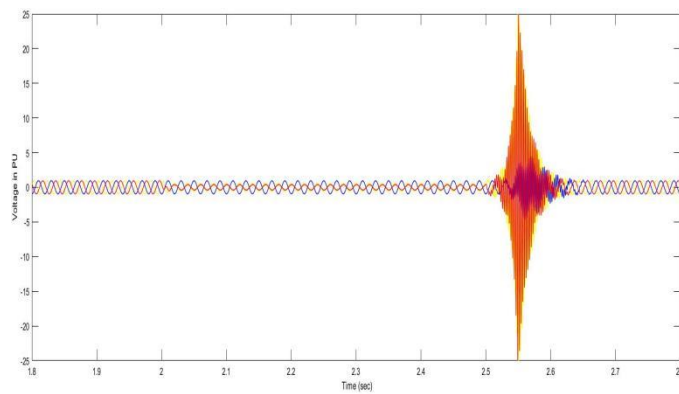Fig 3.9 RMS Value of PCC Voltage- with Distribution STATCOM and With Fault

Fig 3.10 Instantaneous voltage at PCC- with Distribution STATCOM and With Fault
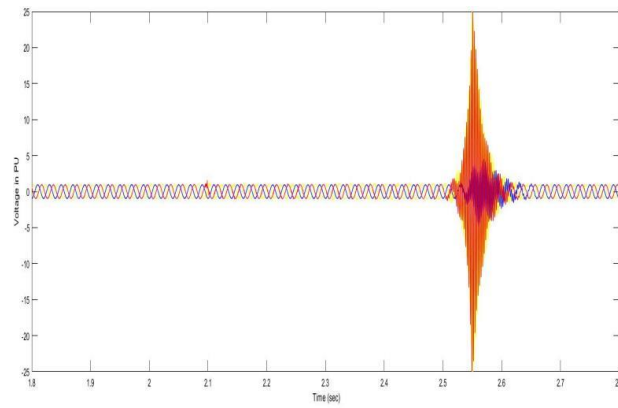
Fig 3.11 Instantaneous voltage before fault location- with Distribution STATCOM and With Fault
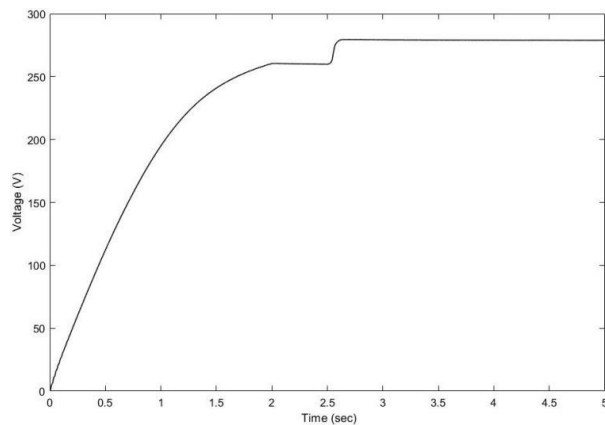

Fig 3.12 Dc link Voltage- with Distribution STATCOM and With Fault

Case No.	With Distribution STATCOM	With Fault
1	NO	NO
2	YES	NO
3	NO	YES
4	YES	YES

Table 3.1 Different cases considered for simulation

IV. CONCLUSIONS

A simulation related case study is undertaken using the PSCAD/EMTDC simulation tool to examine the working of Distribution STATCOM under different operating conditions.

● Distribution STATCOM provides satisfactory performance in all cases by maintaining voltage at the point of common coupling at 1 pu, as shown in the preceding case study.

● Based on the preceding case study, it is possible to conclude that a VCM related control method is appropriate for minimizing voltage based disturbances. However, it fails to address current related power quality issues.

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An Efficient Tracking System for IOT Based Air and Sound Pollution Monitoring System

Shankar Pai B[1], Geeta Bhaira Jogi[2], Sahir Siyad P A[2], Sana H B[2], Shrvan L Bhandary[2]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Mangalore Taluk, Karnataka, India

[2]Final Year Students, Department of Electrical and Electronics Engineering, YIT, Moodbidri, Mangalore Taluk, Karnataka, India

ABSTRACT

The increasing air and sound pollution are one of the significant issues now days. As the pollution increasing it is giving rise number of diseases so, it has become essential to control the pollution for better future and healthy life .Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution monitoring in particular areas through IoT . System uses air sensor to detect or sense presence of harmful gases, compounds in the air and constantly transmit data to microcontroller. Also, system keeps measure sound of level and report it to the online server over IoT.

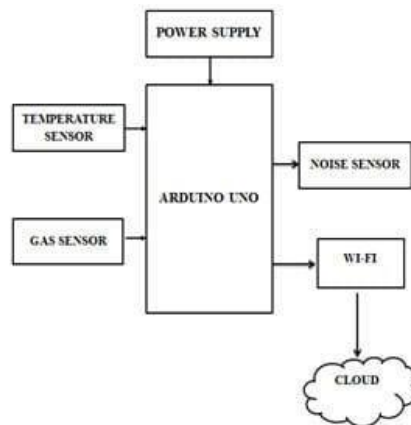**KEYWORDS:** Aurduino uno, Gas sensor MQ135, Sound sensor LM393, WIFI module.

I. INTRODUCTION

Pollution is growing issue for these days and rapid change in infrastructure and industrial plant creating environmental issues like climate change, mal functioning and pollution has greatly influence for the need of an efficient, cheap, operational adaptable and smart monitoring system. To bring it under control its monitoring is majorly recommended. To overcome this issue, a system to be introduced through which the level of sound and the existence of the harmful gases in the surroundings can be detected. The growing pollution at such an alarming rate has started creating trouble for the living beings, may it be high decibels or toxic gases present in the environment leaves a harmful effect on human's health and thus needs a special attention. The solution includes the technology internet of things (IoT) which is outcome of merged field of computer science and electronics. Here the sensing devices are connected to embed computing system to monitor the fluctuation of noise and air pollution level from their normal levels.

II. METHODOLOGY

The gas detector provides the worth of ninety once there was no gas gift there and also the safe level of air quality starts from 350 ppm and it mustn't exceed one thousand ppm. Once it exceeds the limit of one thousand PPM, then it starts cause headaches, drowsiness and stagnant, stale, stuffy air and if exceeds on the far side 2000 ppm then it will cause multiplied rate and plenty of different diseases. Air pollution sensors live the standard of air whereas noise pollution sensors live the sound levels. knowledge from these sensors square measure primarily analog signals. These analog signals square measure regenerate to its equivalent digital kind. The information will be displayed on the 16x2 liquid crystal display connected to the Arduino. To send knowledge to a distant location the information from system is distributed to the Wi-Fi module. Wi-Fi module is connected to the microcontroller exploitation soap 232. The Wi-fi module interacts with microcontroller exploitation 2 ports i.e. Transmitter and receiver provided on that. The measured information is shipped from the module to any location among its vary from the info is fetched employing a laptop computer /mobile. For that we've got to offer module the Wi-Fi details to attach to net, and so offer the scientific discipline address of the web site.

A.   Block Diagram

III. COMPONENT DESCRIPTION
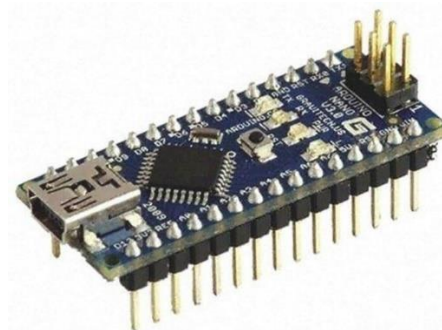
A.   Arduino:

Fig.5: Arduino

Table 1: Arduino Specifications

Pin No.	Name	Type	Description
1-2, 5-16	D0-D13	I/O	Digital input/output port 0 to 13
3, 28	RESET	Input	Reset (active low)
4, 29	GND	PWR	Supply ground
17	3V3	Output	+3.3V output (from FTDI)
18	AREF	Input	ADC reference
19-26	A0-A7	Input	Analog input channel 0 to 7
27	+5V	Output or Input	+5V output (from on-board regulator) or +5V (input from external power supply)
30	VIN	PWR	Supply voltage

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3. x). Released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor.. It works with a Mini-B USB cable instead of a standard one. The Arduino Nano is equipped with 30 male I/O headers, in a DIP30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is

B. **Sound Sensor:**
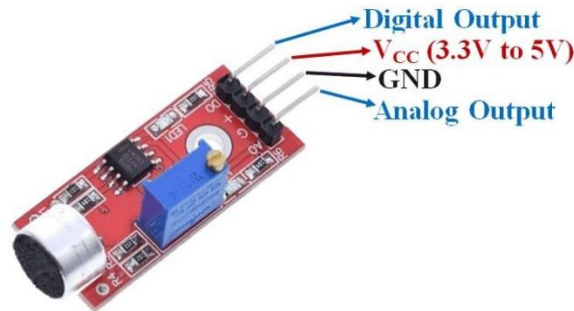
Fig. 6: R307 Finger Print Sensor Module

Features:-

Supply voltage: DC 4.2 ~ 6.0V

Supply current: Working current: 50mA (typical) Peak

current: 80mAThe sound sensor module provides an easy way to detect sound and it generally used

for detecting sound intensity. Module detect the sound has

exceeded a threshold value. Sound

is detected via microphone and fed into an LM393 opamp. The sound level adjusts through

pot. The sound increases set value output is low. These

module work on DC 3.3-5 voltage. Features

- Operating voltage 3.3V-5V
- Output model: digital switch outputs (0 and 1, high or low level)
- Voltage Gain 26dB
- Microphone Impedance 2.2kΩ
- Microphone Frequency 16.20 kHz

C. Gas Sensor:

The MQ135 is a gas sensor it used for detecting or sensing harmful gases in the atmosphere. It has wide detecting scope. It gives fast response and also it is high sensitivity sensor. It is simple and long-life device. They are used in air quality control equipment for building offices are suitable for detecting of NH3, alcohol, benzene, smoke CO2 etc. Features · Wide detecting scope · Fast response and High sensitivity · Stable and long life · Operating Voltage is +5V · Detect/Measure NH3, NOx, alcohol, Benzene, smoke, CO2, etc.

D. LCD Display:

Fig. 8: LCD display (2x16 line)

16×2 LCD is a basic 16 character by 2-line display Yellow/Green Backlight. Utilizes the extremely most common HD44780 parallel interface chipset (datasheet). Even more, it has JHD162A Compatible Pinout Diagram, and Command Interface code is freely available. Finally, you will need 7 general I/O pins (If used in 4-bit Mode) to interface to this LCD screen. It also includes an LED back-light.

This JHD162A 16x2 LCD display has the outline size of 80.0 x 36.0 mm and VA size of 66.0 x 16.0 mm and the maximum thickness is 13.2 mm. 16x2 LCD Displays are built- in controller HD44780 or equivalent. It is optional for + 5.0 V or + 3.0 V power supply. The LEDs can be driven by pin 1, pin 2, or pin 15 pin 16 or A/K. 16×2 LCD Display Support mostly All Digital Microcontrollers such as Arduino, 8051, PIC, AVR, ARM, MSP, COP8, STM, Raspberry Pi, etc.

IV. CONCLUSION

➢ By using this model, each and every variation of air and sound level is monitoring through internet and thus nearby people can be informed in time.

➢ Thus, lots of lives can be saved from unpleasant scenarios. Air and sound pollution monitoring   system will overcome all the problems related to the environment

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Weapon Detection using Machine Learning

Athufa Banu[1], Nida Taskeen[1], Saniya S Taj[1], Raghavendra G.S[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India
[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

ABSTRACT

Death due to firearms is the type of mishap that can be avoided if proper measures are taken. This research is based on real time weapon detection. Machine learning-based weapon detection is a method for detecting the presence of any weapon in real-time surveillance. It is the practice of subjecting a video containing a moving item to image processing algorithms that allow for weapon tracking. For security applications, machine learning technologies are utilized to detect weapons. Using the footage from video surveillance systems, such vision-based systems can recognize and analyze scenarios.

Keywords — Weapon Detection, YOLOv3, gun detection, darknet.

I. INTRODUCTION

The main idea of our project is to create a system that monitors surveillance data of an area to detect weapon. CCTV cameras record video footage 24 hours a day, however there isn't enough people to check each camera for various unusual events. Knives and guns are recognised using machine learning technologies, with the purpose of reducing crime and increasing safety and security. Security agents must visually detect the existence of weapons in monitored situations by studying security footage and making quick decisions based on it in traditional video surveillance. One of the most successful ways to overcome the limitations of manual analysis is to use machine learning algorithms to process the real-time video feed of security cameras.

The YOLO (You Only Look Once) object detection system, which uses convolution neural networks for object detection, is used in this study.

It is one of the quickest algorithms available, with little loss of accuracy. To save hundreds of hours of GPU time on a local runtime, this model's training was done on the cloud. The use of a hosted runtime has also helped us fine-tune our model to near perfection. Because the firearms and fires seen in the dataset only take up a small percentage of the frame, our main goal is to create an algorithm that can reliably construct multiple bounding boxes in such low-quality films.

Furthermore, because the situation being processed may be time-sensitive, the detection must be done in real-time with a high degree of precision.

Because authorities are notified when detection above the threshold is detected, there must be a low amount of false positives. The technology created here can capture visual sequences from both live video from a camera and a previously recorded sequence. Image processing is the next step. It's a technique for performing operations on an image in order to improve it or extract relevant information from it. It's a sort of signal processing in which the input is an image and the output is either that image or its characteristics/features. Object detection algorithm YOLOv3 is frequently used for real-time processing.

II. LITERATURE REVIEW

Celik et al. proposed a paper that proposed weapon detection in video sequences. The system compares foreground object information with fire statistical colour information. Three Gaussian distributions, each of which corresponds to the pixel statistics in the appropriate colour channel, were used to create a simple adaptive scene backdrop model.

The foreground information is extracted using adaptive background subtraction algorithms and then checked by the statistical fire colour model to determine whether or not the foreground object is a fire candidate.

Three rules make up the statistical fire colour model. The value of the red component of an RGB pixel must be bigger than the mean of the Red components of the entire image, according to the first rule. The value of a pixel's red component must be greater than the green component, which must be greater than the blue component, according to the next rule.

The ratio of red, blue, and green components is taken into account in the final rule. All of these rules work in tandem with the previous ones. Non-linearities in the fixed camera, abrupt changes in illumination conditions, and particular types of materials producing varied fire colours while burning all cause errors. However, if there are only a few people, this strategy fails.

III. PROBLEM STATEMENT

Gun-related deaths are unfortunately all too common. In just one year, almost 250,000 people perished as a result of firearms around the world. Homicides accounted for about 71% of gun deaths, while suicides accounted for 21% and unintentional firearms-related mishaps accounted for 8%. In 2019, men accounted for nearly nine out of ten people killed by gun violence.

People aged 20-24 years old had the highest number of homicide deaths, while those aged 55-59 had the highest number of gun-assisted suicides.

Only six nations accounted for 65.9% of the anticipated 250, 227 gun-related deaths globally in 2019: Brazil, the United States, Venezuela, Mexico, India, and Colombia.

To detect this firearm our proposed project will detect the weapon and alarm the authorities when found in the live surveillance.

IV. METHODOLOGY

The technology created here can capture visual sequences from both live video from a camera and a previously recorded sequence. Image processing is the next step. It's a technique for performing operations on an image in order to improve it or extract relevant information from it. It's a sort of signal processing in which the input is an image and the output is either that image or its characteristics/features. Object detection algorithm YOLOv3 is frequently used for real-time processing. To train machine learning models, the most significant and critical aspect of any application is to have a desired and appropriate dataset.

The proposed experiment employs You Only Look Once (YOLO) v3 model, which is a deep learning framework based on Darknet, an open-source neural network in C [14]. YOLOv3 is the best choice as it provides real-time detection without losing too much accuracy. The architecture used is darknet53 which consists of 53 convolutional layers each followed by Leaky ReLu activation and batch normalization layers, making it a fully convolutional network (FCN). For the task of detection, the total layers used are 106 which makes the model bulkier than its previous variants. The model doesn't use pooling to prevent loss of low-level features. Also, the unsampled layers are concatenated with the previous layers to help detect small objects by preserving the minute features. Unlike the sliding window and region proposal- based techniques, YOLO detects objects in an image very well as it gets every detail about the whole image and the object byseeing the entire image.
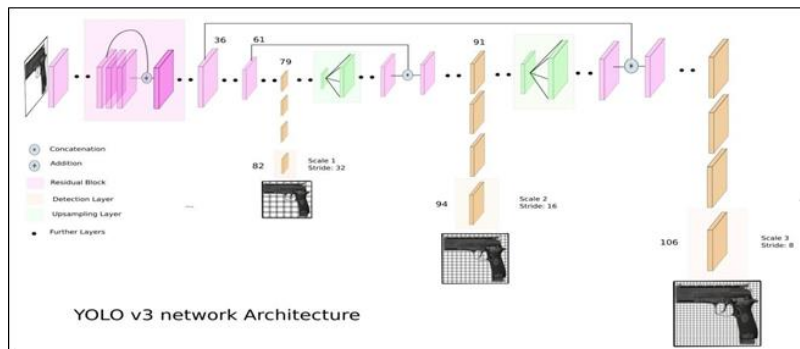

Fig.1. Y O L O v 3   A r c h i t e c t u r e

The image is divided into grids and N bounding boxes with confidence scores are predicted using image classification and localization on each grid cell. YOLO does detections on three different scales ranging from small to large at layer number 82, 94 and 106. The larger objects are detected by 13 x 13 layer, medium objects by 26 x 26 layer and smaller objects by52 x 52 layer.

The model predicts 4 coordinates for each bounding box, tx, ty, tw, th. The cell is offset from top left corner of the imageby coordinates (cx, cy).
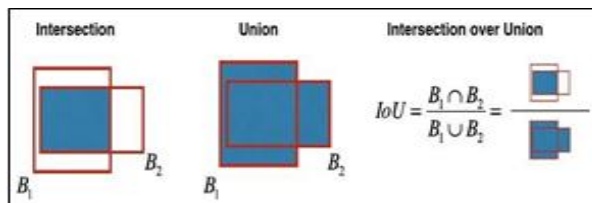

$$IoU = \frac{B_1 \cap B_2}{B_1 \cup B_2} =$$

Fig. 1. Intersection over Union is computed simply by dividing the area of overlap by the area of their union of the bounding boxes

The performance of YOLO v3 is at par with other state- of- the-art detectors like RetinaNet while being considerably faster, at Common Objects in Context (COCO) with mAP 50 benchmarks. It is also better than Single Shot Detector (SSD) and its variants. It gives 30-45 frames per second output on areal-time video on a GPU.

R-CNN based method for handheld gun detection using a pre-trained VGG model is proposed. In the segmented images, Fast Retina Keypoint (FREAK) and Harris Interest Point Detector is used to find the weapons. Testing was done on a dataset built from the Internet Movie Firearm Database (IMFDB).

A. Datasets

Our model was trained using 3000 images of guns from the UGR handgun dataset [15]. The dataset contains images of guns in a variety of different angles, positions and orientations. The dataset is also annotated in (<xmin>

<ymin><xmax> <ymax>) format which were converted into the format suitable for YOLO (<object-class> <x_center>

<y_center><width> <height>).

500 images containing fire were also used which were downloaded from Google and were annotated by using LabelImg - a graphical image annotation tool .

For testing gun detection, we are using the handgun testing dataset and the dataset. The kaggle dataset contains around 3400 images of various guns, rifles, shotguns, etc. These are images of various movie scenes. The negative images in the dataset contain images of objects with shapes similar to a gun like hairdryers, drills, etc. For testing our model's performance on images containing fire we are using the images in the FireNet Dataset .

B. Training Data

Training of datasets is done using the YOLOv3 pre- trained model which was done on cloud. Darknet is where the dataset was stored and accessed to train the model.
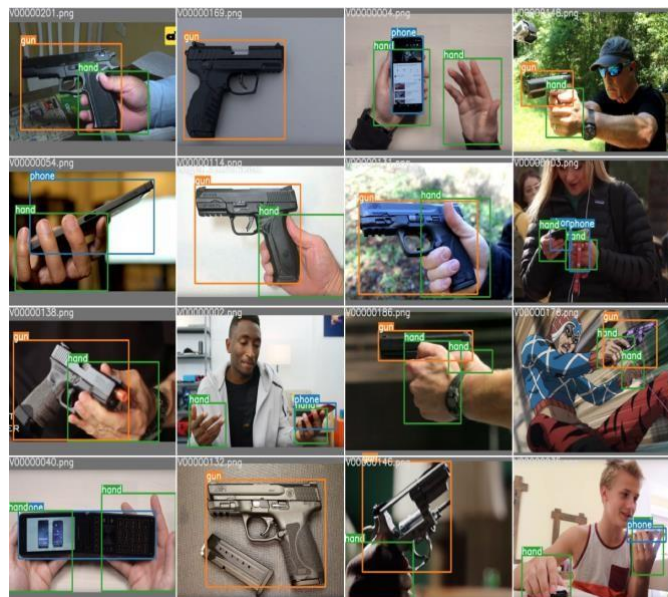

Fig. 2. Firearms Datasets

C. Testing Data

For testing gun detection when the webcam is enabled the camera will be on and the analysis of the surrounding takes place. The code is run on the pc using spyder or google colab which has python processor. The webcam is then enabled. The webcam will start the surrounding for any presence of weapon. When any weapon is detected by the system it will make a border box while identifying the type of weapon used.
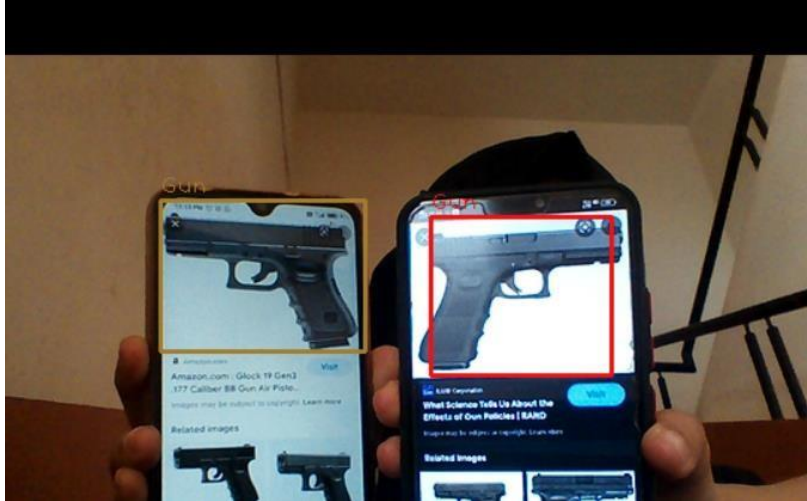
D. Results

Fig. 3. Results of Gun Detection

The weapon is detected and notified to the authority about the presence of gun in the live surveillance. Machine learning based weapon detection is comparably robust and allows higher safety and security. The automation of weapon detection is more consistent and faster than manual review. Increased safety and anomaly event monitoring in crowded events or public places. In mission-critical situations, such systems flag critical situations for immediate human review. Computer vision based weapon detection is highly scalable and can operate with a high number of cameras and in complex and crowded scenes.

V. CONCLUSION

In this paper, a real-time frame-based efficient fire and gun detection deep learning model has been presented with a high accuracy metric. The Darknet53 model might be bulky but has a good detection capability. The detections per frame are appropriate for real-time monitoring . The use of this model is that security level of a premise will increase along with the safety of the people living in apartments, mall and offices etc.

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Criminal Identification using Image Processing

Zeeda Fathima[1], Rifa[1], Amreen[1], Soumya Santhosha[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India
[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

ABSTRACT

The project criminal identification using image processing uses a combination of techniques in two topics: face detection and face recognition. This project will be a real time face recognition that has four steps -training of real time images, face detection using Haar-classifer, comparison of trained real times images with images from the surveillance camera and result based on the comparison. This system is highly effective and gives high accuracy rate. It can be used in surveillance camera or as an application as it can work in real time.

Keywords— criminal, haar-classifier, face recognition, surveillance camera

I. INTRODUCTION

Using In the modern world, security is a one of the main concerns. There is a significant rise of threats to the society with increasing rate of crimes and terrorist activities. An automated facial recognition system for criminal database was proposed using known Haar feature based cascade classifier. This system will be able to detect face & recognize face automatically in real time. We have taken a pre-captured image & performed processing techniques on it. We intend to take a real image & perform "real time image processing" on it. The main objective is to recognise people who are on the watch list and identify the criminal records if present. The objective of this application is to provide information about a particular criminal which we are finding. Police personnel or locals can use this application anytime, anywhere to find a criminal. Any police personnel can access this application using internet from anywhere and anytime. We can also find criminals from live CCTV surveillance cameras. This application is fast, robust, reasonably simple and accurate with a relatively simple and easy to understand GUI.

II. LITERATURE REVIEW

A real time face recognition using an automated surveillance camera. The proposed system consists of 4 steps, including Training of real time images, Face detection using Haar-classifier, Comparison of trained real time images with images from the surveillance camera, Result based on the comparison. It gave us an insight on the advantages and disadvantage of Haar-classifier in facial recognition system [1] .The aspiration of this paper

is to compare an image with several images which has been already trained. In this paper, they represented a methodology for face detection robustly in real time environment. Here they used Haar like classifiers to track faces on Open CV platform. The accuracy of the face recognition is very high. This proposed system can successfully recognize more than one face which is useful for quickly searching suspected persons as the computation time is very low [2] .The paper gave information regarding Viola Jones framework which is an algorithm s named after two computer vision researchers who proposed the method in 2001: Paul Viola and Michael   Jones.   They   developed   a general   object detection framework that was able to provide competitive object detection rates in real time. It can be used to solve a variety of detection problems, but the main motivation comes from face detection. Here we were able to infer on how to differentiate between objects and face. Hence the drawback was finding the exact features of a face using haar-classifier [3] .In this project, a face detection and recognition system for criminal identification is developed using the multi-task cascade neural network. This system will be able to detect faces and recognize faces of criminals automatically in real-time. This system would also just require a single image of the criminal to recognize him, also known as one-shot learning. The purpose is to identify the criminal face, retrieve the information stored in the database for the identified criminal and a notification is sent to the police personnel with all the details and the location at which he was under the surveillance of the camera [4] Utilization of this paper-based systems, police officers have to spend a lot of time as well as man power to analyze existing crime information and to identify suspects for crime incidents. So the requirement of an efficient way for crime investigation has arisen. Data mining practices is one aspect of crime investigation, for which numerous technique are available. This paper highlights the use of data mining techniques, clustering and classification for effective investigation of crimes. Further the paper aims to identify suspects by analyzing existing evidences in situations where any witness or forensic clues are not present [5] .

III. METHODOLOGY

The system takes in the images inserted along with the details provided. The details consists of the name, age and even the identification mark that would help in training the device to produce better result. When the image is registered it gets stored in the database where simultaneous training also begins. The trained data is further stored in different database in greyscale format. Here the haar-clasifier classifies the images into positive and negative set. Haar classifier is the easiest methodology that allows the system to learn by itself and obtain good accuracy. It can distinguish between a object and an image. All the features of a positive image is extracted. Hence the system is trained further to recognize these features instead recognizing the whole face. Haar classifier provides rapid Detection using a Boosted Cascade of Simple Features. Once the register process is done we can insert an image to check if the person is a criminal or not. When we give an image as input and click on recognize the system begins to compare the image with the trained image that is already present in the database and already trained. While comparing the image inserted is downscaled and converted to grey scale. Here the pixels are compared and if there are any similarity between the features it gives us the result as the criminal identified and the name and details of the result acquired.
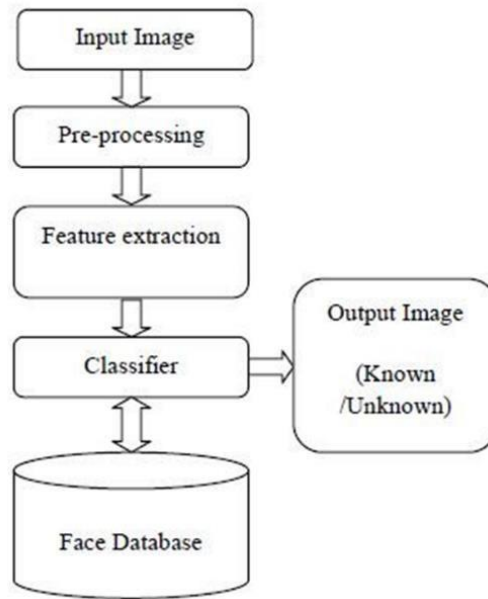
Figure 1: Block diagram of face registration

IV. REQUIREMENTS AND SPECIFICATION

HARDWARE REQUIREMENTS

The selection of hardware configuration is a very important task related to the software development, Random access memory may affect adversely on the speed and correspondingly on the efficiency of the entire system. The processor should be powerful to handle all the operations. The hard disk should have sufficient capacity to store the database and the application. The network should be efficient to handle the communication fast. We used 1.8 GHZ INTEL Core13 processor, Hard disk Drive of 30GB and 4GB RAM. Video is 800*600, 256 colours. Key board must be standard 101/102 or Digi sync Family and monitor of proper resolution.

SOFTWARE REQUIREMENTS

Operating system: Windows 7 & above
Software: Spyder, Visual Studio, Xampp

V. SYSTEM DESIGN

Steps of building the module

Step 1: Face Detection
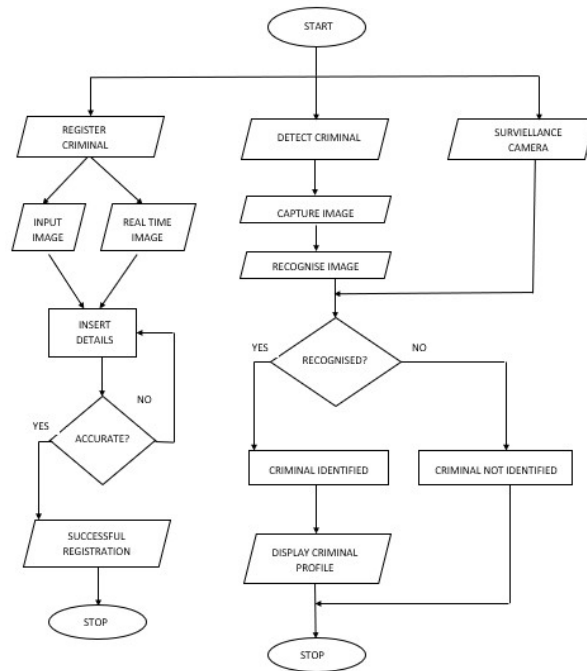Step 2: Face Recognition
Step 3: Output

Figure 2: Working Diagram

STEP 1: Face detection

The camera detects and locates the image of a face either alone
or in a crowd. The image of the face is captured and analyzed.

STEP 2: Face recognition

The software reads the geometry of the face such as eyes, shape
of the cheekbone and the contour of lips ears and chin. The aim is to differentiate between the faces using these
key factors.

STEP 3: Output

A software that can work with real time image as well as the image given as an input that identify and
recognize a face with criminal background and also display his profile.

VI. RESULTS

Criminal Identification using image processing is able to detect criminals either real time or when image is
inserted. This system has used haar-classifier to obtain all the result. It not just recognizes the criminals but also
give their bio-data that was stored during the time of registration. The real time surveillance it helps in
detecting the criminals hence following the protocol "prevention is better than cure".

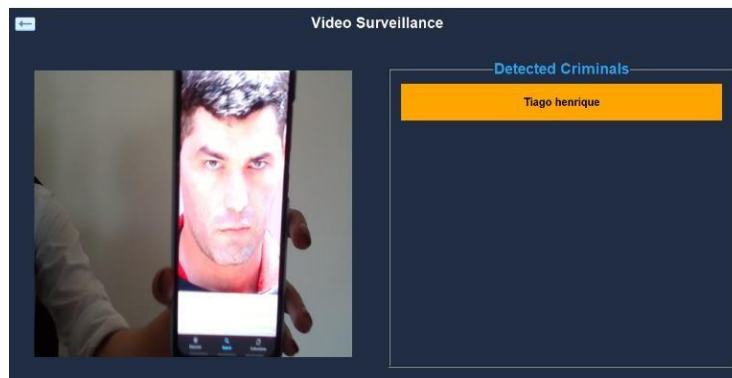Figure 3: Successful Criminal Registration

Figure 4: Criminal Detected

Figure 5: Criminal Detection in real-time

Figure 6: Criminal Profile

Figure 7: Criminal Not Recognized

VII.   CONCLUSION

The system can detect and recognize the faces of the criminals in an image and in a video stream obtained from a camera in a real time. It not only provide a huge convenience to the police in the identification of criminals but also saves time for them as processes are automated in the system.

VIII.   FUTURE WORK

We can add the alarms to the criminal detection system it will ring only when matches when found. So that if anyone is not there to keep watch in the CCTV room they will come to know that someone is found from the database in that public place.

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A Survey on Emotion Classification from Speech Signal using Deep Learning Techniques

Shriraksha, Acharya Sushmitha Ramesh, Y Hima Jain Sharanya

Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Speech Emotion Recognition (SER) is the process of recognizing the emotional state of a person by extracting certain characteristics from the speech. SER has it's applications in various fields like education, security, emergency centre, medical field, etc. SER also plays very important role in development of human computer interaction. The emotions from the speech would be classified by using many deep learning and machine learning algorithms like Logistic regression (LR), Support Vector Machine (SVM), Recurrent neural network (RNN), Convolutional neural network (CNN), Artificial Neural Network (ANN), Deep Convolutional Neural Network (DCNN), Deep Neural Network (DNN), Multi-Layer Perceptron (MLP), Deep Stride Convolutional Neural Network (DSCNN) etc. This paper is a survey on emotion classification from speech using various emotion classification algorithms like DNN, CNN, DCNN, MLP, and DSCNN using popular datasets like RAVDESS, IEMOCAP, and EMO-DB.

Index Terms— Speech Emotion Recognition, Deep learing, Classification.

I. INTRODUCTION

Speech is a way of expressing one's thoughts to other by means of vocal sound. Emotions are the way through which others can identify a person's mental state. Happiness, sadness, fear and anger are the four basic kinds of emotions. Emotion classification is a very important part in human computer interaction. Emotions can be classified based on facial expressions and also based on speech signals. Emotion classification is a challenging task in many researchers. This paper speaks about classifying emotions based on speech. Deep learning is a type of artificial intelligence and machine learning it teaches a computer to study how to predict, classify data by filtering inputs through layer. Speech Emotion Recognition is an approach to classify the emotions and identify the emotional state. Speech Emotion Recognition is a method which includes two phases namely feature extraction and feature classification. Feature extraction is a task of extracting features like pitch, power, and frequency from speech signal. Some of the feature extraction algorithms are MFCC, LPC, LFCC, LSF etc. Classification includes classifying emotions set up on the features extracted from speech signal. This can be done using classification algorithms like DNN, CNN, DCNN, DSCNN etc.

SER is used to recognizing driver's mental state for safety and prevent from accidents. By using SER therapists will understand their patient's hidden emotions. Virtual assistants and personal assistants like Google assistant,

Alexa, and Siri are the applications of SER which takes human voice as input and completes the task requested by the end user. By using SER user's state of emotion can be understood by virtual assistants when the user use some words which have dubious meaning. SER has also found application in online interactive courses and tutorials. Here the machine models the contents of the course based on the student's state of emotions. There are many more applications of SER which will be helpful in researches.

II. SPEECH EMOTION RECOGNITION SYSTEM

Speech Emotion Recognition system is depending on traditional machine learning algorithm comprised of three fundamental components: Signal preprocessing, Feature Extraction and Feature Classification.
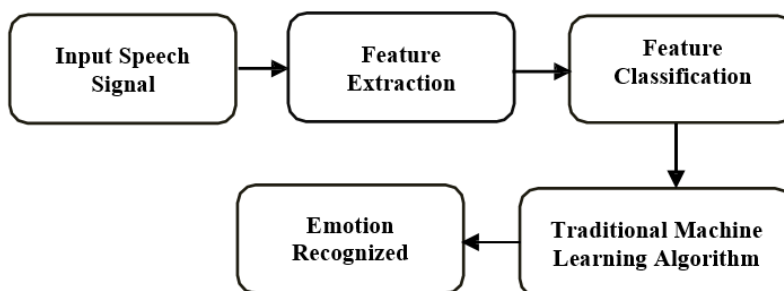

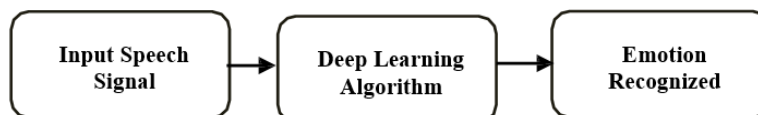Fig. 1. Flow Mechanism of Traditional Machine Learning

Fig. 2. Flow Mechanism of Deep Learning

A. Speech Preprocessing

The collected speech is often corrupted by noise components. This effects the results of feature extraction and classification to be less accurate. So it is very important to eliminate the noise from the speech signal. It can be done by various approaches. Also in this process silent segments and variations while recording is eliminated from speech signal.

B. Feature Extraction

Feature Extraction is the analysis of the features. It means extracting the features from i) speech signal like power, pitch, vowel duration, rhythm ii) time domain signal like short time energy, autocorrelation, iii) frequency domain signal like spectral centroid, spectral flux. Feature extraction techniques like Linear Prediction Coefficient (LPC), Mel Frequency Cepstral Coefficients (MFCC), Line Spectral Frequencies (LSF), Linear Prediction Cepstral Coefficient (LPCC), Perceptual Linear Prediction (PLP), Discrete Wavelet Transform (DWT), etc. are used to extract the feature from the speech signal. The quality of the features will directly influences the accuracy of classification results. Therefore it yields better classification results than applying machine learning algorithm directly to the raw data.

C.   Feature classification

Feature classification is used to categorize a huge number of data into different classes. The classifier used for speech emotion recognition can be broadly classified into two main types, namely Linear classifiers and Non-linear classifiers. All of the extracted features may not be equally important for the classification process so in feature selection stage only those features are selected which are more useful for the problem and then features are classified into various categories based on the feature extracted.

III. DATASETS USED IN SER

A.   Ravdess Dataset

Ravdess dataset is the most commonly used datasets. It contains recorded voices of male and female actors. The voices in this dataset are recorded in North American accent. The recorded audio clips contains speech of 12 male and 12 female actors. The dataset has seven emotions namely calm, surprise, fearful, happy, disgust, anger and sad. All these expressions are recorded at different intensities of emotions like normal, strong and also neutral. The audio was recorded at 48000Hz sampling rate [1].

B.   Emo-DB dataset

Berlin emotion database Emo-DB consist of 535 emotional utterances recorded by 10 professional German speaking actors 5 female and 5 male. The Emo-DB database contains 7 emotions: sadness, anger, boredom, anxiety, happiness, disgust and neutral. The sampling rate of the recorded voice was 48kHz and then it was down sampled to 16 kHz. They used sentences of 8 actors for training and 2 actors for testing the system [1, 2,5,14].

C.   IEMOCAP dataset

The IEMOCAP dataset is a popular dataset which contains recorded data of 10 actors. The dataset has 5 sessions, each session consist of conversation between 2 actors, 1 male and 1 female. Script was recorded at sampling rate of 16 kHz. Each session contains different emotions such as sad, anger, happy, surprise, neutral, disgust, frustrated, excited and fearful. Each utterances was assessed by 3-4 evaluators [1, 10, 15-17] .

D.   RML dataset

The RML dataset consist of 720 emotional samples and those samples were recorded at Ryerson Multimedia Lab. It consists of 6 emotions such as Anger, Fear, Disgust, Happiness, Surprise and Sadness. The database was collected from 6 different languages such as Mandarin, English, Urdu, Persian, Punjabi, and Italian. The sampling rate of recorded samples were 44,110Hz [2,13].

E.   eNTERFACE05 dataset

eNTERFACE05 dataset consists of 6 emotions: disgust, fear, anger, joy, surprise and sadness. The voices in this dataset are recorded in English. Audio was recorded at 48 kHz Sampling rate.. Overall, 1290 utterances are there in eNTERFACE05 dataset [2].

F.   BAUM-1s dataset

The BAUM-1s dataset consist of 8 emotions anger, joy, sadness, fear, disgust, boredom, contempt, and surprise. 1222 utterances were collected from 31 Turkish contents, in which 17 contents were recorded by female. The sampling rate of recorded audio files were 48kHz. In 2016 BAUM-1s dataset was released [2].

G. Deap dataset

Database for Emotion Analysis using physiological signals (DEAP) contsist of electroencephalogram (EEG) recordings of 32 people while they watched 40 music videos. Those videos were rated for four emotional attributes like arousal, valance, dominance and liking based on the contents of video [3].

H. SAVEE dataset

Survey Audio-Visual Expressed Emotion (SAVEE) is a dataset recorded in English language. This dataset has 480 audio clips in British English accent. The audio recorded was of 4 male speakers. The recording contains 15 sentences. Each sentence was recorded in 7 different emotions like fear, anger, happiness, sadness, disgust, surprise and neutral. Each emotion consist of 60 utterances excluding neutral which has 120 utterances [4].

I. Emotion01 dataset

Emotion01 dataset is given by the Speech Information Technology and Industry Promotion Center (SiTEC). It contains 10 Korean utterances in 6 emotional states. The audio was recorded by 6 actors, 3 male and 3 female. The audio was recorded in 6 emotion categories like angry, fearful, bored, happy, neutral, and sad [6].

J. Mandarin dataset

Mandarin dataset consists of 17, 408 utterances recorded from a Microsoft spoken dialogue system. There are four categories of emotions, i.e. neutral, happy, sad and angry [8].

K. RECOLA dataset

Recola contains 46 different recordings and it is divided into 3 parts as train, test, and devel. Each record is 300s audio data which is sampled at a rate of 16 kHz. It contains both male and female recordings which is recorded in 4 languages i.e., Portuguese, Italian, French, and German [11,15].

L. INTER1SP dataset

The INTER1SP Spanish dataset contains utterances from 2 professional actor's 1 female and 1 male speakers. The audio was recorded twice in the 7 emotions such as anger, joy, sadness, fear, disgust, surprise and neutral. It contains 4528 utterances in total [14].

M. BC2013-English dataset

BC2013-English dataset was given by the Voice Factory, which contains 300 hours of mp3 files and 19 hours of wav files in which speech is recorded in English language [15].

N. MSP- Podcast dataset

MSP-Podcast dataset contains recorded speech of 14200 utterances in training, 2893 utterances in development, and 6482 utterances in testing. It contains 5 emotions namely happy, angry, sad, neutral, and disgust [16].

O. Crema-D dataset

Crema-D dataset contains 12 sentences acted by 91 professional actors. In this dataset 48 male and 48 female actors were acted. It contains 4 emotions: Happy, angry, neutral and sad [16].

TABLE I. Characteristics of various emotional speech databases.

Sl.No	Database	Language	Emotions	Size	Source	References
1	Ravdess		Calm, neutral, happy, sad, angry, fearful, surprised and disgusted	7356	Professional Actors	[1]
2	Emo-DB	German	Anger, boredom, anxiety, sadness, happiness, disgust and neutral	535	Professional Actors	[1], [2], [5] and [14]
3	IEMOCAP	English	Sad, anger, happy, surprise, neutral, disgust, fearful, frustrated, and excited	10039	Actors	[1], [10], [15], [16] and [17]
4	RML	English, Urdu, Mandarin, Italian, Punjabi, and Persian	Anger, sadness, disgust, surprise, fear, and happiness	720	Actors	[2] and [13]
5	eNTERFACE05	English	Anger, surprise, disgust, fear, sadness and joy	1290	Actors	[2]
6	BAUM-1s	Turkish	Joy, surprise, anger, disgust, sadness, fear, contempt and boredom	1222	Actors	[2]
7	DEAP		Sad, happy, interest, helplessness, liking			[3]
8	SAVEE	English	Anger, surprise, neutral, happiness, sadness, disgust, and fear	480	Actors	[4]
9	Emotion01	Korean	Angry, bored, fearful, happy, neutral and sad		Actors	[6]
10	Recola	French, Italian, German and Portuguese				[11] and [15]
11	Mandarin	Chinese	Neutral, happy, sad and angry	17408		[8]
12	INTER1SP	Spanish	Anger, neutral, sadness, joy, fear, surprise and disgust	4528	Professional Actors	[14]
13	BC2013	English				[15]
14	MSP-Podcast		Angry, happy, sad, neutral and disgust	23575	Actors	[16]
15	Crema-D		Happy, angry, neutral and sad	7442	Professional Actors	[16]

IV. DEEP LEARNING TECHNIQUES USED IN SER

A. Convolutional Neural Network (CNN)

In [1] the authors have performed experiment on 3 datasets i.e. RAVDESS, EMO-DB, and IEMOCAP. They executed speaker dependent and independent experiments on these datasets to recognize the emotions. They

extracted features from the spectrograms by using CNN algorithm. They normalized and passed the extracted features to deep BiLSTM algorithm for classification.

In [3] the authors have taken 2 popular CNN algorithms for the experiment namely Alex Net and GoogLeNet.

In [4] the authors have used Matlab software to produce spectrograms from SAVEE dataset. The models were trained considering only 4 emotions that is happiness, angry, sadness and neutral.

In [6] the authors have used Convolutional Neutral Network (CNN) for Speech Emotion Recognition. For feature extraction MFCCs and mel-spextrograms are used.

In [9] the authors have used deep learning and image classification method to recognize and classify the emotion according to the speech signal. Inception Net was used for emotion recognition with IEMOCAP dataset. The proposed CNN model was implemented using TensorFlow. Inception model was used for automatic image classification and image labelling according to the image.

In [10] the authors have trained their model end-to-end and used convolutional Neural Network (CNN) and they loaded Long Short Term Memory (LSTM) on top of it. To demonstrate the effectiveness of their model they shown the results produced in a video along with the ground truth.

The combined MFCC and spectrogram based CNN model achieved overall emotion detection accuracy of 73.1%, The combined spectrogram- text convolutional Neural Network model achieved overall emotion detection accuracy of 75.1% whereas the combined MFCC Text CNN model proved to be more accurate and achieved overall emotion detection accuracy of 76.1% [16].

B.   Deep Convolutional Neural Network (DCNN)

The new method was introduced for automatic effective feature learning by combining DCNNs with DTPM. Here they first extracted segment level feature by using DCNN and they aggregated these features along with DTPM [2].

Matlab software is used to produce spectrograms from SAVEE dataset. The models were trained considering only 4 emotions that is happiness, angry, sadness and neutral [4].

C.   Support Vector Machine (SVM)

To classify emotions from ElectroEncephaloGram (EEG) patterns the authors performed the experiment by ensembling CNN and SVM [3].

In [12] the authors firstly extracted 42 dimensional vector of audio files using the parameters 39 MFCC, HNR, ZCR, TEO and secondly they extracted the relevant parameters from the previously extracted parameters using Auto Encoder (AE). Then they classified them with SVM to see the performance of two systems.

D.   Deep Neural Network (DNN)

In [5] the authors have used Keras and Theano framework to build DNN model. For the experiment they considered small subset of the dataset which consist of 271 labelled recordings. The audio files were preprocessed using Google WebRTC voice activity detector to remove the silent parts of the audio signals. To train the proposed model they utilized Stochastic Gradient Descent algorithm with fixed learning rate of 0.11.

In [16] the authors have experimented with several Deep Neural Network (DNN) architectures which takes combination of speech features and text as inputs. Experiments have been performed on speech transcriptions and speech features.

E. Multi-Layer Perceptron (MLP)

In [6] the authors have used Emotion01 dataset provided by the Speech Information Technology and Industry Promotion center. Here they used Multi-Layer Perceptron network (MLP) and Convolutional Neutral Network (CNN) for Speech Emotion Recognition.

F. Gaussian Mixture Model (GMM)

In [7] the authors have used four combinations of algorithms namely Classic GMM approach, GMM-ELM approach, GMM- DNN approach and DNN- ELMK algorithm. Voiced frames are evaluated against emotions and overall log-likelihood is computed for Classic GMM algorithm.

G. Recurrent Neural Network (RNN)

In [13] the authors have classified 7 emotions found in the Berlin and Spanish databases by using Recurrent Neural Network (RNN) classifier. They compared the performance of RNN to Multivariate Linear Regression (MLR) and Support Vector Machine (SVM) classifiers. In their knowledge Spanish emotional database has never been used before. For this reason they used this dataset. In their research, they extracted 12 order of the MFCC coefficients and the speech signals were sampled at 16KHz.

TABLE V: Summary of literature on deep learning technique

References	Database used	Deep learning approach used	Accuracy	Future Direction
[1]	IEMOCAP	CNN	72.25%	The proposed architecture can inspect Speech Emotion Recognition using GRU, spike and DBN networks to get greater accuracy.
	RAVDESS		77.02%	
	EMO-DB		85.57%	
	eNTERFACE05		76.56%	The proposed architecture can inspect the virtue of deep features in
[2]	EMO-DB	DCNN model and DTPM	87.31%	continuous emotion recognition on datasets like JESTKOD, RECOLA
	BAUM-1s	strategy	44.61%	and SEMAINE.
	RML		69.70%	
[3]	DEAP	CNN		
		AlexNet and SVM	87.5%	
		GoogleNet and SVM	100%	

[4]	SAVEE	DSCNN	87.8%	Advance the architecture for effectively recognizing the emotions.
		CNN	79.4%	
[5]	EMO-DB	DNN	96.97%	Increasing the approach by including RNN.
[6]	Emotion01	MLP	75%	Aim to compare the accuracy for other data sets
		CNN	60%	
[7]	Mandarin	GMM	38%	
		DNN	48%	
		ELM	51.6%	
		DNN-ELMK	57.9%	
[8]		MFCC and GMM	84.61%	
[9]	IEMOCAP	Net v3	35%	Concurrent emotion recognition can be established using same architecture.
		TensorFlow	38%	
[10]	RECOLA	CNN		Try extensive CNN models for audio analysis, utilizing immense databases.
		SVM		
[12]	RML	Basic AE	72.83%	In future, they try to use different features and apply their system.
		Without feature	65.43%	
		Stacked AE	74.07%	
[13]	Spanish	RNN	90.05%	Concurrent speech emotion recognition will be invented by improving
	Berlin	MLR	82.41%	the system.
		CNN		
[16]	IEMOCAP	Spectrogram-MFCC	73.1%	
		Spectrogram-Text	75.1%	
		MFCC-Text	76.1%	

V. CONCLUSION

This paper provides review on deep learning methods used for Speech Emotion Recognition. The deep learning methods like Convolutional Neural Network, DCNN, GMM, DSCNN, SVM etc. are used to recognize emotional state of a person. All these techniques are briefly explained over the specified datasets. Emotions such as neutral, joy, anger, happiness, surprise, disgust, fear etc. are classified. Classification of emotions using deep learning

model is very efficient and provides result with better accuracy. Different models are used and the performance accuracy are compared which yields to better classification emotions. The drawback of using deep learning model is it's costlier because it is used over large data sets and equipment's used are very costly. The future aim of this research is to build a model with higher accuracy and to decrease the processing time using deep learning for SER.

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Fire Fighting Robot

Ashwath[1], Rohan R Kotian[1], Sushmith[1], Rizwan Nazeersab Janageri[1], Mr.Manjunath Raikar[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

ABSTRACT

with the advent of technology, humans are replaced with robots in life-threatening situations. We aim to design a robot capable of detecting and suppressing fires. By designing and implementing an autonomous robot capable of detecting and extinguishing flames, disasters can be avoided with minimal risk to human life. In this research, we illustrate an autonomous robot capable of detecting flames indoors and maneuvering towards the flame to extinguish it with the help of fans.

Keywords— Arduino, Sensors, Fire Extinguisher

I. INTRODUCTION

Using Two-wheeled differential drive robot, flame sensors, ultrasonic sensors and Arduino IDE, an autonomous was designed to detect fires, extinguish and avoid obstacles. The scope of the project in the industrial sector is vast, especially in the fire department. The main operation of the robot is to detect and extinguish the fire source with the input from the flame sensors and extinguishing flames. It has a field of view of 180º to detect flames with obstacle avoidance to maneuver in the surroundings. This is achieved by integrating three flame sensors capable of detecting flames into the robot 60° apart in order to achieve an 180° field of view. Since each flame sensor has a field of view of 60°. By using three sensors, a general direction of flame can be computed by the data read from each sensor. In order to extinguish the flame, cartridge mounted on the robot is discharged. A Bike tire inflator is modified as a fire extinguisher by attaching a servo motor to the lever to discharge the cartridge. The firefighting robot is built upon an obstacle avoidance robot. A Ping ultrasonic sensor is used in order to design an obstacle avoidance robot. The distance between the objects ahead of the distance sensor and the robot can be computed by reading the digital values from the ping ultrasonic sensor from an Arduino UNO. The ultrasonic sensor is mounted on a servo motor to pan the surrounding in order to choose an optimum path when it encounters an obstacle.

II. LITERATURE REVIEW

Robotics motion control can be divided into two categories sensor based system and vision based system. The Sensor- based system will be controlled by the feedback from the different sensors such as obstacle sensor, IR sensors, flame sensor etc., while vision based system uses the cameras and the image processing techniques to find the target position. Firefighting robot is designed to be an unnamed ground vehicle, implemented for finding and fighting the fire. Few types of robot's vehicles are fighting the home fire and fighting forest fires [1]. The fire event may involve more dangerous in life. One of the most important systems in the fire detection function system is an intelligent home [2]. The system can have designed an intelligent multi sensor based security that contains a firefighting robot in our daily life [5]. Security and Firefighting advanced robot which is used in the UK is very low in cost and have high performance of detecting fire and extinguishing them [4]. For the novel fire around the surroundings using image processing and device controlling algorithms to detecting fire quickly and accurately [7]. In present days' problem of safety on road and railways tunnels considered to more risk connected to fires, this robotic system can be installed on the existing tunnels without requiring significant modifications of the existing infrastructures [8]. The designing of an autonomous mobile robot that navigates through a maze searching for a fire in a room (burning candle), it detects the candle's flame through sensors, and then extinguishes the flame, and returns to a starting location of the maze. This fire-fighting design interdisciplinary design in colleges [3]. Using Fire extinguisher with gas such as CO2 and N2 has advantages compared ones with water. For example, they provide electrical insulation, they avoid water damages to constructions, electrical equipment's, paper materials, etc., it may useful in spaces hidden from extinguishers [4]. In this robotic system, obstacle avoidance and detection using ultrasonic sensors in large fire fields under large smoke at higher temperature situations, the transducer, anti- jamming processing is designed [8]. In [2], authors proposed a PID controller based on back-propagation (BP) neural networks which are used only in PID controller. To reduce the error rate parameters of PID controller are adjusted concurrently in real time. In [6], an intellectual PID control, which determines system dynamics and states using error and error rate information as an input of the controller, of the robotic system. The 'size and weight' and 'cost and performance' of firefighting robots are problems in present conditions [3]. In this paper, we are designing a firefighting robot with obstacle avoidance and detecting the fire flame and extinguishing the flame.

III. METHODOLOGY

The main brain of this is Arduino, but in order to sense the fire we have to use flame detector that is fire sensor. When the fire burns it emits a small amount of infrared light will be received by the IR receiver on the sensor module. Then we use an op- amp to change in voltage across the IR receiver. There are three flame sensors mounted on the robot. The analog values from these sensors are read continuously to detect any fire source. Once the flame sensor is detected, by comparing the output analog values of each sensor, the direction of flame can be established. Once the direction is established, the robot is made to turn in small increments for the middle sensor to aim at the fire source.
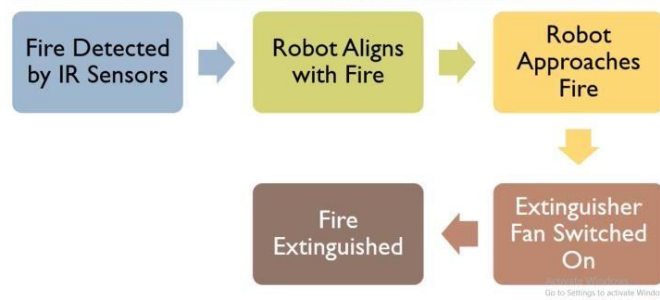
Fig 1: Schematic of Fire Fighting Robot

IV. REQUIREMENTS AND SPECIFICATION

HARDWARE REQUIREMENTS

Arduino UNO, DC Motors, Infrared sensors, Flame sensors, LEDs, BreadboardL293D, IC Pin, Connectors, 9V Battery Connector, Metal Stripes & Clamps, Wheels, UR Cables, Small Fan16 mm, 45 mm, 30 mm M3 screwsM3 nuts Caster wheels, Double Tapes.

Fig 2: Arduino UNO

Fig 2 shows The Arduino UNO is a standard board of Arduino. Here UNO means 'one' in Italian. It was named as UNO to label the first release of Arduino Software. It was also the first USB board released by Arduino. It is considered as the powerful board used in various projects.

Fig 3: DC Motor

Fig 3 shows DC motor or Direct Current Motor is a device that converts the direct current energy into mechanical energy. The energy generated through the current is used to drive the motor. The working of DC Motor depends on the received electric current.

Fig 4: IR Sensor

Fig 4 shows an infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. IR sensor LED transmit the beam of IR light and if it finds an obstacle then the light is reflected back which is captured by an IR receiver. An infrared sensor includes two parts namely the emitter & the receiver (transmitter & receiver), so this is jointly called an optocoupler or a photo-coupler.
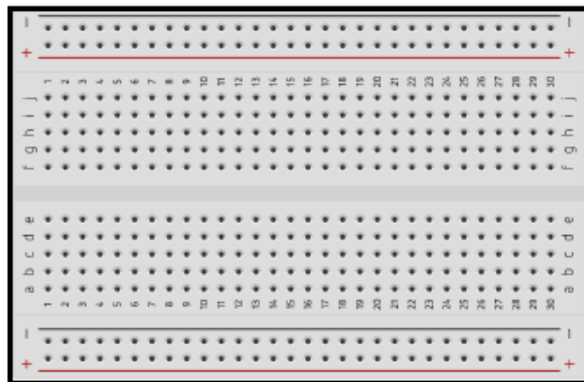

Fig 5: Breadboard

Fig 5 shows the breadboard is a white rectangular board with small embedded holes to insert electronic components. It is commonly used in electronics projects. We can also say that breadboard is a prototype that acts as a construction base of electronics. A breadboard is also categorized as a Solderless board. It means that the component does not require any soldering to fit into the board. Thus, we can say that breadboard can be reused. We can easily fit the components by plugging their end terminal into the board.
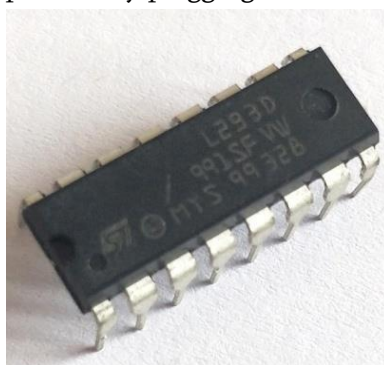

Fig 6: L293D IC

Fig 6 Shows the L293D is a popular 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. A single L293D IC is capable of running two DC motors at the same time, also the direction of these two motors can be controlled independently.
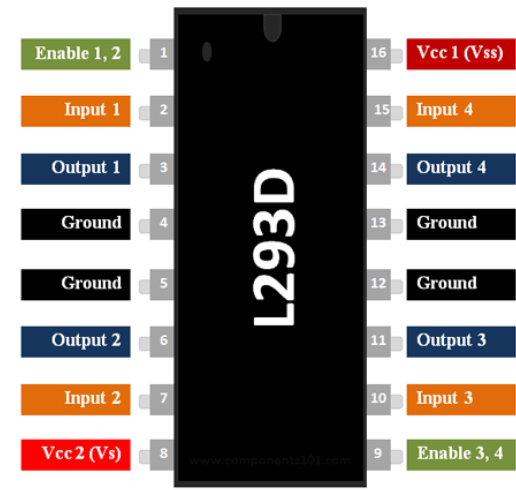
Fig 7: IC L293D Pinout

SOFTWARE REQUIREMENTS

Operating system: Windows 7 & above

Software: Arduino IDE, S4A

V. SYSTEM DESIGN

Steps of building the module

Step 1: Movement

Step 2: Fire Tracking

Step 3: Extinguishing Fire

Step 1: Movement

- Read from front sensor if it's less than specified value goes forward. Else stop and find new route.
- Find new route by going backward. Read left and right sensors. If left distance less than right distance then turn left else turn right.
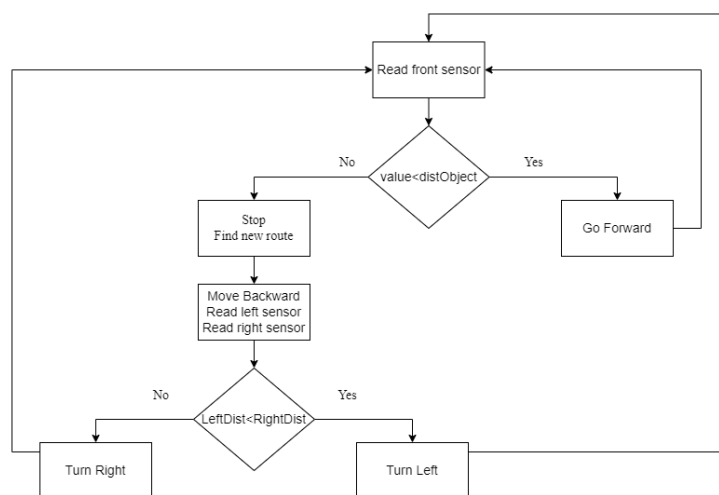- Go back to first step.

Fig 8: Movement Algorithm

Step 2: Fire Tracking

- After we test the movement model, we integrate the flame sensor to the model.
- The flame sensor is an array of sensors, it detects the fire from front, left and right. So, in this step the robot will not move until the flame sensor sense the fire.
- Three flame sensors from the array are used to detect fire from front, left and right.
- To be accurate we read three values for each one and evaluate the average and we must wait few milliseconds before start reading new values from the sensors.

Step 3: Extinguishing Fire

- The robot tracks the flame.
- When the fire is near stop and turn on the fan.
- While the fan is running the robot will keep sensing the fire if no flame (fire) then it will turn off the fan.

VI. RESULTS

The Fire-Fighting robot is capable of detecting flames and extinguishing them successfully. The motor controller and Arduino code work together to control the movement of the robot with obstacle avoidance. It can detect the flame more effectively in the buildings and fixed lighting conditions. The robot is designed for the indoor application. Since the ambient daylight varies throughout the day, a dynamic threshold value is necessary to compensate for the change in ambient light. Use of high torque servo motor was necessary to run the fan.
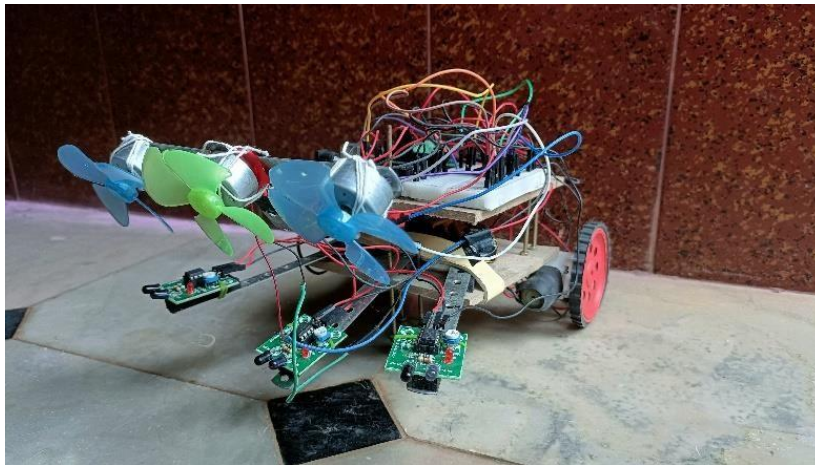

Fig 9 : Fire Fighting Robot

VII.   CONCLUSION

The design was successfully implemented on a four-wheel drive robot. The 3D printed mount was mounted on the front of the robot's chassis. The battery is mounted inside the robot to prevent any damage to the battery from external fire source. The ultrasonic sensor was directly mounted on a servo motor. The robot successfully detected multiple flame sources and extinguished them from a safe distance. The speed of the robot was

reduced to the desired speed in order to increase the operating time and efficient detection of the flame source. The flame sensor threshold values need to be manually obtained.

VIII.   FUTURE WORK

IoT can be implemented onto the robot to send an E-mail to the user when the robot detects a flame. More sensors can be mounted, to achieve a 360º field of view. This will reduce the reaction time to the fire source. The addition of a camera to the robot in order to distinguish between ambient sun light or fire source. This will help set a variable threshold for comparing the sensor value to decide whether there is a fire or not. By adding wheel encoders, we can make the robot maneuver with precision and independent of battery voltage fluctuation. Replacing the 16g canister with a portable fire extinguisher would help suppress larger flame source. The motion of the robot can my mode smooth by implementing PID control. Further can add water or carbon dioxide instead of fans.

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Road Safety Violation Detection

Moulya S P, Srijith R Nayak, Sainikethan, Suman Deril Desa, Mahesh B L

Department of CSE, Yenepoya Institute of Technology, Karnataka, India

ABSTRACT

Real time road violation detection systems are very important for safety of both riders and pedestrians. Roads are the primary route of transportation in any country, and they are frequently congested due to a lack of traffic management. It may be due to the large population, lack of technology and violation did by the people, among them, traffic rule violation is a major issue. Our work proposes a system that detects individual or different riders taking a trip on motorcycle with no helmets and/or triple ride. In our proposed approach, from the beginning stage, motorcycle riders are recognized with the use of YOLOv5 model which is a consistent type of YOLO model, Yolo V5 is currently one of the generally utilized models for Object Detection.

Keywords: - Faster-RCNN Algorithms, Object Detection algorithms, YOLO Algorithm.

I. INTRODUCTION

The number of accidents occurring each day in India is continuously increasing. Because to the disregard for safety measures such as wearing helmets when triple riding a motorcycle, two-wheelers account for 25percent of road crash deaths. A major reason is when there are more than two drivers on a two-wheeler. As a result, we propose a framework for detecting traffic rule violators who ride motorcycles without wearing a helmet. Using Deep Learning and Image Processing technologies, road CCTV footage is used to detect whether a motorcycle rider is wearing a helmet or not. In contrast to other deep networks such as CNN, fast R-CNN and YOLO, the algorithm employed here is faster R-CNN, which increases the detection rate of motorcycles. The registration number of the violator's vehicle is detected using open-ALPR, and a notification is sent to the local police personals.

We divided the detection into four different categories:

- Motorcycle Detection
- Head Detection,
- Helmet Detection
- Number Plate Detection.

II. BACKGROUND

Because motorcycles are a practical and everyday mode of transportation, Because the majority of motorcyclists do not wear helmets, there has been a dramatic increase in motorcycle accidents, making riding a motorbike an ever- present risk. The majority of deaths in accidents in the last few years have been caused by damage to the head, resulting in trauma to the skull or psyche. As a result, wearing a helmet is mandatory by traffic laws, and failure to do so results in severe penalties. Despite this, a large proportion of motorcycle riders do not follow the rules. The police officer used physical force to try to manage the situation, but it was ineffective in the actual world. The usage of helmets is a significant factor in safety, and the demand for security measures is an indisputable requirement to reduce the number of deaths in road accidents.

According to research, wearing a helmet increased the of surviving an accident by 42 percent. Despite the fact that helmets are necessary for motorcyclists' safety, many of them refuse to use them for reasons such as "it ruins my haircut", "it feels uncomfortable", "excellent helmets are expensive" or "it obstructs my peripheral vision". These are not equivalent to the loss of a life. The current procedure for determining whether or not a motorcyclist is wearing a helmet is for police or other employees to manually inspect each rider. It is impossible for motorcyclists to avoid checkpoints under this arrangement.

As a result, the relevance of automated traffic management systems has grown in recent years. All major urban regions have already deployed massive video reconnaissance systems to keep an eye on a variety of threats. Using an existing system in this way is a cost-effective approach, but many frameworks include a large number of employees whose performance is not relevant over lengthy periods of time. According to recent studies, human surveillance is unsuccessful because as the scope of recorded review expands, so does the number of human errors. We want to increase the efficiency of a traffic stream framework, as well as reduce the cost of human labor and eliminate the causes of accidents. The optimum solution is to create an electronic detection system that can recognize this type of problem without requiring human intervention.

III. RELATED WORKS

A brief analysis has been made based on the research articles we completed: Vishnu published a paper on a technique for automatically detecting motorcyclists driving without helmets in CCTV images. For the video edges, flexible background subtraction was utilized to get the moving item. The motorcycle trips in the moving item were also identified using CNN. They were able to identify 92.87 percent of the violators on average with a low false alarm rate of 0.5 percent, demonstrating the effectiveness of their proposed methodology.

Dharma Raj also exhibited the design of a system that uses image processing and deep convolutional neural networks (CNN) to recognize bikers who do not wear helmets. Their method included motorbike detection, helmet versus no helmet detection, and motorcycle licence plate identification. For the classifier, CNN models were created. When the cyclist wore a hat, it was mistaken for a helmet classifier, which resulted in inaccuracies. This problem could be handled by using headwear to increase the training data.

The system was built with the Deformable Parts Model (DPM), which has a high detection accuracy in the image detection technique, according to Baolin Bai's paper. For object detection, the DPM is both efficient and

accurate. The training process used the MPCA algorithm and quick level locating. Despite the fact that the study's technique enhanced detection precision and speed, it could only deal with partial occlusion or damage with the vehicle occlusion problem, and the detection effect was not accurate under the occlusion of vehicle condition or damage severity. Erroneous detections occurred owing to class confusion, such as between car and bus, and false detection in other categories was frequently due to the extremely strong bounding box criterion.

Nagarjuna's article proposed a car accident detection and communication system that would assist in informing families, nearby hospitals, and police of the accident's location. When the car collided, topped, or tilted by more than 30 degrees, the software was able to send messages to the programmed emergency numbers. The fact that the location's coordinates were provided rather than the precise location, which might be determined by an application locating the map's location, was highlighted as a vulnerability in this method.

A deep learning solution called Single Shot Multibox Identification was introduced into the helmet detection problem in Narong's work. Only a single CNN network is used in this method to detect the bounding box region of the motorcycle and rider and categorize whether or not the rider is wearing a helmet. The experiment yielded positive results, indicating that Deep Learning and CNN approaches were effective algorithms for picture detection.

The system employed in Yogameena's research on helmet wear analysis using deep convolutional neural network used the performance metric and meant average precision on CCTV data. The architecture included foreground segmentation using GMM, motorcycle recognition, and detection of motorcycle riders wearing or not wearing helmets using a faster RCNN.

In a Yuanlong publication, they published a study on a traffic accident detection system that combines a self-tuning iterative hard thresholding algorithm for learning sparse Spatio-temporal data and a weighted extreme learning Machine for detection.The disadvantage here was that when the collision occurred at a different depth, false detection occurred.

A similar approach of helmet detection was developed using deep learning in Rohit's paper; they employed the Caffe Model for detection and extraction, which had an accuracy score of about 86, and the Inception V3 model for image classification, which had an accuracy score of 74.

IV. PROPOSED METHODOLOGY

The system is divided into four parts:
- Motorcycle Detection
- Head Detection
- Helmet Detection
- Number Plate Detection

A. Motorcycle Detection

In the world of image processing, recognizing a motorcycle from an image has been a risky situation. The issues encountered were the state of the bike in the photograph, the recognition of folks travelling on a cruiser or an empty vehicle with no rider, the location of the traveler's head, and the differentiating proof of the rider's

helmet at the head area. Before detecting the motorcyclist in the frame, several image processing steps were done to the video sequences, and it was discovered that the properties produced using various methods employing the information included in the image itself provide a lower detection rate for motorcycle detection. Deep learning algorithms such as CNN have recently taken on helmet wearing analysis, and they are identical to hand-crafted features. When compared to other deep networks like CNN, fast R-CNN, and YOLO, the faster R-CNN increases the recognition rate of motorcycles. We use CCTV footage films from the target places and partition them into different frames. We then use open-CV source python code to detect objects (based on faster R- CNN), and if the system detects the presence of a motorcycle, it first examines whether it has a rider. The relevant section from the frame is then removed and further examinations are performed.

B. Head Detection

We identified the required frames from the images (utilizing faster R-CNN). If the model detects the motorcycle's proximity, a bounding box is created around it. This zone is then removed from the current frame and sent to the image classifier for later processing (image acquisition, image restoration, linear filtering, and so on). The image classifier separates the test picture from the captured frame and assigns it to one of two objective classes. A pre-trained model could distinguish humans or things such as people, horses, and chairs using a faster R-CNN with VGG-16. It gives the illusion of a human head when the camera is positioned with its angle of depression. The Gabor-Wavelets filter helps to accommodate its sturdiness and stability to changes in scale, direction, and dazzle while recognising highlights that represent facial segments. It consistently recognises the human head in a variety of environments.
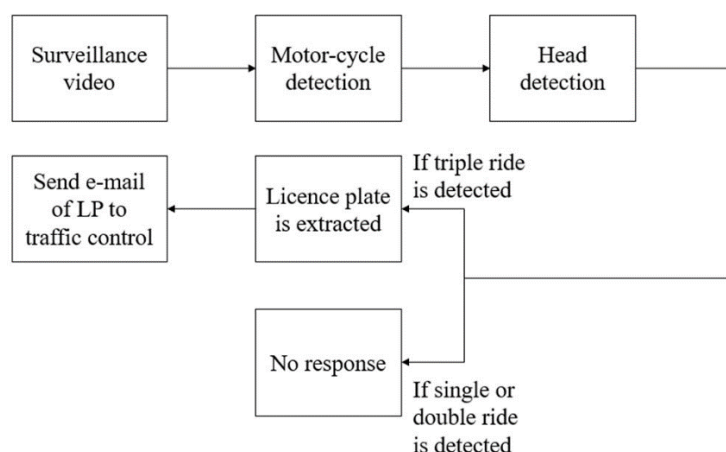

Fig 1. Head and Triple ride detection

C. Helmet Detection

According to related research, existing features and CNNs struggle to handle real-world issues for helmet wear analysis, such as motorcycling helmet identification, thus we adopt a faster R-CNN. We start with a simple model and gradually increase the complexity of the model with RGB colour input channels to obtain a robust and accurate model with helmet or without helmet classification. The identification of persons riding motorcycles or an empty vehicle with no riders, the position of the motorcyclist's head, and the detection of a helmet at the motorcyclist's head position were all investigated. Before it can detect the position of the motorcycle, various image processing procedures must be applied to the video sequence. The detection model in this module recognises the presence of a motorcycle and a person wearing a helmet.
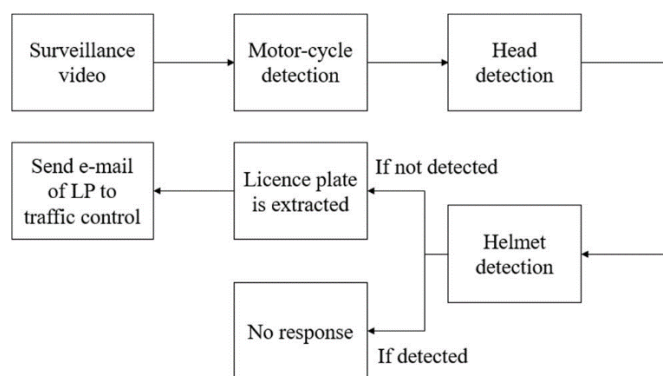
Fig 2. Helmet detection

D. Number Plate Detection

In the same way as motorcycles are detected, motorcyclists with and without helmets are detected in almost the same manner. For character classification of motorcycle licence plates, we've used three distinct CNN models. We assembled the corresponding number plate and prepared the framework with numerous photographs of helmetless riders. That is, the rider wearing a helmet is not considered, but the frame with the motorcyclist without a helmet is included into the database. These images are sent to be processed further. By removing this module, the complete system was evaluated, and the rest of the groupings, such as motorcycle detection and recognition of a motorcyclist wearing or not wearing a helmet, were updated. As a result, in both background and foreground regions, the region associated to the motorcycle, motorcyclist, head, and helmet has been discovered. As a result, it establishes the value of initial foreground segmentation, motorcycle detection, detection of a motorcyclist wearing and not wearing a helmet, and Licence Plate recognition of motorcyclists wearing and not wearing helmets, as well as providing a framework for an automated helmet wear analysis system. The suggested helmet wear analysis framework's main benefit is the research of relevant work, dataset, and experimentation on many sorts of hard settings.
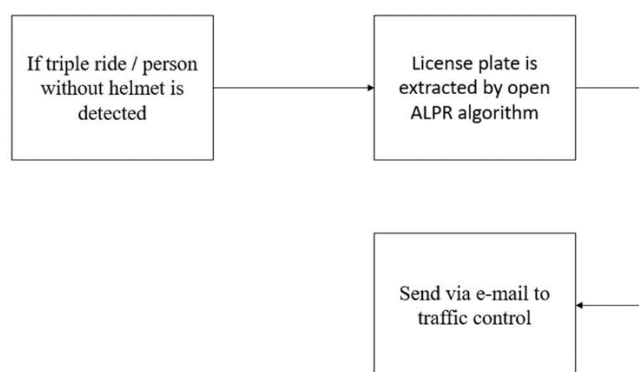

Fig 3. Licence plate detection

E. Interpretation of the result

In the final step, the performance is compared to the preceding two stages and a conclusion is reached. The precision of the investigations will reveal the procedure's exhibition in terms of image categorization and detection. The OpenCV Libraries are utilised in conjunction with the detection system, which includes pre-defined functions and data members for image processing such as background subtraction, morphological operations, feature extraction, and classification.
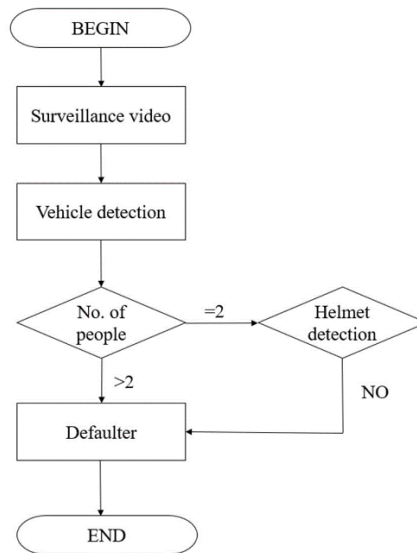
Fig 4: - Block diagram

V. RESULT

Fig 5: - Detection of Bike

Figure 5 shows the outcome of our system's detection of the bike. Blue color boxes are used to highlight motorcycles.

Fig 6: - Bike Rider without helmet detected

Figure 6 illustrates the key aspect of the system, which is the detection of helmetless motorcyclists. The head wearing a helmet is shown in green boxes, whereas the head without a helmet is highlighted in red boxes.

Fig 7: - Cropped Number Plate

After the helmetless riders are identified, their vehicle number plates are cropped (Figure 7) and mailed to the authorities along with the frame.

VI. CONCLUSION

Manual work will be decreased as a result of the implementation of this system, and human limitations will be efficiently addressed. The opportunity for escaping of violators due to negligence has now been limited. More infringers can be detected. We will work toward an automated environment that will minimize the workload on police personnel while also improving the efficiency of the workflow. With the implementation of this new system, rules will be enforced more aggressively, resulting in fewer traffic accidents and fatalities. The system will be automated for the time being. Workflow will be smooth. Road accidents and fatalities will be reduced as a result of enforcement of the rules.

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Gas Leakage and Fire Detection using IoT

Archana Gond, Bhakthi S, Mr. Pandu Naik, Ashika Shetty, Shetty Chaitra Chandrashekhar

Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

The proposed model in this project employs different integrated detectors, such as heat, smoke, and flame. The signals from those detectors go through the system algorithm to check the fire's potentiality and then broadcast the predicted result to various parties using GSM modem associated with the system. To get real-life data without putting human lives in danger, an IoT technology has been implemented to provide the fire department with the necessary data. Finally, the main feature of the proposed system is to minimize false alarms, which, in turn, makes this system more reliable. The experimental results showed the superiority of our model in terms of affordability, effectiveness, and responsiveness.

Index Terms— Gas Sensor, Temperature Sensor, Water level Sensor, IoT.

I. INTRODUCTION

Nowadays, fire incidents have become a critical issue, which must be dealt with on time without any unnecessary delay to avoid the loss in lives and belongings. It is considered a fire situation when the monitored temperature exceeds 45degree C. In critical places such as hospitals, schools, and banks, personnel's arrival time to come for help in fire hazards is around 15 minutes. The statistics show that there are 475,500 structural fires annually in the India, causing 2,950 civilian deaths, 12,775 civilian injuries, and crores in property damage. According to the National Fire Protection Association, one- third of Indian household fires occur in premises with no working smoke alarms, alarms with no proper maintenance, or misplaced alarms. The appropriate allocation of fire alarms with a proactive warning could save lives and reduce property losses. Particularly, there are many types of fire alarms as heat detectors and smoke detectors; studying these types helps to decide which type is more suitable for home or store. Many studies have been conducted to address these issues; however, fire detection issues are not addressed properly since these systems rely on machine vision, where the algorithms need more images to train, and the detection rate is not satisfactory. Other approaches like suffer from some limitations, mainly slow time responses and low accuracy. Thus, this project aims to minimize false alarms, provide faster response, and a new IoT approach than previous studies that used mostly Node- Red.

The contribution is as follows: (1) To determine which combinations and algorithms of sensors can accurately and quickly detect fires, (2) We have designed and then developed a system that detects fire and activates the fire alarm, (3) the proposed system evaluates the situation and initiates an automatic water sprinkler where the water unit was designed separately.

II. LITERATURE SURVEY

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[2] Bello and S. Zeadally, "Communication issues in the IoT (Internet of Things)," in Next Generation Wireless Technologies: 4G and Beyond A musical applications supported on business IoT have been build and instrument in neoteric yonks. This project discusses the present research of IoT, cue enabling technologies, major Industrial IoT applications, identifies research challenges and trends in an effort to understand the evolution of IoT in industries.

[3] S. Yu and Y. Peng, "Research of routing protocol in Internet of Things which is based on RFID," Routing procedure of RFID-supported IoT are homo-genetic to those of

WSN as they both procedure of several-leap passing, but also have a multitude of variations along of the contention in might labor, contexts and practical environments. The concern examines this question, by intend a Tex.-conscious RFID march procedure which is count supported and show the strength study of this sample.

III. PROPOSED METHOD

Using gas sensors, flame sensor, temperature sensor and water level sensor. Arduino UNO and GSM module for taking input from sensors and giving the output. GSM module alerts the emergency services and contacts. The proposed solution presents a prototype for early fire detection. In this system the alert is send to the main headquarter module via SMS whenever the value of any sensors exceeds its threshold value. Another SMS is also send to mobile so that he or she can take necessary action for preventing the fire from spreading.
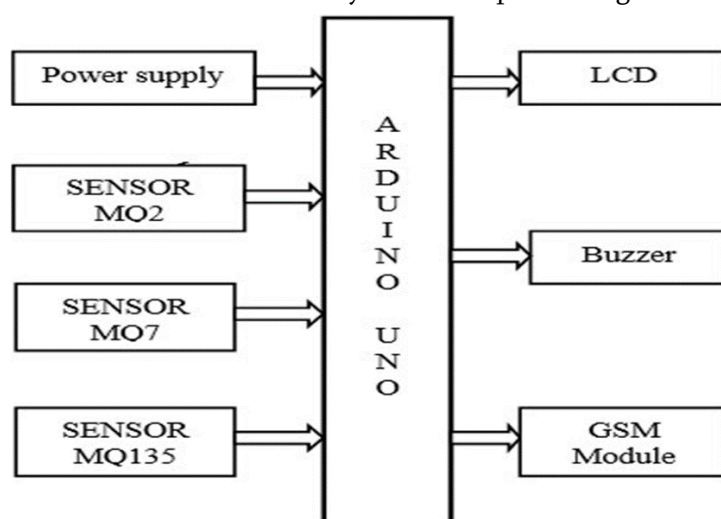

Figure 1. Method of the proposed system

Fires cause serious damage and disrupt daily life in a devastating manner. Hence preventing them or reducing their effects is a top priority. Though there are many systems that have been created to tackle this problem, false alarms is a challenge that is yet to be avoided. In our model, the place to be monitored is under constant surveillance by a closed-circuit television. At tactical points, a number of sensors are placed. The sensor includes pir sensor, temperature sensor, heat sensor and gas sensor. Each sensor plays a vital role in detecting a fire if it occurs. On top of these sensors, the footage from the camera is also used to detect the fire through image processing. The main advantage of this system is that it has a high accuracy.

PROPOSED SYSTEM ANALYSIS:

System analysis conveys the solution of an obstacle that happens in the running system. In the analysis of the proposed system as shown in Figure 1, the fire detection and handling process are divided into 4 (four) stages which are all automated using a microcontroller based on Arduino Uno. The following is an explanation of the proposed system flowchart, as follows:

1. 1.In the first stage, the tool detects the presence or absence of a potential fire by measuring the temperature in the room using a temperature sensor.
2. In the second stage, if the room temperature is detected above >45 ∘C, the system will activate the siren/alarm indicating a potential fire as well as sending a text message containing information on potential fires and also the coordinates for the detection of potential fires via the GSM module to the homeowner and also the fire department's office whose calling number has been registered on the device.
3. The next step is if the detected room temperature is not more than 45 ∘C, the system will detect the potential for an explosion/or fire by measuring the level of LPG gas in the room using an LPG gas sensor.
4. The next step is if it is detected that LPG gas spreading in the room is at 220 ppm, the system will activate the siren/alarm per sign of a potential explosion as well as send a text message containing information on the potential for an explosion to occur to the homeowner via the GSM module.
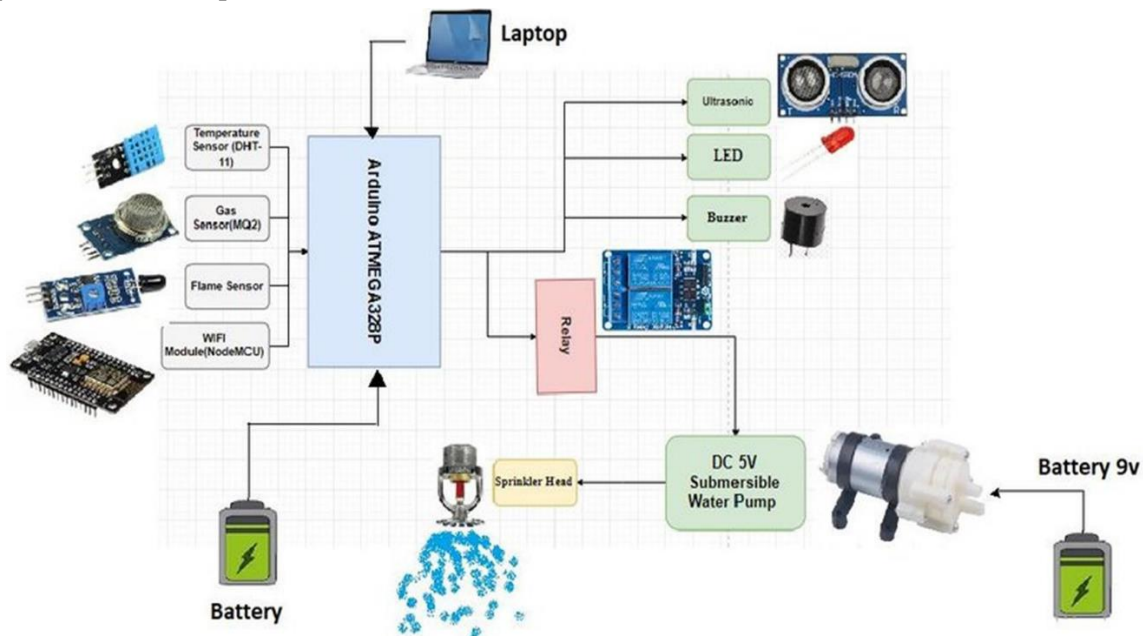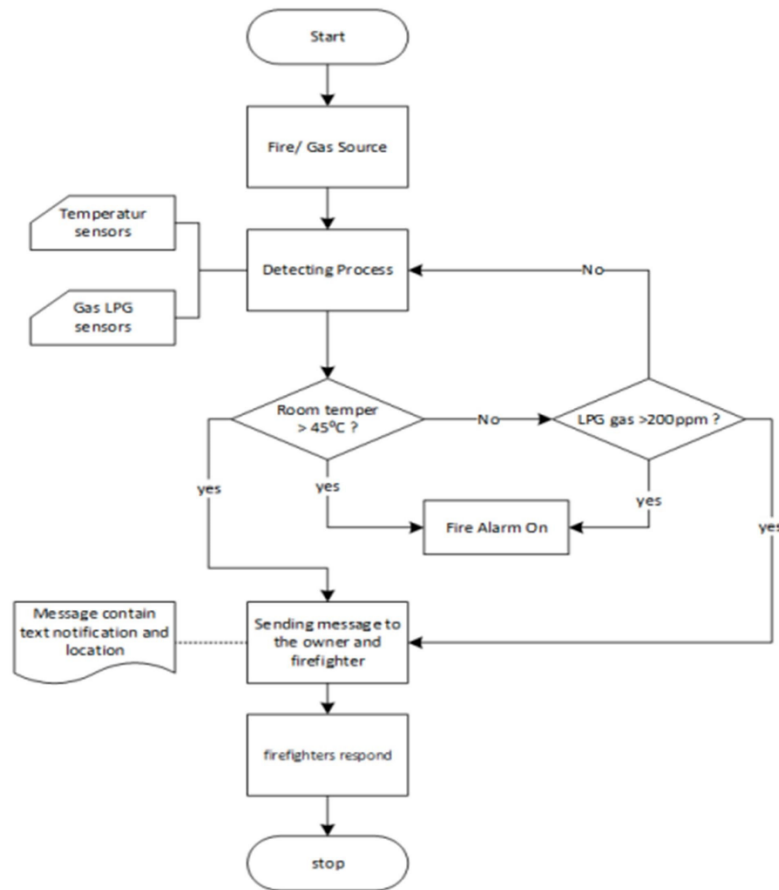

Figure 2. System Design

Figure 3. Flowchart

IV. SOFTWARE DESIGN

The software for the system design to be built is a context diagram (a description of the system designed), called DFD (Data Flow Diagram) level 0. The context diagram shown in Figure 3 is a general explanation of the entities involved. The entities in this system are the admin, community, and firefighters. The admin will input the data required to design this system and receive the information contained in the system. The citizens will receive notifications of gas leaks. Notification of house fires will be sent by text message and alarm if there is a fire. The fire brigade will receive information on the occurrence of fires and confirm fires in people's houses. DFD (Data Flow Diagram) level 0 on the home fire detection system built is shown in Figure 4. In this perspective, there are three processes, 1.0—process, 2.0—tool checking, and 3.0— confirmation. The admin aims to input the data needed for the system configuration to be built and collected on the Arduino system. After the data is stored on the Arduino system, people only need to check the tools installed at their houses. The citizens will receive notification of gas leaks and potential fires that occur. The last process is when a house fire happens, the Arduino system will send information in the form of an SMS to the fire department, and then it will be confirmed that the fire incident occurred.
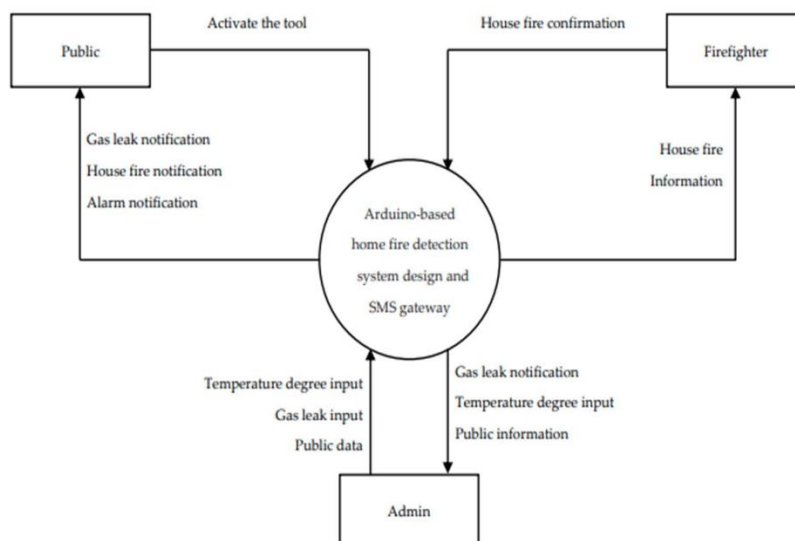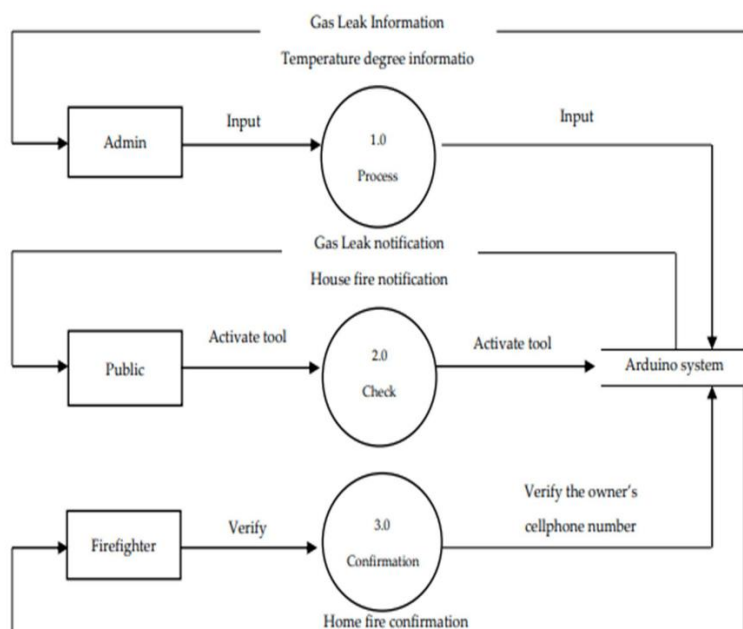
Figure 4. Context diagram

Figure 5. Schematic data flow diagram

V. HARDWARE DESCRIPTION

A. **Ubidots MQTT Broker:** MQTT is specially useful to push data to your devices. Imagine a cloud-controlled device to open/close a door remotely. In the case of HTTP, the device would have to continuously make GET requests to Ubidots server to see if there's a change in a variable, say "Door Control Variable", and then take an action depending on the last reading. This takes a lot of requests and it's not entirely real-time interaction since it depends of the polling frequency. With MQTT, the device can "listen" to the cloud and only get notified when there's a change in the variable. This way, the connection between the device and

the cloud is left open but data only travels when necessary, saving battery, network band and improving the real-time experience.

B. **ESP32 DEVKIT DOIT:** The ESP32 is dual core, this means it has 2 processors. It has Wi-Fi and bluetooth built-in. It runs 32 bit programs. The clock frequency can go up to 240MHz and it has a 512 kB RAM. This particular board has 30 or 36 pins, 15 in each row. It also has wide variety of peripherals available, like: capacitive touch, ADCs, DACs, UART, SPI, I2C and much more. It comes with built-in hall effect sensor and built-in temperature sensor.

C. **MQ-135 - Gas Sensor:** The MQ-135 Gas sensors are used in air quality control equipments and are suitable for detecting or measuring of NH3, NOx, Alcohol, Benzene, Smoke, CO2. The MQ-135 sensor module comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. If you need to measure the gases in PPM, the analog pin need to be used. The analog pin is TTL driven and works on 5V and so can be used with most common microcontrollers.

D. Flame Sensor: A sensor which is most sensitive to a normal light is known as a flame sensor. That's why this sensor module is used in flame alarms. This sensor detects flame otherwise wavelength within the range of 760 nm – 1100 nm from the light source. This sensor can be easily damaged to high temperature. So this sensor can be placed at a certain distance from the flame. The flame detection can be done from a 100cm distance and the detection angle will be 600. The output of this sensor is an analog signal or digital signal. These sensors are used in fire fighting robots like as a flame alarm.

E.   Active Passive Buzzer: A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.

F.   LCD: A typical I2C LCD display consists of a HD44780 based character LCD display and an I2C LCD adapter. A 16×2 character LCD, for example, has an LED backlight and can display 32 ASCII characters in two rows with 16 characters on each row.

VI. RESULTS AND DISCUSSIONS

This technique has been tested by leak of gas almost about sensors, MQ2 gas sensor sends the signal to the Arduino UNO after detecting the gas leakage. Arduino to other externally connected device such as LCD, buzzer and GSM send vigorous signals. SMS is sent by GSM module to the provided mobile number as a result. In practice, results for are noticed by the people surrounding by the area are displayed in the LCD and buzzer sound indicate the danger to the people by making Beep sound.
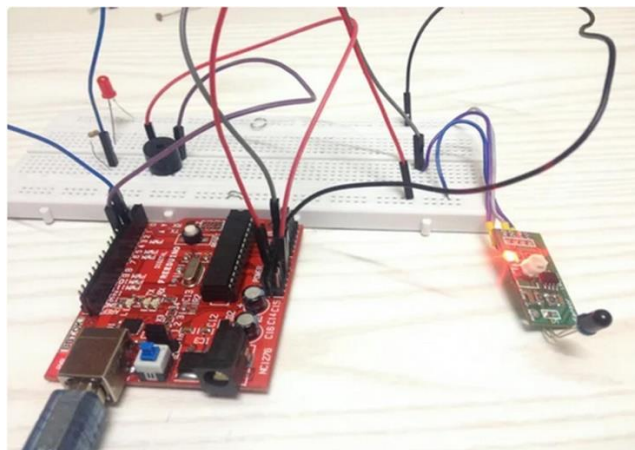

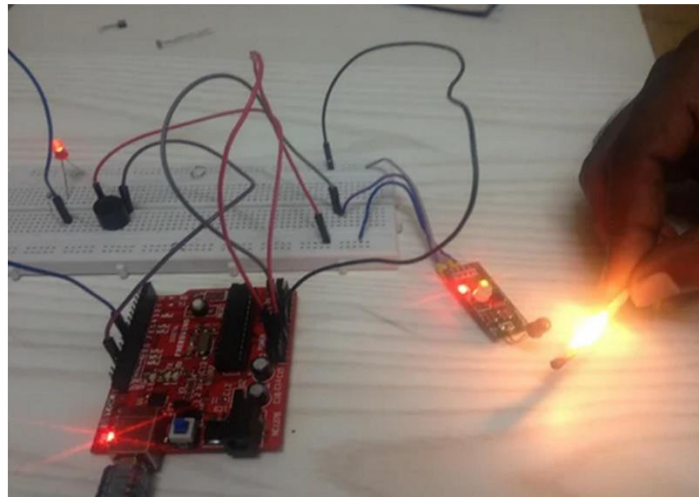Figure 6. Partially Connected Circuit

Figure 7. Fully Connected Circuit

Figure 8. Output in Arduino command window

VII.   CONCLUSION

After this project performance, can conclude that detection of the LPG gas leakage is incredible in the project system. Applicable usefully in the industrial and domestic purpose. In danger situations we are able to save the life by using this system. An alert is indicated by the GSM module. A sensor node senses gas like CO2, oxygen, propane. The estimated range of transmission and consumption of power is obtained. The simple procedures and Arduino UNO Micro controller area used to build the sensor.

VIII.   FUTURE WORK

In the future days we are planning to modify this project by connecting this project to the main server from which we can send message or notification to anyone in any part of the world using the cloud computing

technology with Iot. Now we can send only mail to the choosen person.When the LPG cylinder is empty the cylinder booking will done automatically using Iot technology.

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Drug Recommendation System based on Sentiment Analysis of Drug Reviews using Machine Learning

Aysha Maheen, Shafa Fathima, Sneha, Sushma B H, Mr. Guruprasad G

Department of CSE, Yenepoya Institute of Technology, Karnataka, India

ABSTRACT

The Drug Recommender system for machine learning-based Drug recommender systems, Deep Drug, is proposed. The framework proposed accepts different various heterogeneous inputs from user and Drug entities, and their knowledge to external and implicit feedbacks. In order to ensure the unified deep architecture of the framework, so that it is easier for retrieving and ranking Drugs, it uses suitable machine learning tools to improve the quality of recommendations. The proposed framework has an additional feature which is flexible and modular, and it can be generalized and distributed easily, and hence it turns out to be a rational choice for the recommendation of Drugs for Drug recommender systems. And this can further be extended for other entities.

I. INTRODUCTION

This system is mainly for the secure recommendation purpose and used for the Drug freaks against tedious processes in searching. The first step in this system is to login to check whether the user has been verified or not, the recommendation will not start unless the user logs in and has at least a single rating. In the Drug recommendation it the system application has two entities: users and items. This paper focuses on the Drug recommender systems which are the core usage functionalities of websites and e-commerce applications, i.e. items=Drugs. In order to overcome the drawbacks, such as scalability, sparsity and cold-start problems. Although this framework is intended for Drug recommender systems, it can be easily extended to other domains such as hospital recommendation system. In such Drug recommender systems, users have preferences for certain items, and these preferences must be obtained from the data [8]. And the one main difficulty is in focal point of designing features (e.g. genre in the Drug recommenders) especially for a huge amount of items manually, is intractable. In such issues, the concept of machine learning plays an important role. And as obvious as it is in Artificial Intelligence, Deep Learning, which in the recent emerging of machine learning, there is an approach mainly for recommender systems. In this paper, we propose a novel unified framework which has certain advantages in contrast with the current frameworks. This has future evolved the recommendation system, and in this case a Drug recommendation system.

II. LITERATURE SURVEY

[1] Machine Learning, Nature Machine learning allows computational models that are composed of multiple processing layers to learn representations of data with multiple levels of abstraction. These methods have dramatically improved the state-of-the-art in speech recognition, visual object recognition, object detection and many other domains such as drug discovery and genomics. Machine learning discovers intricate structure in large data sets by using the backpropagation algorithm to indicate how a machine should change its internal parameters that are used to compute the representation in each layer from the representation in the previous layer. Deep convolutional nets have brought about breakthroughs in processing images, video, speech and audio, whereas recurrent nets have shone light on sequential data such as text and speech.

[2] Distributed representations of words and phrases and their compositionality The recently introduced continuous Skip- gram model is an efficient method for learning high- quality distributed vector representations that capture a large number of precise syntactic and semantic word relationships. In this paper we present several extensions that improve both the quality of the vectors and the training speed. By subsampling of the frequent words we obtain significant speedup and also learn more regular word representations. We also describe a simple alternative to the hierarchical softmax called negative sampling. An inherent limitation of word representations is their indifference to word order and their inability to represent idiomatic phrases. For example, the meanings of "Canada" and "Air" cannot be easily combined to obtain "Air Canada". Motivated by this example, we present a simple method for finding phrases in text, and show that learning good vector representations for millions of phrases is possible.

[3] Collaborative Machine Learning for Recommender Systems Collaborative filtering (CF) is a successful approach commonly used by many recommender systems. Conventional CF-based methods use the ratings given to items by users as the sole source of information for learning to make recommendation. However, the ratings are often very sparse in many applications, causing CF-based methods to degrade significantly in their recommendation performance. To address this sparsity problem, auxiliary information such as item content information may be utilized. Collaborative topic regression (CTR) is an appealing recent method taking this approach which tightly couples the two components that learn from two different sources of information. Nevertheless, the latent representation learned by CTR may not be very effective when the auxiliary information is very sparse. To address this problem, we generalize recently advances in deep learning from i.i.d. input to non-i.i.d. (CF- based) input and propose in this paper a hierarchical Bayesian model called collaborative deep learning (CDL), which jointly performs deep representation learning for the content information and collaborative filtering for the ratings (feedback) matrix. Extensive experiments on three real-world datasets from different domains show that CDL can significantly advance the state of the art.

[4] Neural Collaborative Filtering In recent years, deep neural networks have yielded immense success on speech recognition, computer vision and natural language processing. However, the exploration of deep neural networks on recommender systems has received relatively less scrutiny. In this work, we strive to develop techniques based on neural networks to tackle the key problem in recommendation -- - collaborative filtering -
-- on the basis of implicit feedback. Although some recent work has employed Machine learning for recommendation, they primarily used it to model auxiliary information, such as textual descriptions of items

and acoustic features of musics. When it comes to model the key factor in collaborative filtering --- the interaction between user and item features, they still resorted to matrix factorization and applied an inner product on the latent features of users and items. By replacing the inner product with a neural architecture that can learn an arbitrary function from data, we present a general framework named NCF, short for Neural network-based Collaborative Filtering. NCF is generic and can express and generalize matrix factorization under its framework. To supercharge NCF modelling with non-linearities, we propose to leverage a multi-layer perceptron to learn the user-item interaction function. Extensive experiments on two real- world datasets show significant improvements of our proposed NCF framework over the state-of-the-art methods. Empirical evidence shows that using deeper layers of neural networks offers better recommendation performance

III. METHODOLOGY

The dataset used in this research is Drug Review Dataset (Drugs.com) taken from the UCI ML repository [4]. This dataset contains six attributes, name of drug used (text), review (text) of a patient, condition (text) of a patient, useful count (numerical) which suggest the number of individuals who found the review helpful, date (date) of review entry, and a 10- star patient rating (numerical) determining overall patient contentment. It contains a total of 215063 instances. Fig. 1 shows the proposed model used to build a medicine recommender system. It contains four stages, specifically, Data preparation, classification, evaluation, and Recommendation.
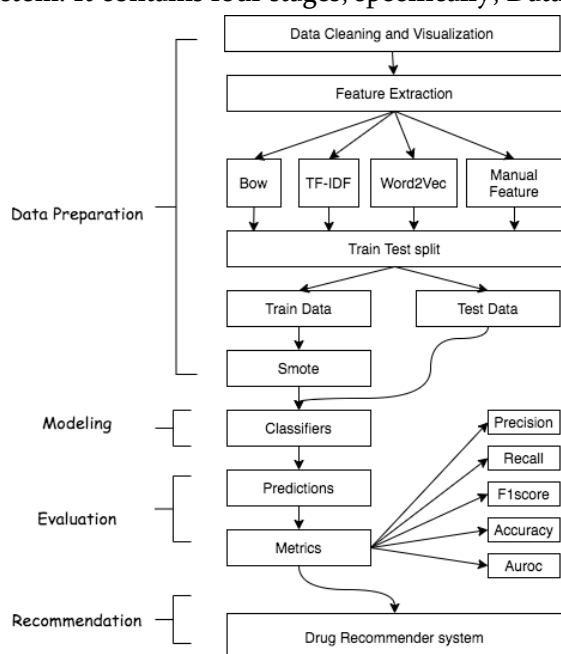

Fig. 1. Flowchart of the proposed model

A. Data Cleaning and Visualisation Applied standard Data preparation techniques like checking null values, duplicate rows, removing unnecessary values, and text from rows in this research. Subsequently, removed all 1200 null values rows in the conditions column, as shown in Fig. 2. We make sure that a unique id should be unique to remove duplicacy.
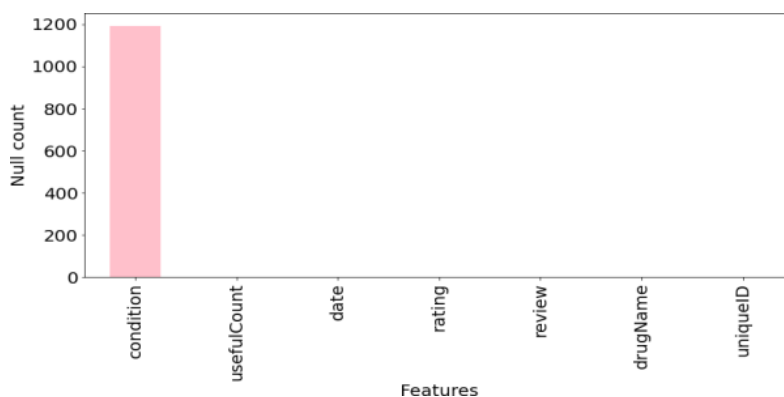
Fig. 2. Bar plot of the number of null values versus attributes

Fig. 3 shows the top 20 conditions that have a maximum number of drugs available. One thing to notice in this figure is that there are two green-colored columns, which shows the conditions that have no meaning. The removal of all these sorts of conditions from final dataset makes the total row count equals to 212141.
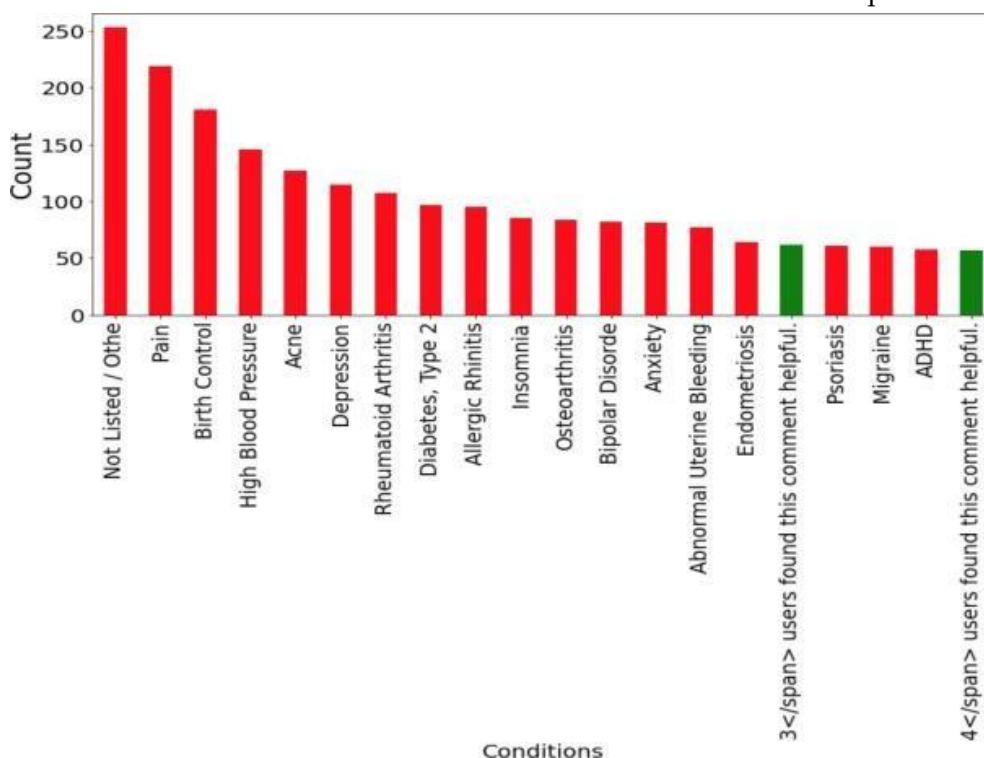

Fig. 3. Bar plot of Top 20 conditions that has a maximum number of drugs available

Fig. 4 shows the visualization of value counts of the 10-star rating system. The rating beneath or equivalent to five featured with cyan tone otherwise blue tone. The vast majority pick four qualities; 10, 9, 1, 8, and 10 are more than twice the same number. It shows that the positive level is higher than the negative, and people's responses are polar. The condition and drug column were joined with review text because the condition and medication words also have predic- tive power. Before proceeding to the feature extraction part, it is critical to clean up the review text before vectorization. This process is also known as text preprocessing. We first cleaned the reviews after removing HTML tags, punctuations, quotes, URLs, etc. The cleaned reviews were lowercased to avoid duplication, and tokenization was performed for converting the texts into small pieces called tokens. Additionally, stopwords.
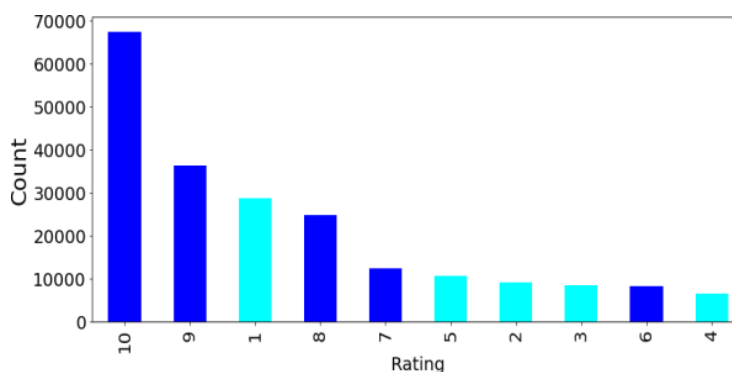
Fig. 4. Bar plot of count of rating values versus 10 rating number

for example, "a, to, all, we, with, etc.," were removed from the corpus. The tokens were gotten back to their foundations by performing lemmatization on all tokens. For sentiment analysis, labeled every single review as positive and negative based on its user rating. If the user rating range between 6 to 10, then the review is positive else negative.

B. Feature Extraction After text preprocessing, a proper set up of the data required to build classifiers for sentiment analysis. Machine learning algorithms can't work with text straightforwardly; it should be changed over into numerical format. In particular, vectors of numbers. A well known and straightforward strategy for feature extraction with text information used in this research is the bag of words (Bow) [16], TF-IDF [17], Word2Vec [18]. Also used some feature engineering techniques to extract features manually from the review column to create another model called manual feature aside from Bow, TF-IDF, and Word2Vec.

1) Bow: Bag of words [16] is an algorithm used in natural language processing responsible for counting the number of times of all the tokens in review or document. A term or token can be called one word (unigram), or any subjective number of words, n-grams. In this study, (1,2) n-gram range is chosen. Fig. 5 outlines how unigrams, digrams, and trigrams framed from a sentence. The Bow model experience a significant drawback, as it considers all the terms without contemplating how a few terms are exceptionally successive in the corpus, which in turn build a large matrix that is computationally expensive to train.
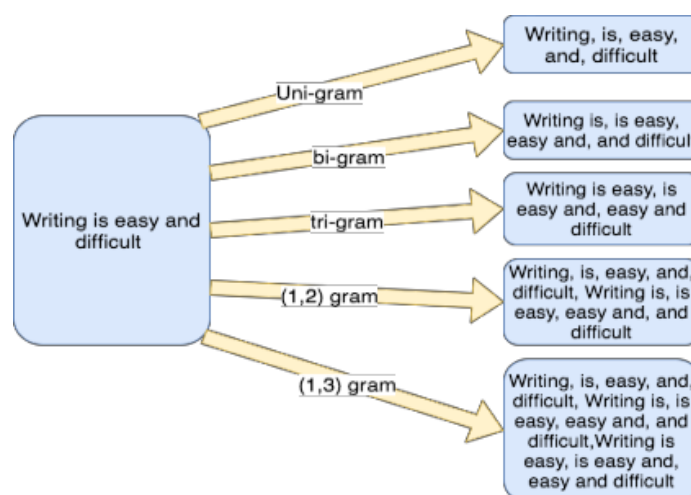

Fig. 5. Comparison of various types of grams framed from a sentence

2) TF-IDF: TF-IDF [17] is a popular weighting strategy in which words are offered with weight not count. The principle was to give low importance to the terms that often appear in the dataset, which implies TF-IDF estimates relevance, not a recurrence. Term frequency (TF) can be called the likelihood of locating a word in a document. tf (t, d) = log(1 + freq(t, d)) (1)

Inverse document frequency (IDF) is the opposite of the number of times a specific term showed up in the whole corpus. It catches how a specific term is document specific. idf (t, d) = log(count(d∈D : t∈d)) (2)

TF-IDF is the multiplication of TF with IDF, suggesting how vital and relevant a word is in the document. tfidf (t, d, D) = tf (t, d).idf (t, D) (3) Like Bow, the selected n-gram range for TF-IDF in this work is (1,2).

3) Word2Vec: Even though TF and TF-IDF are famous vec- torization methods used in different natural language preparing tasks [27], they disregard the semantic and syntactic like- nesses between words. For instance, in both TF and TF- IDF extraction methods, the words lovely and delightful are called two unique words in both TF and TF-IDF vectorization techniques although they are almost equivalents. Word2Vec [18] is a model used to produce word embedding. Word- embeddings reproduced from gigantic corpora utilizing various deep learning models [19]. Word2Vec takes an enormous corpus of text as an input and outputs a vector space, generally composed of hundred dimensions. The fundamental thought was to take the semantic meaning of words and arrange vectors of words in vector space with the ultimate objective that words that share similar sense in the dataset are found close to one another in vectors space.

4) Manual Features: Feature engineering is a popular con- cept which helps to increase the accuracy of the model. We used fifteen features, which include usefulcount, the condition column which is label encoded using label encoder function from Scikit library, day, month, year features were developed from date column using DateTime function using pandas. Textblob toolkit [20] was used to extract the cleaned and uncleaned reviews polarity and added as features along with a total of 8 features generated from each of the text reviews as shown in Table I. C. Train Test Split We created four datasets using Bow, TF-IDF, Word2Vec, and manual features. . These four datasets were split into 75% of training and 25% of testing. While splitting the data, we set an equal random state to ensure the same set of random numbers generated for the train test split of all four generated datasets.

C. Classifiers Distinct machine-learning classification algorithms were used to build a classifier to predict the sentiment. Logistic Regression, Multinomial Naive Bayes, Stochastic gradient descent, Linear support vector classifier, Perceptron, and Ridge classifier experimented with the Bow, TF-IDF model since they are very sparse matrix and applying tree-based classifiers would be very time-consuming. Applied Decision tree, Ran- domForest, LGBM, and CatBoost classifier on Word2Vec and manual features model. A significant problem with this dataset is around 210K reviews, which takes substantial computational power. We selected those machine learning classification al- gorithms only that reduces the training time and give faster predictions.

D. Metrics The predicted sentiment were measured using five metrics, namely, precision (Prec), recall (Rec), f1score (F1), accuracy (Acc.) and AUC score [23]. Let the letter be: Tp = True positive or occurrences

where model predicted the positive sentiment truly, Tn = True negative or occurrences where model predicted the negative class truly, Fp = False positive or occurrences where model predicted the positive class falsely, Fn = False negative or occurrences where model predicted the negative class falsely, Precision, recall, accuracy, and f1score shown in equations given below,

Precision = Tp + Fp (4)

Tp Recall = Tp + Fn Tp + Tn (5)

Accuracy = Tp + Tn + Fp + Fn (6)

F 1score = 2. Precision + Recall (7)

Area under curve (Auc) score helps distinguish a classifier's capacity to compare classes and utilized as a review of the region operating curve (roc) curve. Roc curve visualizes the relationship between true positive rate (Tpr) and false positive rate (Fpr) across various thresholds. G. Drug Recommender system After assessing the metrics, all four best-predicted results were picked and joined together to produce the combined prediction. The merged results were then multiplied with normalized useful count to generate an overall score of drug of a particular condition. The higher the score, the better is the drug. The motivation behind the standardization of the useful count was looking at the distribution of useful count in Fig. 7; one may analyze that the contrast among the least and most extreme is around 1300, considerable. Moreover, the deviation is enormous, which is 36. The purpose behind is that the more medications individuals search for, the more individuals read the survey regardless of their review is positive or negative, which makes the useful count high. So the accuracy achieved by perceptron (91%) using bag of words model. There was a close competition between LinearSVC, perceptron, and ridge classifier, with only a 1% difference. However, LinearSVC was picked as the best algorithm since the AUC score is 90.7%, which is greater than all other algorithms.

TABLE IV TF-IDF

Model	Class	Prec	Rec	F1	Acc.	AUC
LogisticR egression	negative	0.79	0.74	0.76	0.86	0.826
	positive	0.89	0.92	0.90		
Perceptro n	negative	0.89	0.83	0.86	0.92	0.895
	positive	0.93	0.96	0.94		
RidgeCla ssifier	negative	0.89	0.84	0.86	0.92	0.897
	positive	0.93	0.95	0.95		
Multinom ialNB	negative	0.85	0.83	0.84	0.90	0.883
	positive	0.93	0.94	0.93		
SGDClas sifier	negative	0.76	0.57	0.65	0.82	0.745
	positive	0.83	0.92	0.88		
LinearSV C	negative	0.89	0.86	0.87	0.93	0.907
	positive	0.94	0.96	0.95		

The performance metrics of various classification methods on Word2Vec can be analyzed using Table V. The best accuracy is 91% by the LGBM model. Random forest and catboost classifier provide comparable sort of results whereas decision tree classifier performed poorly. Analyzing the region operating curve score, we can easily manifest that the LGBM has the highest AUC score of 88.3%.

TABLE WORD2VEC

Model	Class	Prec	Rec	F1	Acc.	AUC
Decision Tree Classifier	negative	0.61	0.69	0.65	0.78	0.751
	positive	0.86	0.81	0.84		
Random Forest Classifier	negative	0.86	0.77	0.81	0.89	0.858
	positive	0.91	0.95	0.93		
LGBM Classifier	negative	0.86	0.82	0.84	0.91	0.883
	positive	0.93	0.94	0.93		
Cat Boost Classifier	negative	0.81	0.79	0.80	0.88	0.855
	positive	0.91	0.92	0.92		

Table VI displays the performance metrics of four different classification algorithms on manually created features on user reviews. Compared to all other text classification methods, the results are not pretty impressive. However, the random forest achieved a good accuracy score of 88%.

TABLE VI MANUAL FEATURE SELECTION

Model	Class	Prec	Rec	F1	Acc.	AUC
DecisionTree Classifier	negative	0.65	0.75	0.69	0.80	0.816
	positive	0.88	0.83	0.85		
RandomForest Classifier	negative	0.79	0.81	0.80	0.88	0.857
	positive	0.92	0.91	0.91		
LGBM Classifier	negative	0.74	0.74	0.74	0.85	0.787
	positive	0.89	0.89	0.89		
CatBoost Classifier	negative	0.72	0.73	0.73	0.84	0.804
	positive	0.88	0.88	0.88		

After evaluating all the models, the prediction results of Perceptron (Bow), LinearSVC (TF-IDF), LGBM (Word2Vec), and RandomForest (Manual Features) was added to give combined model predictions. The main intention is to make sure that the recommended top drugs should be classified correctly by all four models. If one model predicts it wrong, then the drug's overall score will go down. These combined predictions were then

multiplied with normalized useful count to get an overall score of each drug. This was done to check that enough people reviewed that drug. The overall score is divided by t he total number of drugs per condition to get a mean score, which is the final score. Fig. 8 shows the top four drugs recommended by our model on top five conditions namely, Acne, Birth Control, High Blood Pressure, Pain and Depression.

condition	drugName	Score
Acne	Retin-A	0.069334
Acne	Atralin	0.088545
Acne	Magnesium hydroxide	0.088545
Acne	Retin A Micro	0.097399
Birth Control	Mono-Linyah	0.005448
Birth Control	Gildess Fe 1.5 / 30	0.005987
Birth Control	Ortho Micronor	0.006149
Birth Control	Lybrel	0.027766
High Blood Pressure	Adalat CC	0.303191
High Blood Pressure	Zestril	0.305851
High Blood Pressure	Toprol-XL	0.362589
High Blood Pressure	Labetalol	0.367021
Pain	Neurontin	0.158466
Pain	Nortriptyline	0.171771
Pain	Pamelor	0.231829
Pain	Elavil	0.304513
Depression	Remeron	0.124601
Depression	Sinequan	0.146486
Depression	Provigil	0.240185
Depression	Methylin ER	0.328604

Fig. 8. Recommendation of top four drugs on top five condition

IV. DISCUSSION

The results procured from each of the four methods are good, yet that doesn't show that the recommender framework is ready for real-life applications. It still need improvements. Predicted results show that the difference between the positive and negative class metrics indicates that the training data should be appropriately balanced using algorithms like Smote, Adasyn [24], SmoteTomek [25], etc. Proper hyperparameter optimization is also required for classification algorithms to improve the accuracy of the model. In the recommendation framework, we simply just added the best-predicted result of each method. For better results and understanding, require a proper ensembling of different predicted results. This paper intends to show only the methodology that one can use to extract sentiment from the data and perform classification to build a recommender system.

V. EXPERIMENTAL RESULTS

In this section we will be discussing the results of our implementation and display the snapshots of the application that has been developed. How each module that we discussed in the implementation will be

represented and how the expected results are obtained. The app that has been developed can be shown with a screenshot and how the interactions happen. But the working of the model cannot be displayed in this report.

VI. CONCLUSION

The results procured from each of the four methods are good, yet that doesn't show that the recommender framework is ready for real-life applications. It still need improvements. Predicted results show that the difference between the positive and negative class metrics indicates that the training data should be appropriately balanced using algorithms like Smote, Adasyn [24], SmoteTomek [25], etc. Proper hyperparameter optimization is also required for classification algorithms to improve the accuracy of the model. In the recommendation framework, we simply just added the best-predicted result of each method. For better results and understanding, require a proper ensembling of different predicted results. This paper intends to show only the methodology that one can use to extract sentiment from the data and perform classification to build a recommender system.

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Intelligent Mirror using IoT

Anvith V. Shetty[1], Shaikh Mohd. Altamash Riyazuddin[1], Mohit Kunder[1], Sunith Kumar[1], Mrs. Smitha K. Rai[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

ABSTRACT

Internet of things (IoT) is a way of connecting and integrating physical devices to technologies using the internet. In this method, systems have connectivity to the internet so that they can communicate with humans and be controlled by other devices remotely or vice versa. The purpose of this project is to make the traditional mirrors more intelligent, and to make daily life smart, informative, and productive. "Intelligent Mirror" works in two modes viz. network and stand-alone mode. In stand-alone mode, it works as a usual reflecting mirror and in network mode, it gets connected to the internet via the Raspberry Pi and provides the user, relevant information, such as appointments, news, reminders, notifications, weather report, etc.

Keywords—Intelligent mirror; Raspberry Pi; Internet of Things.

I. INTRODUCTION

People in today's generation prefer to not have difficulties in life. They would like to be connected to each other and to be able to access information easily. People like to stay up to date with current affairs, whether they are watching television or browsing the web. The term "IoT" defines, the interconnection of computing devices embedded in objects over the Internet, allowing them to effectively share information. With its exponential growth, is currently changing the living environment of the current generation by turning a home into a smart home. A smart home connects all types of digital devices to communicate with each other via internet. IOT, with its exponential growth, is currently changing the living environment of the current generation by turning a home into a smart home. A smart home connects all types of digital devices to communicate with each other via internet. generation values time above all else in their lives, which has evolved into a lifestyle that revolves around it. As all of us look in the mirror when we leave, why shouldn't the mirror also be smart? A possible reason for our work may be that when we go out, we observe what we look like in the mirror. To build a smart mirror, one commonly utilizes a one-way glass, an LCD monitor, a frame to hold the display and glass, and a web browser running Python for the software features and display. Browser with python to provide the software features and drive the display.

FIGURE 1. Illustration of IoT

This project has been developed with the idea of making home smart to save our time. As a result of the internet, we now have more access to information and other people through online communication. The State of Innovation currently is to provide more information with less interaction to get it. Research and development have taken place to develop a device dubbed the Intelligent Mirror. Mirrors like this display relevant information for users, such as the weather, time, date, temperature, news, and other subjects. Through the Internet, IoT is envisioned as a way to remotely monitor objects. In different fields, intelligent mirrors can serve as consultants who will help people to choose their outfits by way of simulation and display information that they can benefit from. For example, in the field of fashion, intelligent mirrors can act as consultants who help people to choose their outfits.

II. METHODOLOGY

A. INTELLIGENT MIRROR AS A NORMAL MIRROR

The smart mirror can be viewed as a natural mirror while looking and self-grooming with the help of a mirror. The smart mirror when switched off or when the display unit is in sleep mode the two-way mirror will act as a one-way mirror as there won't be any light source behind the mirror.

B. INTELLIGENT MIRROR AS AN INFORMATION SYSTEM

When the information is to be displayed on the screen of the smart mirror it just needs to turn on or wake up when kept in sleep mode. The methodology behind this is, when the display behind the two-way mirror is woken up the light source beneath the mirror makes the one-way mirror a two-way mirror. As the display is turned, it directly opens the smart mirror screen built over a Raspbian OS.

C. INTELLIGENT MIRROR AS AN ENTERTAINMENT SYSTEM

The mirror will have entertainment access like video and music playback which can be used while self-grooming. This is made possible by adding plugins supporting music and video playback in the smart screen of the mirror. Icons will be added to the smart screen of the mirror for convenient opening of the applications.

Every component will be put together in a wooden frame. The entire structure is divided into two wooden parts constructed as a box type structure. The behind part will hold the display screen and the Raspberry Pi and will support the device so that it can be hung on a wall. The front structure of the box type is made using the glass which is made to fit entirely in front of the screen display.

III. SYSTEM ARCHITECTURE

A. SOFTWARE

- Raspbian OS ARM.
- NPM.
- Mirror Interface.
- Additional services/ software to complement with the mirror interface.

B. HARDWARE

Components	Specification
SBC (Single- Board Computer)	Raspberry Pi 4.
Display	15" Display panel.
Speakers	Wired / wireless speaker.
Mic	Any audio input device.
Communication	Wi-Fi, Bluetooth, audio jack port.

IV. SYSTEM DESIGN

The fig: 4.1, elaborates the clear picture of the architecture of the proposed system that involves a Raspberry Pi 4 motherboard which uses a 15´´ display to output an interactive user interface that shows the current date, time, weather report, etc.
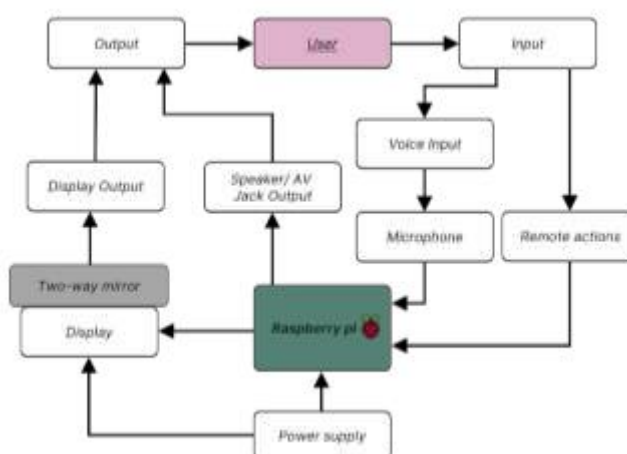

FIGURE 2. System Design.

The user will be able to interact with the intelligent mirror by using a keyboard and a pointing device i.e., mouse, trackpad, etc. The input devices will be connected to board through a USB port within the Raspberry Pi motherboard.

The display and the Raspberry Pi board will be powered by suitable power supply that fulfils the power output requirement.

V. FEATURES

A. GOOGLE ASSISTANT

To access the Google Assistant within the system, the user has to command the system verbally using a mic which is connected to the raspberry pi motherboard. As the voice command is received to the system, the command is processed over the google cloud platform for the Google Assistant and the data for the request is sent back to the user's mirror, and the assistant speaks. Figure 3, shows the Google Assistant in action.

B. SPOTIFY

To play Spotify music, the user has to connect the mobile device by casting the Spotify to the Spotify connect device, i.e., the Intelligent Mirror. Once the device is casted successfully, the songs can be played over the mirror interface and also can be controlled to play, pause, stop either by Google Assistant voice commands or through the devices that are present within the same network. Figure 4, shows the Spotify actions through voice commands.

FIGURE 3. Google Assistant in action.

C. YOUTUBE SCREEN-CAST

To play videos on YouTube over the mirror interface, the user has to cast the YouTube from the devices within the same network. Once the device is casted successfully, the videos can be played over the mirror and can be controlled either on the mirror interface or from the casting devices available within the same network. Using voice command, the YouTube screen-cast can be stopped by the mirror user.

FIGURE 4. Spotify in action.

D. DATE AND TIME

The mirror interface is provided with date and time that is synchronous with network (Internet) time. The date is represented in "week, month date, year" format. Time is represented in 24-hours format with seconds in superscript of the time.

E. WEATHER FORECAST

Weather Forecast shows the essential information like temperature, sky forecast, wind-direction and wind-speed. Also, it has additional features like sunrise time and weather predictions for a week.

F.   PHONE NOTIFICATIONS

The mirror displays the notification received by the user on its smartphone. The phone of the user is to be connected to Intelligent Mirror using a service called Pushbullet. A maximum of three notifications can be displayed on the mirror on the mirror interface.

G.   NEWS-FEED

This component within the mirror interface shows the new from a well-known Indian news publisher, Time of India. The news is fetched using RSS Feed provided by the news publisher an open-source service. The news feed is refreshed every five seconds. There are two news feeds one being national news and the other being international.

H.   ADDITIONAL FEATURES

A continuously rotating 3-d animated globe is displayed over the mirror interface to improve its appearance.

VI. CONCLUSION

This project has helped up in understanding IoT and IoT devices in a nutshell, how a device sends and receives messages via a payload to and from another object, thus making it a "smart object".

We've also inculcated the ability to DIY, to build parts, that is, and team planning, and teamwork, efficient economy resource utilization, reducing expenses, as much as possible, cutting costs wherever it isn't needed.

The project has also helped us further understand JavaScript, and Linux, and the electron web framework.

Aesthetically the mirror looks exactly as we had envisioned it, and the final design we ended up using (for both function and decoration) is in fact better than the original design. Our only regret in this area is that the project is very heavy and bulky. To make future versions better and lighter, weight should be reduced and the device slimmed down. We have also added features like Google assistant and Spotify connect, including YouTube casting in this project.

Even so, the mirror looks exactly as we had envisioned it, and the trim we chose (for both function and decoration) is perfect.

The project met most of its goals and we are happy with its outcome. Several areas of slack and inexperience were uncovered (such as scheduling delays and cost underestimations) that would have improved our overall progress, but we are now considering these lessons for future projects

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Fake Review Monitoring System

Hari Prasad R[1], Pranav Prasanth[1], Sourav P V[1], Sangeerth K M[1], Mr. Manjunath Raikar[2]

[1]Department of CSE. Yenepoya Institute of Technology Moodbidri, Mangalore, Karnataka, India

[2]Assistant Professor, Department of CSE. Yenepoya Institute of Technology Moodbidri, Mangalore, Karnataka, India

ABSTRACT

One of the very rapid growth areas is ecommerce. Generally, e-commerce provide facility for customers to write with its service. The existence of these reviews can be used as a source of information. For examples, companies can use it to make design decisions of their products or services but unfortunately, the importance of the review is misused by certain parties who tried to create fake reviews, both aimed at raising the popularity or to discredit the product. They share their thoughts on internet. we are proposing a AI-powered RPA' it is a term used for advanced automation technology. It leverages several technologies like AI (Artificial Intelligence), Text Analytics, and Machine Learning, etc. This RPA based intelligent review monitoring system which will helps to detect whether a review generated on different, product is fake or real and help the customer for the right choice.

Keywords— RPA, Machine learning

I. INTRODUCTION

In the current scenario, the data on the web is growing exponentially. Social media is generating a large amount of data such as reviews, comments, and customer's opinions on a daily basis. This huge amount of user generated data is worthless unless some mining operations are applied to it. As there are a number of fake reviews so opinion mining technique should incorporate Spam detection to produce a genuine opinion. Nowadays, there are a number of people using social media opinions to create their call on shopping for product or service. Opinion Spam detection is an exhausting and hard problem as there are many faux or fake reviews that have been created by organizations or by the people for various purposes. Before purchasing anything, it is a normal human behavior to do a survey on that product. Based on reviews, customers can compare different brands and can finalize a product of their interest. These online reviews can change the opinion of a customer about the product. If these reviews are true, then this can help the users to select proper product that satisfy their requirements. On the other hand, if the reviews are manipulated or not true then this can mislead user. This boosts us to develop a system which detect fake reviews for a product by using the text and rating property from a review. The honesty value and measure of a fake review will be measured by utilizing the data mining

techniques. An algorithm could be used to track customer reviews, through mining topics and sentiment orientation from online customer reviews and will also blocked the fake reviews.

II. RELATED WORK

The previous analysis is done on the expressed views through text, blogs, reviews, feedbacks, etc. as opinions by users which are unique to compute, study to obtain relevant information, that is nothing but sentiment analysis. Exiting research used a two-step approach, SVM classifier for classifying tweets [1]; other used emoticons, smileys, and Hashtags to classify labels into multiple sentiments [2]. The other researcher used an SVM classifier for training data using emoticons [3].

2.1. Existing systems:

2.1.1. Lexicon-based methods: - Based on counting thenumber of positive and negative words in a sentence-Twitter.

2.1.2. Rule-based methods: – Based on syntactic rules, e.g., [query] is pos-adj – Tweet feel

2.1.3. Machine learning based methods: – Based on the classifier built on a training data Twitter sentiment [14]. The fake review detection problem the researchers have developed techniques to address the problem of fake review detection. New models like the ICF++ model that uses honest y value, their research influenced the accuracy and increased by 49% [7]. VADER and Polarit y based approach was used to flag the reviews as true, false, suspected categories and assign polarity +1, -1, and 0 to identify/classify fake reviews and eliminate them using this technique [4]. The review of all the other methods and techniques used by researchers of the past decade is a great collection of vast literature compiled for sentiment anal ysis and gives in -depth information on methods related to fake review detection [5]. Spam review detection based on comments made on the reviews to help in sensing the review reliability and its truthfulness and the method achieved 91% of F1_score for this model [8]. The detection of spam reviews in singleton reviews using singleton spam review correlated temporal pattern was followed [9]. The algorithm in practice KL divergence essentiall y used to differentiate fake reviews from the original due to its asymmetric propert y is an issue of pseudo fake review [10]. The sequence of reviews used to filter spam ones used feature extraction up to six times to classify fake reviews and genuine reviews [6]. Another researcher proposed spam review detection using new concept time series prediction method which uses pattern recognition to know the suspicious time-intervals in which spam review was posted [11]. The author's utilized activeness, context similarit y, the behavior of ratings of review to compute spam score explored deep neural networks to know models behavior in detecting spam opinions, where recurrent and convolution networks were also monitored to convert raw text to vectors which in turn used as features to locate spam reviews [12]

III. METHODOLOGY

The, following methods are used for classifying fake and real reviews

- Tracking IP address of the user to detect if the reviews are from a Spammer. If multiple reviews are from the same IP address then the Reviews are considered Spam.

- Using Account Used to check whether the reviews are done using the same account.
- Brand only Review detection i.e. whether the reviews are on only Brand not the product. It's not helpful to consider only the Brand value to judge a product.
- Using Negative Dictionary i.e. the negative words are identified in the review. If there are more than five Negative Words then the review is a Spam.
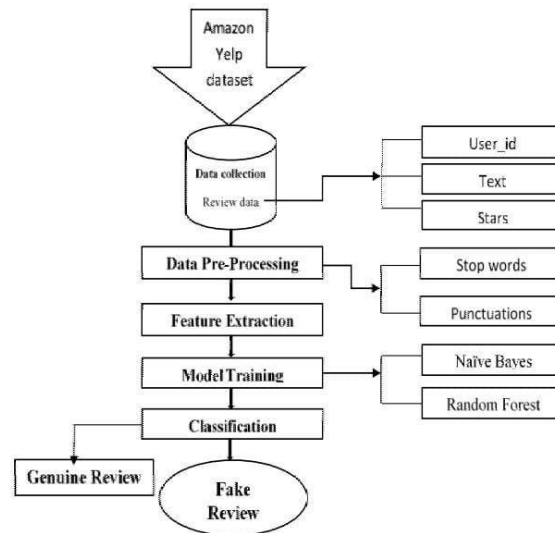

Fig 1: Flow chart of methodology

IV. SYSTEM DESIGN

System design for implementing the product review monitoring system is shown in fig. 5.1. The identified challenges motivate bring up a solution to all the problems stated in the above problem statement section. Following are the objectives of the proposed approach and this thesis work:

- To implement different algorithm to get better spam detection i.e , IP address, account used, negative word dictionary using senti-strength, ontology.
- Graphical representation of work.
- To deal with six different types of spam reviews.
- To present opinion mining on spam filtered data.
- To implement ontology in spam detection.
- To present an algorithm that does opinion mining with spam detection. They are various ways to detect Spam Reviews in order to the Opinion mining to be more accurate and useful will be studied. A detailed discussion about the existing techniques to find out whether the review is spam or not is presented. Other Techniques are incorporated like IP Address Tracking and ontology to detect Spam Reviews in order to get more accurate results from Opinion Mining. After detecting the spam reviews from the existing dataset, a new Dataset is created which doesn't contain spam reviews and then opinion mining is performed on the new Spam Filtered Dataset. Atlast a new algorithm is proposed that detects spam reviews more precisely and performs opinion mining using spam filtered data.
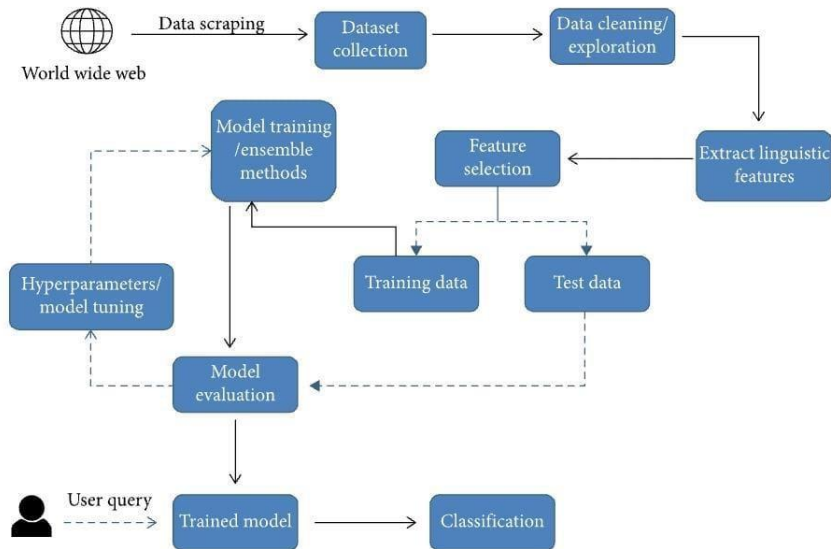
Fig 2 : System Design

V. RESULTS

Proposed system is implemented using python and its various modules, Natural Language Processing , RPA. Graphical processing unit (GPU) enabled machine are used for experimental and testing purpose. Some reviews were tested and results were obtained.

Fig 9 : Fake Review Detection

VI. CONCLUSION

The fake review detection problem is addressed fairly and gives a fair insight into its legality and need, the purpose is to select an algorithm to fulfill the task of fake review detection and its elimination. This can be further implemented with fake product detection also. As ,in this paper only fake review is monitored , not the genuinity of the product.

VII. FUTURE WORK

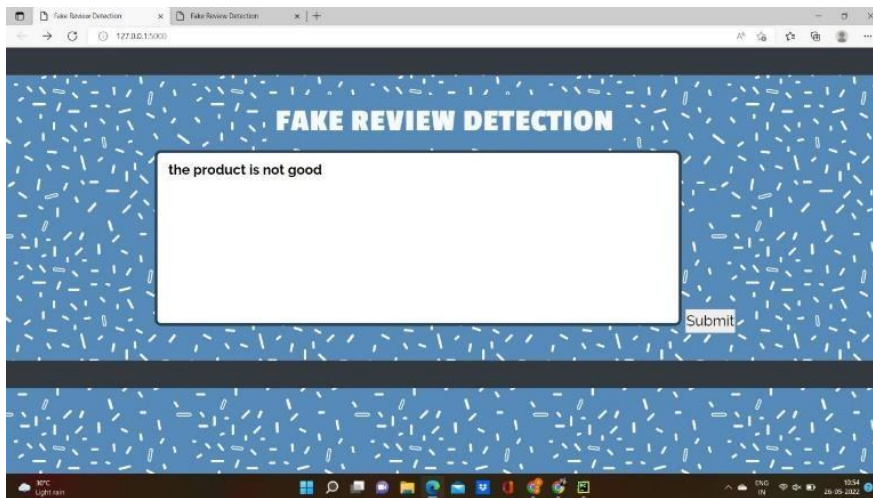In future work, hybrid models and new models can be tried for the fake review detection model. By using Google co-lab and NVIDIA graphics GPU, the research can speed up the process of execution .And can be implemented with fake product detection. Which will turn out to be a useful to users when buying any item from e-commerce website.

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Object Detection and Narrator for Visually Impaired Person

Chirag Shetty, Kazi Ruvef Ahamed, Mohammed Faizan, K Pandu Naik

Department of CSE, Yenepoya Institute of Technology, Karnataka, India

ABSTRACT

Detecting things in photos has been a popular study topic, and computers can now not only recognise objects but also draw bounding boxes around them. Computer vision is another name for this. We proposed the use of computer vision machine learning techniques to detect objects and assist visually impaired and blind people in this work. It can recognise items and narrate information about them to vision impaired people. This implementation works with any camera-equipped device, including desktops, tablets, and mobile phones. The main goal is to create a machine learning app that can assist blind people in recognising objects. Blind persons must rely on their senses to navigate their environment. Hearing, smelling, and touching are among these senses. However, because they can't see, this makes it difficult for them to gain a full picture of their environment. They require assistance to gain a sense of objects in their environment without touching, smelling, or hearing them. Machine learning apps can aid them and act as a personal assistant.

Keywords: - TensorFlow object detection, COCO datasets, google voice assistant

I. INTRODUCTION

There are numerous applications and technologies available for visually impaired people to use in their daily lives. Mobility Assistance Robots, optical sensors such as RGB cameras, and GPS are among the gadgets. KNFB Reader reads the text aloud, LookTel identifies money, and Color Id detects colours, among other software programmes. One of the issues with these apps is that they are made for a specific function and not for recognising random objects in your environment. To process the objects, some applications required a live connection to the server or cloud. However, none of these applications make use of Machine Learning to comprehend Object detection is a concept that has been around for a long time. We can detect objects using methods such as edge detection, corner detection, and color-based segmentation. However, the main drawback of these systems was that they could only be used for a certain object and required extensive supervision. Researchers began utilising machine learning approaches to recognise objects as computing power and data availability increased. Machine learning can aid blind people in recognising objects. Blind persons must rely on their senses to navigate their environment. Hearing, smelling, and touching are among these senses. However, because they can't see, this makes it difficult for them to gain a full picture of their environment.

II. LITERATURE SURVEY

The Electronic Walking System for the Blind designed a talking stick with optical sensors that record surrounding information and convert it to voice, which the user can hear through headphones. Eugene Evanesce of the Xerox Corporation created a portable blind gadget. This device takes pictures, classifies the spatial relationships, and calculates item distances. And then convert it back to audio format so that the blind person may hear it Orozeo Cervantes created a programme that analyses images collected by a camera and sensors attached on glasses. These photos are processed by remote computers and then returned to the blind person with audio information. The device's disadvantage is its reliance on an internet connection With the rising use of smart phones, a combination of obstacle detector canes, mobile phone GPS for direction finding, and headphones for speech transmission for the blind has been employed The main issues were the field view with these devices using cane; could not detected the objects above chest and the field view angle was also near to 62°. The authors of have developed a smart walker with a structure similar to that of a novel walker and computational purpose extension. Two vibrotactile motors are mounted on the handles, and two lasers are used to measure. Both motors are connected by a vibrotactile feedback generator, which measures object distance and height. All of the systems were examined using 14 different wearable ETA structures, and the shortcomings of each technology were revealed . It lacks detection precision since it may detect but not recognise an object that belongs to a human. This technology also requires training for the handler to properly apply it.With the age of computer vision, artificial intelligence, and machine translation, where neural networks play a large part, image processing is progressing with the help of deep neural networks in applications such as image compression, robotics, and character recognition. Machine learning can be defined as the part of artificial intelligence that makes computers capable of learning without being explicitly programmed . We presented a low-cost system that uses a personal mobile phone to detect items and narrate to visually impaired people to assist them in navigating the surroundings in this study.

III. METHODLOGY

TensorFlow is at present the most popular software library. There are several real-world applications of deep learning that makes TensorFlow popular. Being an Open-Source library for deep learning and machine learning, TensorFlow finds a role to play in text-based applications, image recognition, voice search, and many more. Deep Face, Facebook's image recognition system, uses TensorFlow for image recognition. It is used by Apple's Siri for voice recognition. Every Google app that you use has made good use of TensorFlow to make your experience better. The TensorFlow Object Detection API is an open -source framework built on top of TensorFlow that makes it easy to construct, train and deploy object detection models. There are already pre-trained models in their framework which are referred to as Model Zoo. It includes a collection of pre-trained models trained on various datasets such as the COCO (Common Objects in Context) dataset, the KITTI dataset, and the Open Images Dataset.

Characteristics of the COCO dataset

Segmentation of objects using detailed instance annotations In-context recognition Segmentation of super pixel items Over 200'000 photos are labelled out of a total of 330'000. 1.5 million instances of objects The "COCO classes" are 80 object categories that encompass "things" for which individual instances can be simply labelled (person, car, chair, etc.) 91 thing categories, where "COCO stuff" refers to materials and objects that provide substantial contextual information but have no apparent borders (sky, street, grass, etc.).There are five captions per image.250'000 persons with 17 key points, commonly used for Pose Estimation The COCO dataset classes for object detection and tracking include the following pre-trained 80 objects:

'person', 'bicycle', 'car', 'motorcycle', 'airplane', 'bus', 'train', 'truck', 'boat', 'traffic light', 'fire hydrant', 'stop sign', 'parking meter', 'bench', 'bird', 'cat', 'dog', 'horse', 'sheep', 'cow', 'elephant', 'bear', 'zebra', 'giraffe', 'backpack', 'umbrella', 'handbag', 'tie', 'suitcase', 'frisbee', 'skis','snowboard', 'sports ball', 'kite', 'baseball bat', 'baseball glove', 'skateboard', 'surfboard', 'tennis racket', 'bottle', 'wine glass', 'cup', 'fork', 'knife', 'spoon', 'bowl', 'banana', 'apple', 'sandwich', 'orange', 'broccoli', 'carrot', 'hot dog', 'pizza', 'donut', 'cake', 'chair', 'couch', 'potted plant', 'bed', 'dining table', 'toilet', 'tv', 'laptop', 'mouse', 'remote', 'keyboard', 'cell phone', 'microwave', 'oven', 'toaster', 'sink', 'refrigerator', 'book', 'clock', 'vase', 'scissors', 'teddy bear', 'hair drier', 'toothbrush'
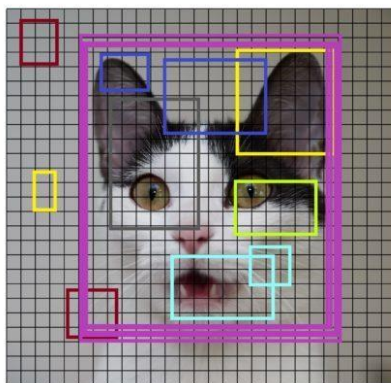

Fig1:tensorflow object detection

To anticipate whether a segmented rectangular area contains a valid object, feature extraction is performed for each segmented rectangular area.
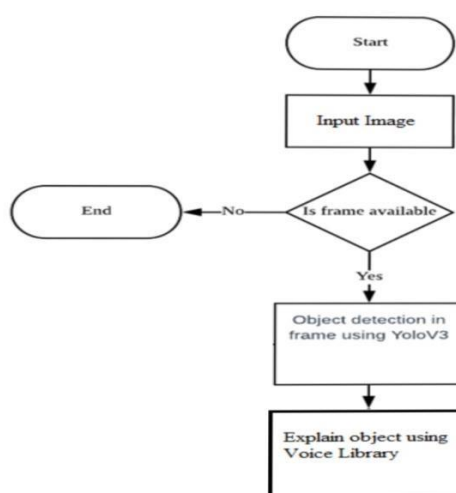

Fig 2 :Flowchart

For object detection, the machine learning model employs TensorFlow, which captures real-time objects. The commands are activated by using voice help (Camera, Emergency call) The COCO datasets are used to train the machine learning model. The text is converted to voice and narrated to the blind or visually impaired person by a voice library (Google Voice).
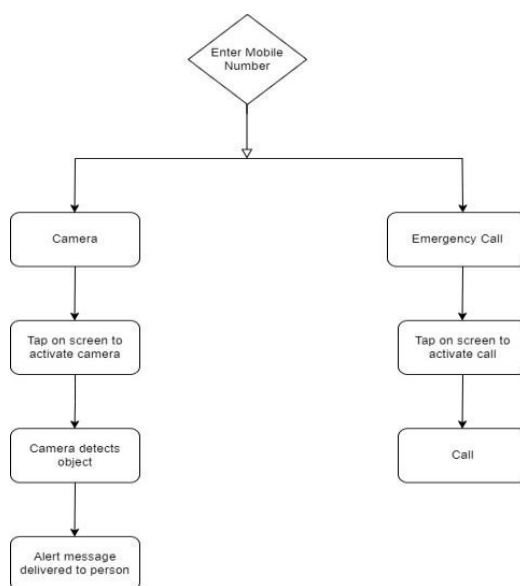
Fig 3:working diagram

The steps involved in constructing the module are as follows: To begin, provide a mobile phone number. The voice assistant module was utilised to turn on the camera and make an emergency call.

It may be accessible by pressing the screen and saying "camera" or "call," which will activate the camera and place a call to the number specified. The camera is turned on, and it is presently capturing real-time images and generating the object's class. These details will now be supplied to that visually impaired person in an audio format, thanks to voice generation modules.

IV. RESULTS AND CONCLUSION

The app's initial screen is seen below, which includes commands such as camera emergency call and a phone number to be typed into the blank space supplied.

Fig 4: interface of app

In the image below, the camera's frame takes a real-time image and, with the help of coco databases, classifies the object's class. The accuracy of visual object detection is determined by the type of mobile device used.
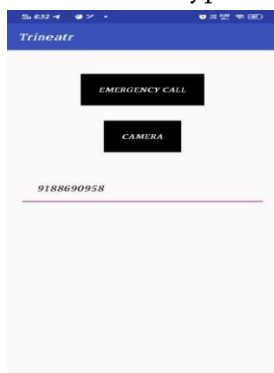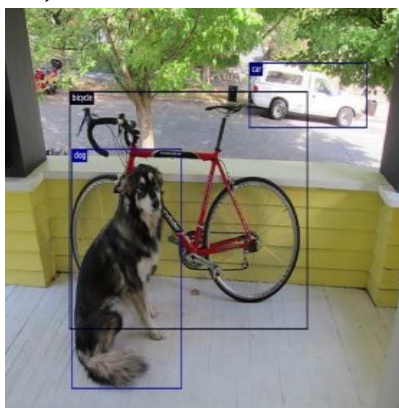

Fig 5:object detection

V. CONCLUSION

We presented the Trineatr app, which may be used to help vision impaired people understand their surroundings by describing the objects in their environment. The camera on an Android phone captures an image and determines the object's class, with the outcome of the detection being given to a visually impaired individual.

The results revealed that the number of items spotted differed between phones, as did the accuracy. In the future, object detection accuracy can be increased, and software can be developed to assist in determining the distance between an object and a visually impaired person.

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Music Recommendation System Using Emotion Recognition

Mrs. Akshatha Dange[1], Mohammed Hisham[2], Ibrahim Zaheer[2], Shresta Shenoy[2], Mohammed Fayiq[2]

[1]Assistant Professor, Department of Computer Science, Moodbidri, Karnataka, India

[2]Fourth Year, Department of Computer Science and Engineering, Moodbidri, Karnataka, India

ABSTRACT

The mood of an individual person is usually recognized based on their facial expressions. With today's technologies, distinguishable features of the face can be extracted as inputs with the help of a webcam or any other external device. The gathered data helps in detecting the mood and songs are played from a personalized playlist, if available or a default playlist can be used based on the mood detected. This removes the time-consuming and tedious task of manually grouping songs into different lists and helps in generating an appropriate playlist based on an individual's emotional features. Thus, our proposed system mainly aims on detecting human emotions for developing emotion- based music player. A brief idea about our systems working, playlist generation and emotion classification is mentioned below.

Key Words: Emotion Recognition; music recommendation; Facial Extraction; Emotion Extraction Module; Audio Feature Extraction Module

I. INTRODUCTION

When they have hundreds of tracks, music listeners find it difficult to manually create and organise playlists. It's also tough to keep track of all the songs: some are added but never played, wasting a lot of device memory and forcing the user to manually locate and delete songs. Users must actively select songs depending on interest and mood each time. When users' play-styles change, it's also tough to reorganise and play music. As a result, we employed the Machine Learning idea, which entails facial scanning and feature tracking, to assess the user's mood and create a tailored playlist based on it.

Fig -1: Various basic emotions of humans

II. LITERATURE SURVEY

S Metilda Florence and M Uma (2020) proposed a paper "Emotional Detection and Music Recommendation System based on User Facial Expression" where the proposed system can detect the facial expressions of the user and based on his/her facial expressions extract the faciallandmarks, which would then be classified to get a particular emotion of the user. Once the emotion has been classified the songs matching the user's emotions would be shown to the user. It could assist a user to make a decision regarding which music one should listen to helping the user to reduce his/her stress levels. The user would not have to waste any time in searching or to look up for songs. The proposed architecture contained three modules, namely, Emotion extraction module, Audio extraction module and Emotion- Audio extraction module. Although it had some limitations like the proposed system was not able to record all the emotions correctly due to the less availability of the images in the image dataset being used. The image that is fed into the classifier should be taken in a well-lit atmosphere for theclassifier to give accurate results. The quality of the image should be at least higher than 320p for the classifier to predict the emotion of the user accurately.

H. Immanuel James, J. James Anto Arnold, J. Maria Masilla Ruban, M. Tamilarasan (2019) proposed "Emotion Based Music Recommendation" which aims at scanning and interpreting the facial emotions and creating a playlist accordingly. The tedious task of manually Segregating or grouping songs into different lists is reduced by generating an appropriate playlist based on an individual's emotional features. The proposed system focuses on detecting human emotions for developing emotion-based music players. Linear classifier is used for face detection. A facial landmark map of a given face image is created based on the pixel's intensity values indexed of each point using regression trees trained with a gradient boosting algorithm. A multiclass SVM Classifier is used to classify emotions Emotions are classified as Happy, Angry, Sad or Surprise. The limitations are that the proposed system is still not able to record all the emotions correctly due to the less availability of the images in the image dataset being used. Diverse emotions are not found. Handcrafted features often lack enough generalizability in the wild settings.

Ali Mollahosseini, Behzad Hasani and Mohammad H. Mahoor (2017) proposed "AffectNet: A Database for Facial Expression, Valence, and Arousal Computing in the Wild" where more than 1,000,000 facial images were obtainedfrom the Internet by querying three major search engines using 1250 emotion related keywords in six different languages. About half of the retrieved images were manually annotated for the presence of seven discrete facial expressions and the intensity of valence and arousal. Two baselines are proposed to classify images in the categorical model and predict the value of valence and arousal in the continuous domain of dimensional model. There were certain limitations such that VGG16 only makes improvement over AlexNet by replacing large kernel sized filters with multiple 3X3 kernel-sized filters one after another. With a given receptive field multiple stacked smaller size kernel is better than the one with a larger size kernel. AffectNet database does not contain very strong samples. That is, samples where valence is 1 or -1 and with arousal being 1 or -1.

III. PROPOSED SYSTEM

Our strategy is to use Deep Neural Networks (DNN) to learn the best appropriate feature abstractions directly from uncontrolled data and to deal with the limitations of handcrafted features. DNNs have been proven to be a successful method for visual object recognition, human position estimation, and face verification, among other applications. DNNs can extract highly discriminative features from data samples thanks to the availability of computer power and large databases. CNNs have been shown to be extremely effective in picture recognition and classification. CNNs are exceptionally good at lowering the amount of parameters without sacrificing model quality.

The proposed system can detect the facial expressions of the user and based on individual's facial expressions using VGG16 CNN model. Once the emotion has been classified the song matching the user's emotions would be played.
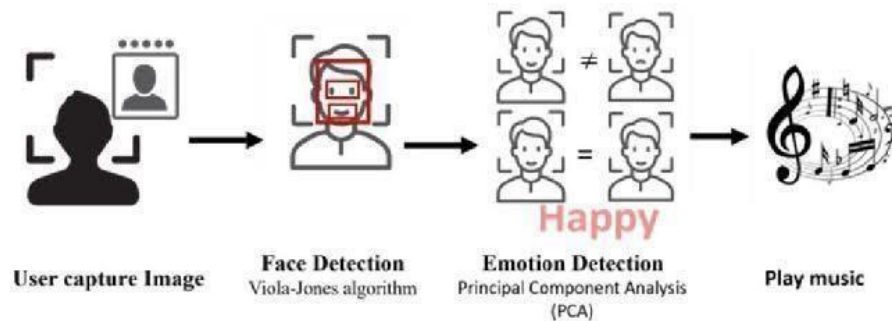

Fig -2: Proposed System

IV. SYSTEM ARCHITECTURE

On the webpage, there is a stream button. To detect his or her mood, he or she must press the capture button, which captures the image on the client side and sends it to the server, where it is processed by the VGG 16 model and a forecast is created. The emotion labels are matched with the corresponding forecast, and the emotion is presented on the homepage. There are currently seven emotion labels: happy,sad, neutral, disgust, rage, fear, and surprise. After the feeling has been identified, the next step is to play songs that match the atmosphere. We've integrated the song database onto our website.The The client side then requests music from the database, analyses the songs and audio attributes, and plays songs to the user based on the emotion observed. The playlist can either be created by the user and then played based on the detected emotion, or a predefined playlist can be used. The user can also use the Play and Pause buttons whenever they want.

Client, user, server, VGG16 model, and Song Database are the five modules that make up the system architecture. The user's image is captured by the client programme and sent to the server. The server greyscales the image and uses the haar cascade method to see if a face can be found. The face in the image is cut and given to the VGG16 model, which has already been trained. The server assigns an emotion to the image based on the model's predictions and delivers it to the client. The client uses the Song Database to request songs and their audio features from the user's playlist, and then analyses the audio features. The client recommends a music to the user based on the analysis.
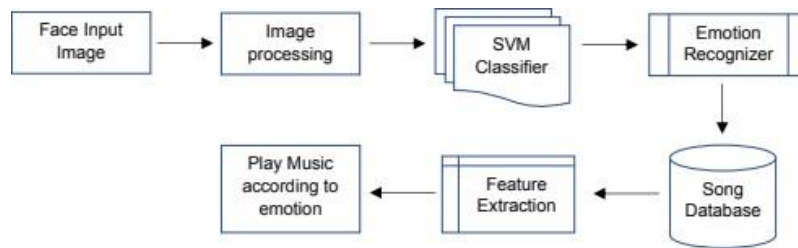
Fig -3: System Architecture of Music Recommendation System Using Emotion Recognition

All requests must include the access token, which is obtained by including client id, client secret id, grant types, and scopes in the request. This is used to get music from a playlist, as well as audio features, song data, and more.

V. SYSTEM IMPLEMENTATION

The emotion function is in charge of detecting emotions. TensorFlow's load model method is used to load the pretrained model. The OpenCV package also contains the HaarCascade classifier. An image is used to feed the emotion function. It uses the HaarCascade classifier to pre-process the image. If no face is detected, a nil label is returned; otherwise, it transmits the latest face found to the loaded vgg16 model.The model makes image-related predictions. The emotions are labelled when the predictions are analysed.

The flask framework is used to construct the server. It takes two paths: home and emotion. The emotion route accepts an image and provides an emotion label, while the home route returns the application webpage. The emotion function is used to detect emotions in the emotion route.

VI. RESULTS ANALYSIS

Each batch of 478 photos was used to train the VGG16 model across 400 epochs. Various hyperparameters are tweaked throughout the training process. For training, the Google Collab platform is employed. Below are accuracy graphs taken during training.
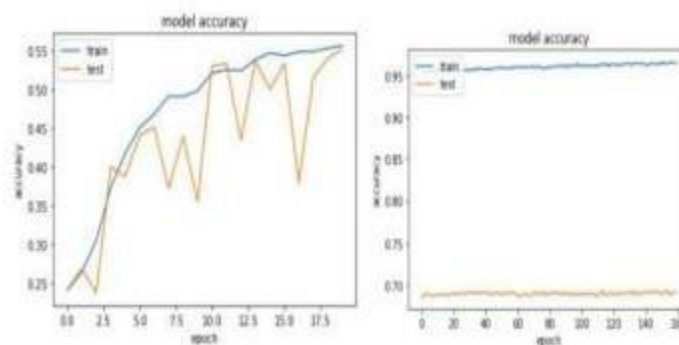

Fig -4: The left snapshot is Epoch 1 – 20, right snapshot is Epoch 160 – 240 Our VGG16 model achieved an accuracy of around 97% in Train set and around 72% in Test set.

VII. CONCLUSION AND FUTURE WORK

The application intends to provide operating system users with a simpler, additional hardware-free, and trustworthy emotion-based music system. People looking for music that is based on emotion and emotional behaviour will benefit from the Emotion-based music programme. It could help shorten the time it takes to find music, reducing wasted processing time and improving the system's overall accuracy and efficiency. The app meets the basic demands of music listeners without bothering them in the way that other apps do it use technology to boost the system's contact with the user in a variety of ways. It makes the end-job user's easier by capturing an image using a camera, assessing their mood,and offering a personalised playlist from their Spotify Premium account.

VIII. FUTURE WORK

- Facial recognition can be used for authentication purposes.
- Can be used to determine the mood of physically challenged & mentally challenged people.
- Could be implemented in Raspberry Pi as a feature of Smart Home.
- Music classifier models can be developed

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Leukemia Detection using Deep Learning

Sushmitha[1], Harshith K N[1], Adarsh S G[1], Pandu Naik[2]

[1]Department of CSE, Yenepoya Institute of Technology Moodbidri, Mangalore, Karnataka, India
[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology Moodbidri, Mangalore, Karnataka, India

ABSTRACT

Leukemia is a type of cancer of the blood that can affect both children and adults. According to the Leukemia and Lymphoma Society. Every year, an estimated 300,000 new cases of leukemia (2.8 percent of all new cancer cases) are diagnosed worldwide. The patient requires early diagnosis in order to receive the most effective treatment. As a result, we require an early diagnosis support system to guide treatment for patients with leukemia as soon as possible. In this paper, the authors propose a Convolutional Neural Network (CNN)-based method for distinguishing between normal and abnormal blood cell images in this paper. With a dataset of 1188 blood cell images, the proposed method achieves an accuracy of up to 98.6 percent. Leukemia is a type of blood cell cancer that can affect both children and adults.

Keywords— Convolutional neural network, classification, leucocyte, leukemia

I. INTRODUCTION

Leukemia is a type of blood cancer that kills the most adolescents and children, and the risk of developing it is higher in children under the age of five. This type of cancer develops in the bone marrow, where it produces an abnormally large number of lymphocytes. Lymphocytes are immune cells that are produced in the bone marrow and found in the blood. They produce antibodies, which aid in the killing of tumor cells and the regulation of immune responses. In adults, a normal lymphocyte count ranges from 1000 to 4800 lymphocytes per microliter of blood. It ranges from 3000 to 9500 lymphocytes per microliter of blood in children. Leukemia (blood cancer) is a cancer of blood cells caused by radiation exposure, family history of leukemia and exposure to certain chemicals. In general, leukemia was classified based on the speed of progression and the type of cells. Base on leukemia progresses, the first type of Leukemia classification is divided into two groups: acute leukemia and chronic leukemia. In acute leukemia, the abnormal blood cells (immature blood cells) which cannot carry out their normal functions are multiply speedily. In chronic leukemia, some types of it produce too many cells and some cause too few cells are born. Unlike acute leukemia, chronic Leukemia involves mature blood cells. second type Leukemia determined by the type of white blood cells Affected lymphocytic leukemia and myeloid leukemia. Lymphocytic leukemia (lymphocytes) results from A type of bone marrow cell that forms

lymphocytes. myeloid Leukemia (myeloid) affects bone marrow cells that cause redness. Blood cells, some other types of white blood cells and platelets.

Combining the two general classifications above, we get Leukemia is divided into four main types. Severity and Type of In fected Cells Acute Lymphoblastic Leukemia (ALL), Acute Myelogenous Leukemia (AML), Chronic Lymphocytic Leukemia (CLL), and Chronic Myelogenous Leukemia (CML) are the four types of leukemia (KML).

Acute lymphoblastic leukaemia is the most common type of leukaemia in children, but it can also affect adults, particularly those over the age of 65.

Acute myeloid leukaemia affects men more than women and adults more than children. Because the five-year survival rate for AML is only 26.9 percent, it is considered the most dangerous type of leukaemia.

Chronic lymphocytic leukaemia is more common in people over the age of 55, and it primarily affects men, with men accounting for two- thirds of all patients. From 2007 to 2013, CLL had a five-year survival rate of 83.2 percent. Chronic myeloid leukaemia primarily affects adults, with a five-year survival rate of 66.9 percent.

According to the National Cancer Institute, leukaemia killed 24,500 people in the United States in 2017. In the United States, leukaemia accounts for 4.1 percent of all cancer deaths.

The bone marrow examination performed by a pathologist is used to diagnose acute leukaemia, and the test result is based on the technician's experience. As a result, in the Leukemia diagnostic system, an automatic system for early detection of leukaemia plays an important role.

II. RELATED WORK

In recent years, leukemia classification research has primarily relied on computer vision techniques. The most common algorithm in this approach is made up of several Image pre-processing, clustering, and morphological analysis are all rigid steps. Filtering, segmentation, feature selection, or extraction are all examples of operations. Most of the authors in the literature have adopted machine learning techniques such as Keans clustering in order to detect and classify blood cells in images. In most of cases, the conventional statistical features such as energy, entropy, contrast, and correlation, were extracted and given as inputs to a machine learning model. It is clear that the traditional machine learning methods have some disadvantages such as time consuming in development and, mostly, the need of deciding which kind of features must be utilized in order to maximize the classification`s accuracy. Instead, deep learning can learn and extract high level features automatically and perform classification in the same time. As a result, we present a novel Convolutional Neural Network (CNN) architecture for distinguishing between normal and abnormal blood cell images. Classification of Blood Cell Images Using a Convolutional Neural Network. The advantage of using a CNN is that it skips most of the preprocessing steps, thereby reducing processing time.

In high throughput cell biology and bio-image informatics, there are some cutting-edge models capable of nonlinear classification of cell images. Among these models are support vector machine (SVM), adaptive Random Forest and boosting. K-next-door neighbor (KNN) and neural network (NN) are also popular. Classification of white blood cells (WBC). Knowing Which model to use is described as a "black art" that must be learned. Instead of textbooks, use experience or trial-and-error. This paper describes the use of a

convolutional neural network. (CNN) model for fine-grained image classification of leukemia outperforms other commonly used models' classification models were used.

III. METHODOLOGY

The main objective of our proposed work for leukemia detection is to construct classification system that takes blood cell image as input and classifies the images as Leukemic or not.
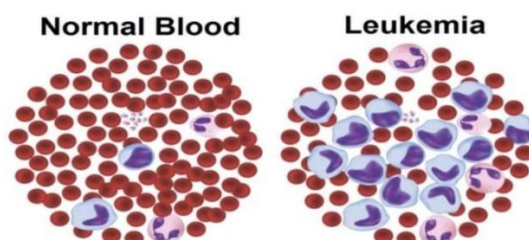

Fig. 1: Blood cell images
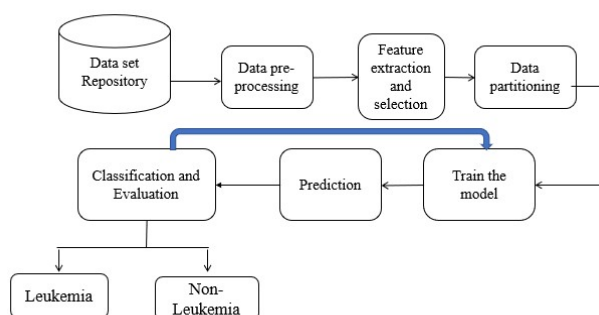
Fig. 2: Flowchart of the proposed Leukemia diagnosis approach

Kaggle and/or C-NMC_Leukemia image dataset are allowed for pre-processing followed by Feature extraction and selection which is done by CNN model. The dataset is split into training and validating data. The training data is allowed to train the model and the validating data is used to test the model. After training, the model classifies the image as Leukemic or not based on its training experience.

IV. PROPOSED METHOD

A. CNN Architecture

We use CNN to extract and classify features from raw blood cell images. CNN's architecture includes three types of layers:

Convolutional layer, pooling layer, and fully-connected layer are all examples of layers. Convolution layers compute neuron output by calculating a weighted sum of the inputs and then applying a bias to that weighted sum, followed by the rectifier linear unit It has (ReLu) on it. ReLu is defined as ReLu $(z) = \max(0,z)$, is one example of an activation function that determines whether a Whether a neuron should be active or not. Layers of pooling are in charge of reducing the representation's spatial size in order to reduce the number of

parameters and calculations, resulting in control overfitting Layers that are fully connected include neurons that are linked to all the activations from the previous layer.
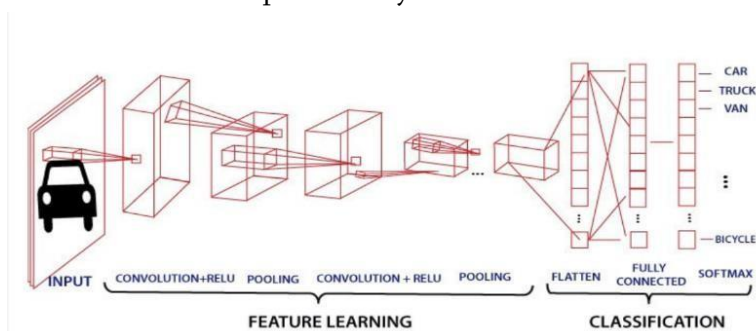
Fig. 3: Basic architecture of CNN

CNN is a supervised method that is a type of feed-forward artificial neural network whose connectivity pattern is inspired by the organisation of the animal visual cortex. A convolutional neural network (CNN) is made up of an input and output layer, as well as several hidden layers. It is made up of four hidden layers. Convolution layer, RELU layer, Pooling layer, and fully connected layer are the four layers.

B. Convolution Layer

A convolution is simply the application of a filter to an input, which results in activation. The repeated application of the same filter to an input produces a feature map, which indicates the locations and strength of a detected feature in an input such as an image.

Fig 4: Edge detection using convolution layer

Choose a 3x3 matrix (F) and place it over an image to compute the "inner product" (similarity) of the matrices and the image's corresponding field, then replace the pixel in the centre of the field with the output of the inner product operation.

Fig 5: Sharpening of an image using convolution layer

On the input volume, the convolutional layer nodes are connected locally. As a result, they have a receptive field, which is a spatial window. The receptive field depth is always equal to the input volume d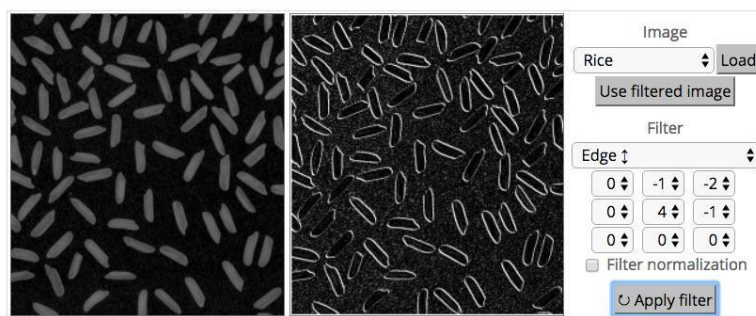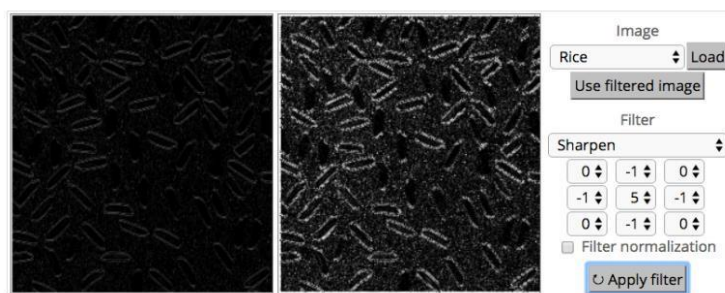epth, but the height and width are hyper parameters. Another characteristic of the convolutional layer is that nodes at the same depth have the same parameters. This organizes the nodes into a depth slice, also known as a filter. The convolutional layer greatly reduces the number of parameters stored in memory by sharing parameters in this manner. The convolutional layer converts input volume to output volume. The spatial size of the output volume is determined by the number of spatial strides made by the filters. The output volume's depth is determined by the number of filters.

C.   ReLU (Rectified Linear Unit) Layer:

To prevent the values from summing to zero, this layer removes all negative values from the convolved image and replaces them with zeroes. Since output is linear with input when it's greater than zero, ReLu layer is used.
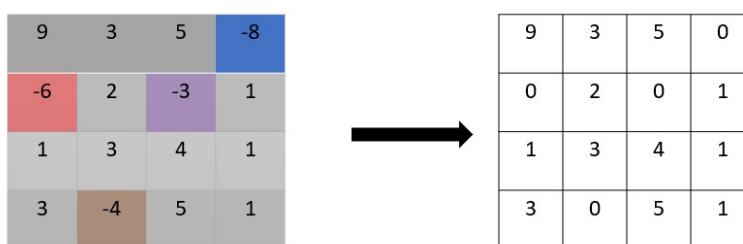
Fig 6: ReLu Layer

ReLU is the maximum function(x,0) with x as an input, such as a matrix from a convolved image. ReLU then sets all negative values in the matrix x to zero while keeping all other values constant. ReLU is a nonlinear activation function, similar to tanh or sigmoid, that is computed after convolution.

D.   Pooling Layer

To reduce pixel density, this layer down samples the filtered image. The feature maps' dimensions are reduced by pooling layers. As a result, the number of parameters to learn and the amount of computation performed in the network are reduced.
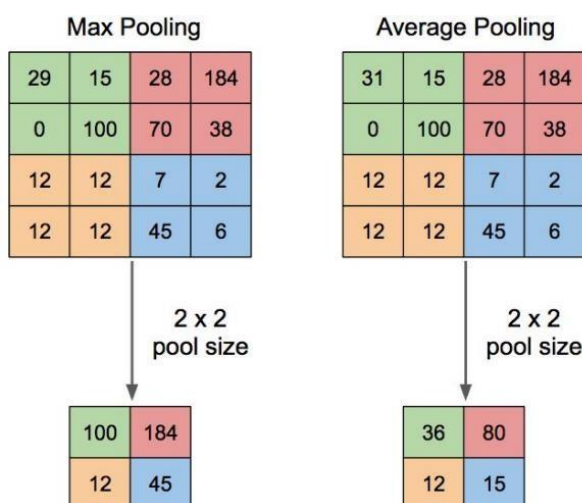
Fig 7: Pooling Layer

The pooling layer summarizes the features in a region of the feature map produced by a convolution layer. As a result, subsequent operations are carried out on summarized features rather than precisely positioned features generated by the convolution layer. As a result, the model is more resistant to changes in the position of the features in the input image.

E.   Fully connected (FC) Layer:

This is the final layer where actual classification occurs, where filtered and shrined images are combined into a single list known as a vector.

The network's final layers are Fully Connected Layers. The output of the final Pooling or Convolutional Layer is flattened and fed into the fully connected layer as the input to the fully connected layer.
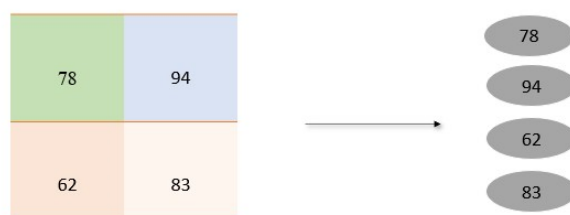
Fig 8: FC Layer

F.   Terminologies:

Pre-processing: The first step in the deep learning workflow is to prepare raw data in a format that the network can understand.

Optimization is a crucial process that compares the prediction and the loss function to optimize the input weights. It minimizes the loss function and reduces model error. RMSprop, Adam, SGD, and other optimizers are examples.

The activation function is a mathematical equation that determines the output of a neural network model. ReLu, leaky ReLu, Sigmoid, tanh, SoftMax, and other activation functions are available.

Epoch: An epoch occurs when the entire dataset is only passed forward and backward through the neural network once.

The epoch batch is too large to feed the computer all at once. As a result, we must divide them into several parts known as batches.

G.   Evaluation Metrics

Confusion matrix: An n*n matrix used to assess the performance of a classification model. It has parameters for true positive, true negative, false positive, and false negative.

Fig. 9: Confusion Matrix

True positive: The actual value is positive, and the model predicts it correctly.

True negative: The actual value is negative, and the model correctly predicts it as such.

False positive (Type I error): The actual value is negative, but the model predicts it to be positive.

False negative (Type II error): The actual value is positive, but the model incorrectly predicts it to be negative.

Accuracy: It is the fraction of predictions that the model correctly does.

$$Accuracy = \frac{T_p + T_n}{T_p + T_n + F_p + F_n}$$

Precision is defined as the proportion of correct positive predictions to total predicted positives.

$$Precision = \frac{T_p}{T_p + F_p}$$

Recall: It is the proportion of correct positive predictions to all observations in the actual class.

$$\frac{True\ Positives}{True\ Positives + False\ Negatives}$$

F1-Score: It is the weighted average of Precision and Recall.

$$F_1 = 2 \cdot \frac{precision \cdot recall}{precision + recall}$$

V.   EXPERIMENTAL RESULTS

Kaggle and C-NMC_Leukemia image dataset are used for our project. Kaggle dataset which is a public dataset available online. It has total 4961 images. Among which 3968 training images and 993 validating images. NMC_Leukemia dataset is also a public dataset available in Calcutta national medical college portal and also at Kaggle. It has total 3521 training images. Among which 2815 training images and 706 validating images. We have made use of CNN model to implement our project which does feature extraction and classification of the Leukemia Blood cell images.

C-NMC_Leukemia Dataset

- Total number of images used for training: 3521
- Training = 80% & Validation = 20% After splitting -
- Training data = 2815
- Validating data = 706

Kaggle Dataset

- Total number of images used for training: 4961
- Training = 80% & Validation = 20% After splitting
- Training data = 3968
- Validating data = 993

Amount of ill people on train data set

Amount of ill people on test data set

Model loss and accuracy

Confusion Matrix
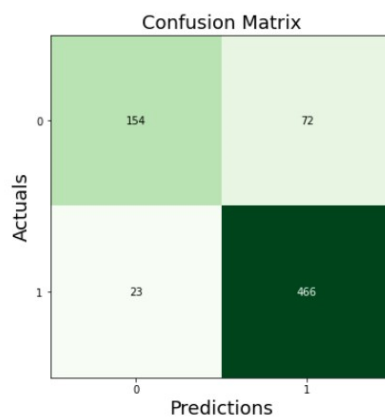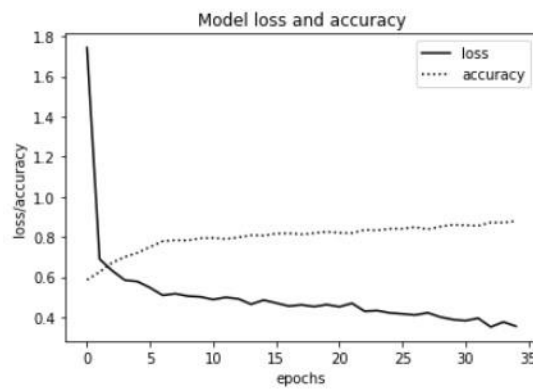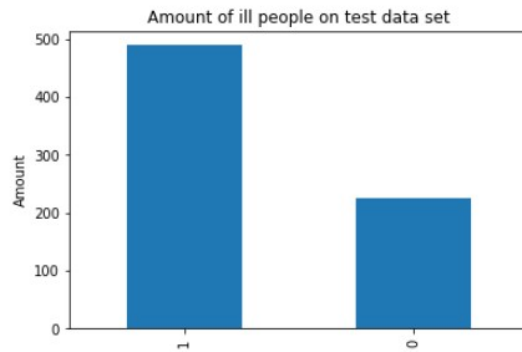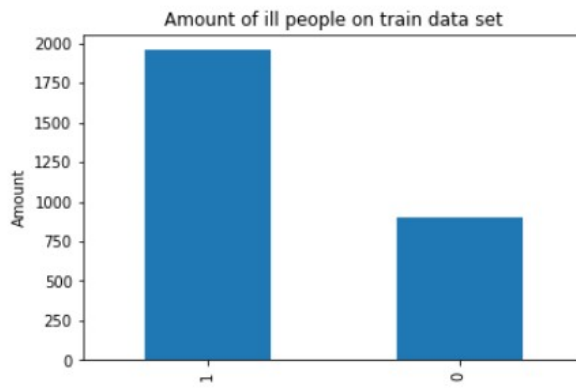
```
Printing classification report...

              precision    recall  f1-score   support

           0       0.87      0.68      0.76       226
           1       0.87      0.95      0.91       489

    accuracy                           0.87       715
   macro avg       0.87      0.82      0.84       715
weighted avg       0.87      0.87      0.86       715
```

VI. CONCLUSION

Leukemia is considered as one of the life-threatening cancers which may cause death if not diagnosed early. Leukemia detection can be done with the help of most trending technology i.e., Deep Learning. In our work, we proposed CNN model applied on Kaggle and C-NMC_Leukemia dataset. Future work should focus on reducing filter noise and developing deeper network models to accommodate larger scale classification tasks. Using a larger dataset to enhance the training process is one possible solution. Increasing regularization strength may provide additional refinement.

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Enhancing Blockchain Traceability with DAG-based Tokens

Aishwarya B Shetty¹, Lavanya Bhat¹, Pandu Naik²
¹Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India
²Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Blockchain technology has positively impacted traceability across various industries such as logistics like cold chain agriculture product and shipping.By overcoming the problem of data silos among organizations and concentration of authority, this innovative approach allows a decentralized and tamper- resistant ledger to be built. On the other hand, the use of non- fungible tokens, a new concept for projecting digital and physical goods on a blockchain, is expected to be able to represent complicated operations in traceability systems. However, the existing token design lacks an efficient model for retrieval of past histories. The most popular way to retrieve past information on tokens is to use blockchain explorers, which are centralized trusted parties. Otherwise, so far there is only a naive way to examine all block headers, and it takes a vast amount of time. Our preliminary study shows that the processing time for retrieving all histories of 1,030 tokens on the Ethereum mainnet takes approximately 57 minutes.

Keywords—Distributed ledger technology, Immutable records, Smart contracts

I. INTRODUCTION

Arduino Blockchain technology has brought advances in terms of traceability and transparency to various industries. Supplychain management for the shipping and logistics industries, a practical example of blockchain technology, benefits from this distributed ledger being updated and validated reliably. The food tracking system introduced by Walmart and its partners has made it possible to guarantee the production origin and quality of food and has reduced the time needed to trace the source of food from 7 days to 2.2 seconds. The blockchainbased traceability system does not require users to place trust in a centralized system, which enables them to follow the distribution process with a decentralized approach while preventing fraud, corruption, tampering, and counterfeiting. In verifications using smart contracts, the reliability of an asset is confirmed in an autonomous and distributed manner; thus, companies can reduce the costs of both fraud and compliance. This powerful distributed tracking system reduces dependency on obsolete paperwork in all situations where traceability is required and shortens the time required for the whole workflow.

II. LITERATURE SURVEY

[1].International Journal of Research in Engineering and Technology, vol. 5, issue 9, pp. 1-10, 2016. Abeyratne and R.P. Monfared, "Blockchain ready manufacturing supply chain using distributed ledger,": This paper helps in manufacturing supply chain using distributed ledger.Blockchain has security features that can benefit BIM such as immutable and impossibility to be tampered with and   forged.The features   makes blockchain   have   incomparable advantages in ensuring information credibility, security and traceability.The objective of this research is to assess application of blockchain technology on Building Information Modeling (BIM).Construction management based on blockchain-based BIM could enhance information

[2]. W. Entriken, D. Shirley, J. Evans, and N. Sachs, "ERC-721 Non-FungibleTokenStandard,"2018.[Online].Available: https://github.com/et hereum/EIPs/blob/master/EIPS/eip-721.md. [Accessed: 30- May2019].: It is helpful to solve the pain points such as data storage centralization, information isolated island and data tampering in the traceability of agricultural products.Block-chain technology has been preliminarily applied in the field of traceability of cold-chain agricultural products.Taking Ningxia cabbage heart as an example, this paper combines the core technology of block chain with the specific business of each link in the circulation process of Ningxia cabbage heart, and constructs the traceability system of cold chain agricultural products based on block chain.It realizes the transparency and traceability of the whole cold chain circulation process of Ningxia Chinese cabbage, which is helpful to maintain the brand image, enhance the consumer trust and realize the safe consumption of agricultural products.At the same time, this study also has a certain reference value for the construction of traceability system of other kinds of cold chain agricultural products , this paper built the traceability system of Ningxia Cabbage to realize the transparency and traceability of the whole cold chain process of Ningxia Cabbage, ensuring the quality of life and safety of consumers.

[3].E. Ordano, A. Meilich, Y. Jardi, and M. Araoz, "Decentral and whitepaper,"2017.[Online].Available: https://decentraland.org/whitepaper.pdf. [Accessed: 30- May- 2019: DAG based systems provide innovative models whose underlying structures enable high throughput and large scalability.However, the field has grown increasingly complex with different designs and patterns, making newcomers confused.In this work,   we provide the first structured analysis of DAG-based blockchains. We provide the overview through collecting and reviewing all ever-existed and ongoing studies.Then, we abstract a general model to capture the features of DAG and identify six types of design atterns.We analyze the collected systems by respectively evaluating their structure, consensus mechanism, property, security, and performance, followed by discussions on their impacts, comparisons, and challenges.

III. RELATED WORK

A. Challenges facing blockchain-based traceability systems

Several solutions have been proposed to enhance traceability using blockchain technology in order to comply with legal obligations, streamline inventory management, guarantee product quality,and counter fraud

and more. Industry has performed proof-of-concept demonstrations of typical supply chain operations, and some companies and organizations have launched traceability services for commercial use. However, considerable gaps have been found in the integration of supply chains using blockchain technology. One of the challenges is how to link physical products and digital products. RFIDs, barcodes, and QR codes can be used to provide products with digital identifiers on the supply chain network, but these virtual IDs are physically replicable. For instance, Toyoda et al. propose a mechanism to detect replications of false physical tags by managing EPC information included in the RFID in association with information on the producer and owner of the product by using Ethereum smart contracts.Assuming that physical products can be properly projected to digital representations on a blockchain, the next problem is how to manage the digital representations while ensuring reliability, neutrality, and efficiency. Lu et al. state that the structural design of a smart contract affects not only performance but also updatability and overall system adaptability. For example, if you move the logic to a blockchain, the reliability that the blockchain provides enable you to use it as a computing platform, but it may be difficult to renew your legal agreements or renew a smart contract for new regulations. This means that better standards and methodologies for development are needed for a blockchain-based traceability system. It is considered that a modeling approach can improve this state of affairs. For instance, Kim and Laskowski propose to introduce an ontology-based data model for traceability Sinto the design of smart contracts. The contracts based on the ontology support several typical supply chain operations such as production and consumption.

B.   Exploration methods for token tracking

A standardized interface allows a more efficient search of the transaction history of the token by linking with a thirdparty explorer. Etherscan1 is an explorer for the Ethereum blockchain, and it provides advanced search and analysis platforms. Additionally, Etherscan can search standardized ERC-721 tokens with the contract address and its token ID as the key. This kind of explorer service offers efficient searches, but there are two concerns. One concern is that it is not a completely trustless architecture; every user needs to place trust in the service operators. Another one arises when we use a closed and isolated consortium-type blockchain. The cost to maintain the explorer service would be huge, because it must always monitor and analyze the blockchain this may be an obstacle to introducing a blockchain system. Barring an explorer service like the above, a naive way of searching the token history is to look through all past blocks. In this method, the time spent searching linearly increases as the search range expands. In Ethereum, this problem is alleviated to some extent by the mechanism of event and logs. Ethereum smart contracts can emit events and write logs to the blockchain when mining. If indexed parameters are specified in the logs, the smart contract can add them to a Bloom filter in the header of each block. The Bloom filter enables the searcher to detect whether or not a specific event log has occurred in each block in seconds
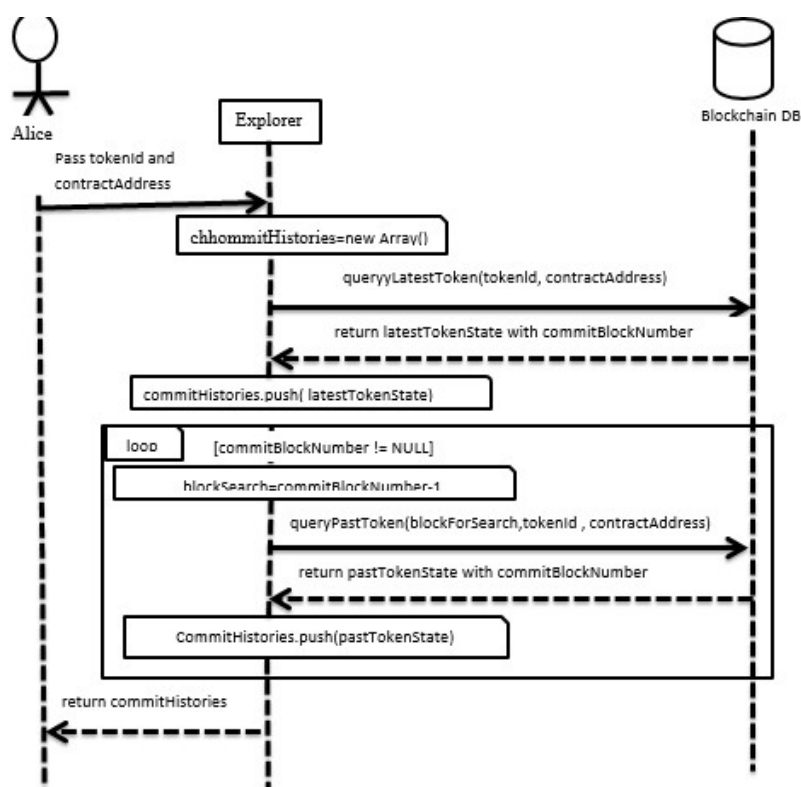
IV. SYSTEM DESIGN

Fig. 1. Exploring all state histories of a DAG-based token

Figure 1 shows the sequence diagram of the tracking process for a token ID. First, the searcher Alice passes the token ID and its contract address to the explorer, and the explorer obtains the latest state of the token from the blockchain. The result includes the committed block number, which means that the explorer can see the token object (i.e., the 3-tuple, commitBlockNumber, tokenID, contractAddress). In the next inquiry, the explorer specifies the block number of the value decreased by 1 from the committed block number and 224 queries the past token state. This processing is recursively performed until a committed block number cannot be found.

LIMITATIONS OF CONVENTIONAL BLOCKCHAIN TECHNOLOGY

Scalability: In a conventional blockchain, after creation of a block it needs to be approved by the majority of the network which is inefficient. To tackle scalability issues researchers mostly work on two different approaches; tuning parameters and designing a new scalable architecture. Both approaches bring some performance gain to the system.

Transaction Fee: In conventional blockchains, computational power of other nodes are required, e.g. PoW and PoS. This directly increases the total cost to make a transaction. Microtransactions are almost impossible as transaction fees could be more than intended transfer amount. In a DAG based system, involvement of other peers during a transaction isn't necessary. This feature of DAG system reduces transaction fees to almost zero and makes it possible to have microtransactions.

Transaction Approval Time:In the PoW based systems, miners are required to do heavy, complex computations to approve new transactions. It can only be valid after each of those peers approve it. In the PoS systems,

approval of a transaction depends on how busy the network is and how much the transaction initiator pays for fee. Eventually, this makes the approval process longer.

Dark Side of Decentralization: By its existence, blockchain systems are a chain of trust. Making a transaction means directly trusting the peers on the network on successful execution of the transaction. As described in Pervez et. al.'s work , decentralization can also cause adverse effects on the network. Malicious peers may try to play with transaction contents, prioritize some other transactions or drop them randomly. Decentralization also increases attack surface

DAG BASED BLOCKCHAINS

A Directed Acyclic Graph is a type of directed graph that is structured in a way which doesn't allow passing through a node twice. This is what makes it acyclic. A directed tree is a good example of Directed Acyclic Graphs. In DAG based blockchains, transactions are represented as nodes and approvements are represented as edges.
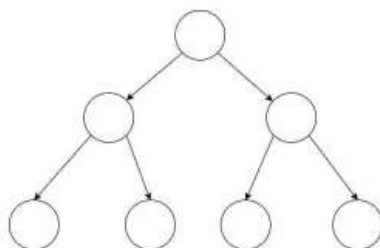
Figure 2: Binary tree is an example of DAG

When a new transaction occurs, other non-validated transactions are picked and attached to this new one by including it's hash value in itself. Therefore when there is an upcoming transaction, it is used to validate some previous transactions. There is no need to group transactions into blocks. This also speeds up the transaction approval process and reduces the amount of computational power required.
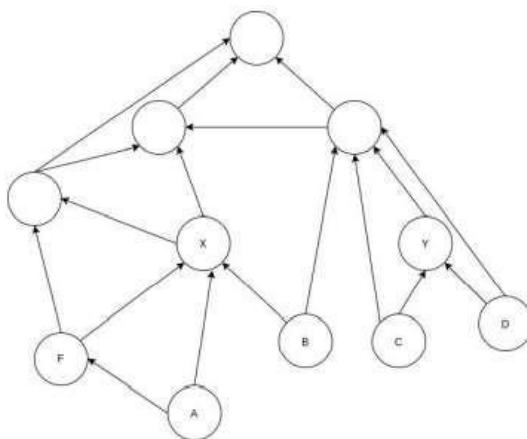
Figure 3: A more complex DAG structure

A DAG network can run asynchronously which may cause conflicting nodes to exist on the network at thesame time. For instance, Consider X and Y nodes as conflicting nodes in Figure 2. Node X is validated by 3 nodes which are F, A and B while Y is validated by only C and D. Most common approach in this case is to pick X as valid and discard Y. On the other hand there is no unanimous way to treat discarded transactions. Each technology has their own way to handle these consensus-related problems.

V. CONCLUSION

With so many experiments taking place through legacy as well as new-age businesses, stakeholders in all these industries are certainly looking forward to integrating blockchain into their core processes. The distributed ledger technology, especially Blockchain, is not only revolutionizing the currency world but also creating a more transparent financial system.Even though the tech is yet to deliver concrete results in many cases, the enthusiasm amongst engineers, developers, and industry stakeholders is at an all-time high. The future of blockchain is not going to be limited to cryptocurrencies. Even though the crypto market will grow several folds, there will be new opportunities for blockchain developers in some very exciting fields.

VI. FUTURE SCOPE

Many organizations across various fields and domains have been attracted to this technology and the future applications of Blockchain. Additionally, Blockchain technology has been a part of many studies as a form of disruptive technology that has the potential to be recognized more widely across the world.

VII. RESULT

DAG-based tokens have an advantage in that retrieval performance does not deteriorate over the long term, even taking into account that a private-type blockchain was used in the experiments. Overall, these results suggest that the retrieval can be completed within several seconds even if the block length and event density increase.
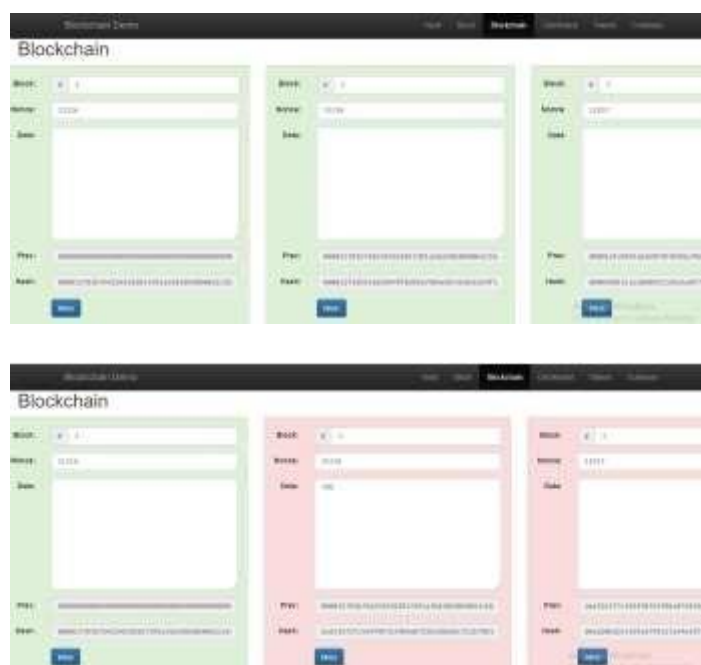
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Leaf's Medicinal Use and Disease Detection using Computer Vision

Roshni[1], Sahana[1], Shwetha Anand Kamath[1], Varshitha[1], Mahesh B.L[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

Plants are considered as one of the greatest assets in the field of Indian Science of Medicine called Ayurveda. Some plants have its medicinal values apart from serving as the source of food. People failed to have their medications at their door step instead went behind the fastest cure unaware of its side effects. The studies of the plant diseases mean the studies of visually observable patterns seen on the plant. Identification of the plant diseases is the key to preventing the losses in the yield and quantity of the agricultural product. It is very difficult to monitor the plant diseases manually. It requires tremendous amount of work, expertize in the plant diseases, and also require the excessive processing time. If proper care is not taken in this area then it causes serious effects on plants and due to which respective product quality, quantity is affected. Hence system is designed which inputs the image from web application and computes it in cloud using CNN, here classification of these is done with the help of images of leaves. It involves steps like image Pre-processing, image feature extraction, detection of edges; many convolutional layers are used for the effective recognition of images.

Keywords—disease detection, medicinal use, cnn, computer vision

I. INTRODUCTION

India is a cultivated country and about 70% of the population depends on agriculture. Farmers have large range of diversity for selecting various suitable crops and finding the suitable pesticides for plant. For achieving better yield in cultivation, the proper plant assessment is highly essential. Healthy plants provide better yields. But the plants suffer from different disease due to unsettled climate and environmental conditions. When plants are affected by diseases, they show a range of symptoms such as colored spots or streaks that occur on the leaves, stems and seeds of the plant. Hence, damage to the crops would lead to huge loss in productivity and would ultimately affect the economy. Leaf is an important parameter while studying plant nutrition, amount of water with soil, plant protection measures, crop ecosystems and photosynthesis. To conserve plant species, their identification is the first step. Therefore, it is highly essential to have an object recognition system to identify various species of plant and protect them from being endangered. Plant diseases have turned into a cause of significant reduction in both quality and quantity of agricultural products. Agricultural productivity is the

source of economic   growth   for   developing   countries   like   India. Medicinal plants are the ones that normally grow in our backyards or the ones that we find along the roadsides. As the days pass it is becoming difficult for the people to identify the existence of the medicinal plants, One among the reasons is the lack of knowledge about identifying medicinal plants among the normal ones, thus helping even a common man to be aware of the plants with medicinal values around them. Medicinal plants have a promising future because there are about half a million of plants around the world, and most of the plants medical activities are not been explored until now, and their medical activities could be decisive in the treatment of present or future studies. At present, the conventional technique of visual inspection in humans by visual inspection makes it impossible to   characterize   plant   diseases.   Advances   in computer vision models offer fast, normalized, and accurate answers to these problems. The developments in the field of computer vision can be utilized for this purpose where an web application is developed with vision based approach to create an automated system which the image of the leaf is given as input by user and identifies the plants and provides its medicinal values, or any type of disease.

II. RELATED WORK

[1] In this paper the leaf disease Detection and Classification of Leaf Disease is done using Artificial Neural Network begins with capturing the images. Color feature like HSV features are extracted from the result of segmentation and ANN is then trained by choosing the feature values that could distinguish the healthy and diseased samples appropriately. Experimental results showed that classification performance by ANN taking feature set is better with an accuracy of 80%. The present work proposes a methodology for detecting only cotton leaf diseases early and accurately, using diverse image processing techniques and ANN. [2] In this paper the leaf disease detection is done using neural network classifier. The segmentation is done using k-means clustering. Various features like Contrast, Correlation, Energy, Homogeneity, Mean, Standard Deviation and Variance are extracted for cotton and tomato diseases. The diseased leaves considered for simulation are bacterial leaf spot, target spot septoria leaf spot and leaf mold disease. Features are computed from disease affected clusters 1 and 3. The features are fed to the classifier for recognizing and classifying the diseases. Out of twenty cotton samples nine samples are classified correctly as bacterial leaf spot and one sample is misclassified as target spot. Eight samples are classified as target spot and two samples are misclassified as bacterial leaf spot. Out of twenty tomato samples 10 samples are classified as septoria leaf spot disease and 10 samples are classified as leaf mold disease. Accuracies for four diseases bacterial leaf spot, target spot septoria leaf spot and leaf mold are 90%, 80% and 100% respectively and its average classification accuracy is 92.5%. [3] This   paper   explores feature vectors from both the front and back side of a green leaf along with morphological   features   to   arrive   at   a   unique optimum combination of features that maximizes the identification rate. A database of medicinal plant leaves is created from scanned images of front and back side of leaves of commonly used ayurvedic medicinal plants. The leaves are classified based on the unique feature combination. Identification rates up to 99% have been obtained when tested over a wide spectrum of classifiers. The above work has been extended to include identification by dry leaves and a combination of feature vectors is obtained, using which, identification rates exceeding 94% have been achieved. [4] The texture based feature

classification has been discussed in this paper, where a statistical approach has been used which gives the quantitative measure of the pixel arrangements in a region. So, the GLCM method has been used and the dissimilarity between the leaves has been found and leaves are classified. This algorithm works on different herbal leaves namely Tulasi, Omavalli, Neem, Vana Tulasi, Thudhuvalai and nochi. [5] This paper explores a model (Deep Neural Networks) for the identification of medicinal plants. To train the model they used around 8,000 images for the efficient classification of medicinal plants, and this work is implemented by having four number of plant disease classes. Finally, this whole work is implemented from scratch and produces an accuracy percentage of 85.15%. The future work is to increase the size of the dataset by increasing the samples as well as by adding new kinds of medicinal plants.

III. PROPOSED METHOLOGY

The images of plant leaves will be uploaded by the user. The system will preprocess the data that is transforming raw data into an understandable format to get the required features that is color, shape and texture. The feature extraction that is employed for developing the system is Gray-Level Cooccurrence Matrix (GLCM) and it is deployed into CNN model. The GLCM method is a statistical method for texture. CNN model will train the data to get the predicted output, which is stored in Keras file. Keras is a simple and powerful open source neural network library written in Python.

CNN model is deployed into flask as the API and the POST request is sent from web application which contains the image selected by the user. The API will respond back with the Predicted result that is disease from the leaves or medicinal value is displayed to the user in the web app.
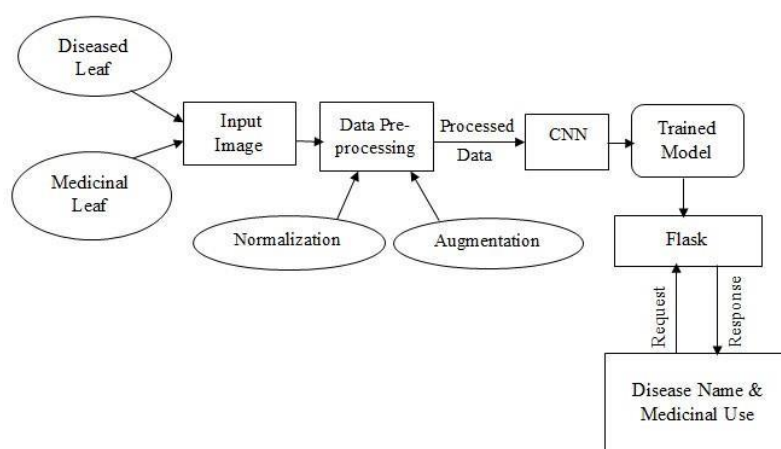
Fig.1 Data Flow diagram

IV. DATASET DISCUSSION

The Plant Village Dataset obtained from SP Mohanty"s GitHub repository [10] is used in this work. This dataset contains 54323 plant leaves images of 38 different categories, which includes images of common diseases of the plant, as shown in Table 2. All the images that are used in this work are colored images because the colored images give greater accuracy when compared to grayscale images. All the images were taken from different

angles and in different conditions. Some of the images are given below in figure 2. The entire dataset is randomly partitioned into training and testing sets. The training set is used to train the model. Normally, these sets are partitioned in the ratio of 20% - 80%, 40% - 60%, 60% - 40%, 80% – 20%, etc. if more images are inputted in the training dataset then the most accurate results can be obtained. In this work, 80% of the dataset is used to train the model and 20% for testing, is shown in Table 2.

Fig. 2: a) Apple Scab, b) Squash Powdery Mildew, c) Apple healthy, d) Blueberry healthy, e) Corn (maize) Cercospora leaf spot Gray leaf spot, f) Grape Black Rot, g) Grape Healthy, h) Grape Leaf Blight, i) Orange Huanglongbing (Citrus Greening), j) Peach Bacterial Spot, k) Bell Pepper Bacterial Spot, l) Potato Late Blight, m) Raspberry healthy, n) Strawberry Leaf Scorch, o) Tomato Leaf Mold, p) Tomato Mosaic.

TABLE 2. PLANT VILLAGE DATASET DETAILS

S. No	Name	Total Images No.	Training Images No.	Testing Images No.
1.	Apple Scab	630	504	126
2.	Apple Black Rot	621	497	424
3.	Apple Cedar Rust	275	220	55
4.	Apple healthy	1645	1316	329
5.	Blueberry healthy	1502	1201	301
6.	Cherry healthy	854	683	171
7.	Cherry Powdery Mildew	1052	842	210
8.	Corn Gray Leaf Spot	513	410	103

9.	Corn Common Rust	1192	954	238
10.	Corn healthy	1162	930	232
11.	Corn Northern Leaf Blight	985	788	197
12.	Grape Black Rot	1180	944	236
13.	Grape Black Measles (Esca)	1383	1106	277
14.	Grape Healthy	423	338	85
15.	Grape Leaf Blight	1076	861	215
16.	Orange Huanglongbing	5507	4406	1101
17.	Peach Bacterial Spot	2297	1838	459
18.	Peach healthy	360	288	72
19.	Bell Pepper Bacterial Spot	997	798	199
20.	Bell Pepper healthy	1478	1182	296
21.	Potato Early Blight, Alternaria solani	1000	800	200
22.	Potato healthy	152	122	30
23.	Potato Late Blight, Phytophthora infestans	1000	800	200
24.	Raspberry healthy	371	297	74
25.	Soybean healthy	5090	4072	1018
26.	Squash Powdery Mildew, Erysiphecichoracearum	1835	1468	367
27.	Strawberry Healthy	456	365	91
28.	Strawberry Leaf Scorch, Diplocarpon earlianum	1109	887	222
29.	Tomato Bacterial Spot	2127	1702	425
30.	Tomato Early Blight	1000	800	200
31.	Tomato Late Blight	1591	1273	318
32.	Tomato Leaf Mold	1909	1527	382
33.	Tomato Septoria Leaf Spot, Septoria lycopersici	952	762	190
34.	Tomato Two Spotted Spider Mite	1771	1417	354
35.	Tomato Target Spot	1676	1341	335
36.	Tomato Mosaic Virus	1404	1123	281
37.	Tomato Yellow Leaf Curl Virus	373	298	75
38.	Tomato healthy	5375	4300	1075

V. IMPLEMENTATION

This section describes the implantation details of the entire process includes data collection, preprocessing, feature extraction, and finally the model building. The model will be validated using performance evaluation metrics.

A. **Dataset Collection:** This paper uses Plant Village Dataset obtained from SP Mohanty''s GitHub repository. This data set contains both the diseased and healthy leaves of different kinds of plants. This dataset set is in an un-processed form. The dataset needs to be preprocessed.

B. **Dataset Preprocessing:** All the training and testing images should be pre-processed before sending them to the network. The opencv library is used in this work. The main aim of image pre-processing is to enhance the image information contained unwanted distortions or to reinforce some image features for any processing. Preprocessing technique uses various techniques like dynamic image size and form, filtering of noise, image conversion, enhancing image and morphological operations.

C. **Image Segmentation:** In image segmentation is used K- means cluster technique for partitioning of pictures into clusters during which a minimum of one part of cluster contain image with major space of unhealthy part. The k means cluster algorithmic rule is applied to classify the objects into K variety of categories per set of features.

D. **Feature Extraction:** After clusters are formed texture features are extracted using GLCM (Gray-Level Co- occurrence Matrix).

E. **Classification:** Classification is a process of categorizing a given set of data into classes, It can be performed on both structured and unstructured data. The process starts with predicting the class of given data points. The classes are often referred to as target, label or categories. Here the Support vector machine algorithm is used for classification.
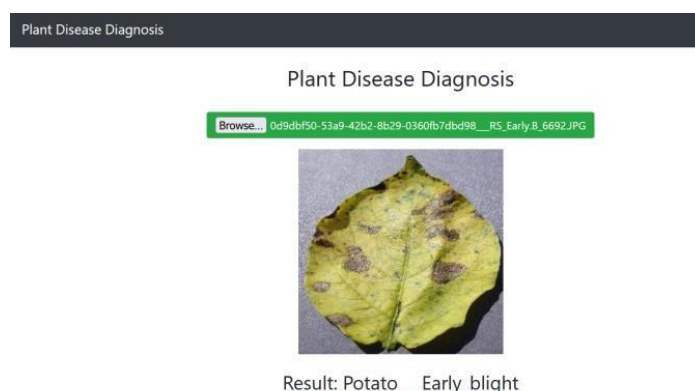
VI. RESULTS

Fig.3 Diseased Leaf

Fig.4 Healthy Leaf

VII.   CONCLUSION & FUTURE WORK

Plant Diseases are major food threats that can overcome before it leads to further loss of the entire field using this model. It will help to produce good yeild and stable plant community. The proper identification of plant species has major benefits for a wide range of stakeholders. Medicinal plant identification and using them properly will help to cure common disease. Classification of plants will help in conservation of those plants. It will help easily to detect diseases or medicinal use in plant. In future this system can be used in multiple platform like website, mobile application, smartwatches etc. This model can be made to detect large number of plant species.

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A Novel Approach for Communication between Ordinary People and Specially Abled People

Akshatha Acharya[1], Pratiksha Prashant Shetty[1], Kotegar Manisha L[1], Prashanti S Naik[1], Soumya Santhosha[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

ABSTRACT

Inability to speak is considered to be true disability. People with this disability find it very difficult to communicate with others, they use different modes of communication methods to communicate. Hand sign is one of the methods for human-to-human interaction. Sign language is usually used as a mode of communication by people who are speech impaired. This paper is incorporated with a method to recognize ISL in the real time video streaming which includes alphabet and (0-9) digits, the output will be both in speech as well as text with the help of Google speech API. An responsive GUI is constructed which is user friendly and easy to access. The Convolutional Neural Network (CNN) and Support Vector Machine (SVM) are made into use for the purpose of classification.

Keywords— Indian Sign Language(ISL), Convolutional Neural network, Google Speech API, Support vector machine (SVM) , sign recognition of hands

I. INTRODUCTION

Communication is an important medium for every living being to express their feelings, action, emotions and conduct. Humans can communicate using speech, body language, facial expressions, hand gestures and signs, reading, writing etc. The method of communication and language we use may differ from place to place. Hence communication should be in such a way that should be understood easily by others, if not there is no use of such communication.

Not every people have the opportunity to communicate normally, people with disability find it difficult to express them especially the one with speech disability. The speech disabled people who are capable to show hand gestures use sign language for communication. This sign language is specific to different regions of the world. Sign language is one of the widely used communication method by speech impaired people, which helps them to communicate with each other with the help of sign. Sign Language is the strategies for correspondence among the hard of hearing and dumb people organize. Communication through sign language creates and advances regularly inside hearing hindered people.Sign Language correspondence incorporates non manual and the manual signs where, manual signs incorporate arms, hands and fingers and

other which is non manual signs incorporate confront, eyes and body. Interaction by means of sign Language could be a well- organized dialect with a phonology, morphology, linguistic structure and punctuation/grammar. Sign Language could be a wrapped up common language that utilizes particular strategies for enunciation.

In different region of India both the dynamic as well as static use of sign language is seen, which provide exceptionally troublesome to take forward such an interactive method conspire. Further expansion, There is not any standard or custom made dataset which is available.

The progresses in the field of ML where profound endorsing innovation is given in modern strategies as well as calculations involving the recognition of the ISL letter sets productively, precisely and cheaply. The regular running of the models solves exceedingly inconsistent confinements from conventional strategies, moving forward precision the accuracy of how the result is obtained. Technique for obtaining the dataset of alphabet and digit which serves as recognition for the system in ISL. Real time approach where the ISL plays an important role to bridge the gap between the specially able people and the ordinary people which has to be accurate so that there is not major complexity arises while using the proposed system.

II. LITERATURE REVIEW

Different author has employed different methodology for making effective use of sign language.

Many methods were used such as Euclidean distance which was used for the purpose of classification in the system [1].Another approach used Jones algorithm recognition of hand sign gesture [2]. Artificial Neural Network was used for the purpose of classification of the sign.[2] In an endeavour [3], movement of block which was premeasured strategy were utilized to skip the segmentation as well as initialization steps. Good accuracy for static images and thirty three essential unit of words utilized.

Majority of the work involved pattern recognition, segmentation, feature extraction etc. Where as in many case there has been system having a individual characteristic isn't sufficient. Hence there is a need of approach which combines it such as hybrid being one of the approaches has been researched to look after the concept of accuracy. [5] Made use of combination of Euclidean distance along with the K- Nearest Neighbor which is an approach of hybrid which was used to classify the histogram features of the gestures. Only drawback was the performance was very poor. Another approach [6] Fuzzy was considered one of the approaches in this paper which made the use of Natural Language Processing which could display text. Researchers required a faster approach to handle challenge for real-time systems sign language recognition. Image recognition may now be automated using multiple image recognition models thanks to advances in Deep Learning technologies. CNN, for example, shown significant progress in area comprising of deep and machine learning. This has solved the issue of background reliance, allowing the system to be employed outside of controlled situations.
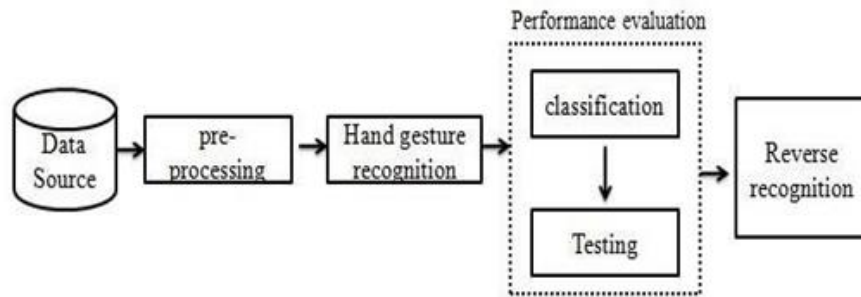
III. METHODOLOGY

Fig 1: Block diagram of proposed method

The proposed system requires systematic and powerful data for the purpose to design an reliable system which will be useful in the real time communication. For solving sign detection and classification problem we made the use of dataset which are build on the custom requirement. The different steps for sign language recognition are Data Source, Pre-processing, Hand Gesture Recognition, Performance Evaluation, and Reverse Recognition as shown in the Fig.1

1) Data Source

Data plays a major role in the research works in many areas it promote deployment of the ML (machine Learning) model, but the data has many obstacles to undergo. Most dataset are already available for ASL (American Sign Language), however its seen that there are not standard form of dataset of ISL . Hence in this system incorporation of manually constructed dataset is developed that aims to help one to solve any queries.

Firstly, in this proposed model capturing of video by the help of webcam is done. The position of the camera is very important for removing background noise and improving the quality of the images. We have used two options for capturing the images to get the variety of dataset collection. The first option is provide to use the default approach where image is undergone with the skin which issues segmentation on the taken image used in presence of plain or we say clear background.

secondly, it is implementing the method of crossing average, one of the basic starting of the frame has to be considered as the back-ground, while any of the other newly formed object after our initial start frame will be taken as the foreground, adding and easier method for extraction as a process. In accordance with making model for improving the performance Using live video signs are obtained which was converted as frames with the help of the pixels value will be extracted in the threshold. Since we need very little power of computation in the pre processing of the frames which has been estimated with an resolution of (200+50)*(200+50). Every sign envelope variety of pictures of different sign language. Sign language makes use of one or both of our hands to create sign depending on the character from the included digit or alphabets. Images are taken in various resolution later put away onto gray scale organised which has an extension of jpg . Pictures of the dataset included in this system is shown in Fig. 2

Fig. 2: dataset representing the different sign

2) Preprocessing

During the preprocessing image will be ready for feature observation and detection. To maintain consistency of scale, kept same dimensions of all images.

Within the collected frames of video can transformed to Hue Saturation value color by default for the image received by using simple environment . With the skin's HSV is distinctive in comparison to the images it is retrieved effortlessly. The experimental filter is matched with the filter which can be further summed up and filtration extracts the body crimson pixel value taken out from images. Then, the extracted images will be binarized, obscuring is accepted and evacuate acoustics and the optimum contouring is derived from the output expecting form of output from the biggest region constitute the forearm. Corrections are then evacuated using structural procedures and the noise removal. The next option is to check the moving framework for the images, the primary thirty images be designated back forth, and the objective difference between the progressive total of those thirty images then the current screen is determined for the remaining frames, giving foreground to frontend area for new screen.

Those images begin with changed over grayscale then after that Gaussian channel was implemented. For forearm disguise the division, a cover was made by highest feature is extracted that is associated within the frontal area assumes made that it was hand. Sounds are then evacuated by implementing the structural method like expansion and attrition calculation of strength of the edge from the pixels

3) Hand Recognition

A. Feature Extraction

The stage includes creating a BOVM where consists codebook implementation on the described system , extracted feature, histogram being produced and grouped feature. An BOVW is widely used for

classification of image. It keeps count of the each word which repeats and use it as keywords by calculating the frequency of words and draw histogram of frequency from those values. In our proposed work, the image features is used as words. By creating a dictionary of every   image is spoken to an recurrence histogram's attributes was derived images details and also the key subjects is applied. Next, another category of similar image can taken from the prediction the histogram frequency. As mentioned, the primary method in creating BOVW can be derived with the descriptions from individual images within dataset. Descriptor on consists of 64-bit vector in every interested points within an implementation utilized that describes the materials intensity of the material around the points of interest. To implement that, we have used SURF an function is made into use for detecting the feature which are local which finds the essential features from the given image and acts as descriptor to describe the extracted feature. SURF   function are vigorous to fluctuation and rotation of hands, any blockage or stoppage and give operators a filters of the box for quick calculation.

☐   Im= {d1, d2, d3,……………dn}   ☐☐☐☐

The above equation di is the color, structure, etc. are from the forearm and n states the number of image. In the fig.4 displaying the taken feature related to Speeded up robust feature and the secondary images is passed to A sings.

Looking forward towards uprooting highlights where Speeded up Robust Feature which acquired feature that intrigued. Typically completed the gathering of exactness of the features which is conceivable for utilize at centre group them as catchphrase. Grouping can be used to carry out utilizing the kmean calculation, nevertheless, utilized smaller than expected bunch clustering K-means for the details is enormous. Comparatively better in the utilization of the memory and the time of the system.

The features which are used in quantizing which takes an input is taken as vector and which will then be mapped to the it to the label of the close vector. The V is represented as the Vocabulary in the Eq(2)

V= {w1, w2,w3,. . . . . wk}   (2)

In the above equation k represents the number of ,sum of clusters which is 179.

The descriptor (di) and visual word (w) can take taken as the distance in-between is represented by Dist(w,di) and the mapping of each is done, w(di) is the visual of the word given. For descriptor in iTh term. Final is done by calculating the recurrence of event . Sum of the total bins within the equal number of histogram that is k denoted in the equation (3).

bini = C(Di) Where Di = { dj, jε1,……n |w (dj) = wi } (3)

where a set of Di is made to all descriptors comparing for certain Wi words of visual. Inside images C(Di) representing the components total value of the frames .Each word of visual of image is the performed again and again to get histograms which is then passed to the classifier for recognition.

4)   Classification

After the completion of feature detection and extraction classification takes place. we use CNN and the SVM algorithm .

A. Support Vector Machine

It is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning.We used

SVM with linear kernel for classification. For the classification we pass the visual words to SVM which act as features. After the training, testing is done and the performance is checked with the help of accuracy, precision, recall, etc.

B. Convolutional neural networks

A convolutional neural network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data.. CNNs considers images piece by piece, those pieces can be known as features, hence they think about images of two tracking down roughly similar highlights at around similar areas. CNNs have a superior capacity to see pictures and order them than other brain organizations. Our overall engineering is a genuinely normal CNN design, comprising of various convolutional with the thick layer .Convolutional Neural network has three layers each. An designing begins by gathering of two convolutional layers which have thirty- two channels and size of window which is of 3 X 3 with an dropout layer and a maxpool layer.

5) Testing

In testing, feature extraction which is done in the previous process is tested against the dataset to predict the sign.

6) Reverse Recognition

In our system, the reverse process is fundamental part to give a method of communication in dual mode impaired and hearing loss. This project has fulfilled this way of communication in our framework. The input is given as an important form such as speech for the user by the user, then mapping and labeled. Comparisons of signs (in database images is stored) will be represented letter by letter. Using the Google Speech API, the recognition of speech is performed.

IV. RESULTS AND DISCUSSION

Entire set of data is split in two groups. First is training data set comprises 80% from the dataset, while the left 20% serving taken for testing. On photos, both SVM and CNN classifiers provided good accuracy. CNN can perform better even with the small number of feature. Entire proposed system has been programmed so that it can recognise thirty six different indications (having alphabet and digit that is 26+10). The present yield are encouraging, but a few tweaks could yield even better outcomes.

1) Performance of CNN

With the use of CNN it has come to notice entire veracity of 93% of preparation incite end period when in fact a experiment veracity more99%. Epoch counts to be in the total of 50. Model is prepared in a way that can accompanying categories such as softmax function and the loss of entropy function, that come with an   likely preparation misfortune of 0.1826 on the last period and a experiment misfortune of .0183.

2) Performance of SVM

Support Vector Machine which is likely to have an accuracy approximating to 98-99% on the data that has been tested with. deliberate principles giving accuracy and matching with digits and the alphabets for an

overall accuracy stating 98% Support Vector machine (SVM) that granted significant bettering in the performance of the system.

3) Quantitative analysis

A. Accuracy:

It being the foremost intrinsic execution estimating and is essentially a comparison of observation which is seen as right to overall experimental observation. In the wording of equation where True Positive(TP), False Positive(FP0, True Negatives(TN), and False Negative(FN), equation of the experimental accuracy that could be composed is as following

Accuracy= Number of correct predictions / Total number of predictions

For binary classification, accuracy can also be calculated in terms of positives and negatives as follows:

Accuracy=   TP+TN / TP+FP+FN+TN

Where TP = True Positives, TN = True Negatives, FP = False Positives, and FN = False Negatives

In the Table 1. Both the classification of the accuracy along the various test cases has to be performed. Performance of two of the classifier is good data that has been tested across more prominent then the 98%.

Table 1: Accuracy Table

SVM	CNN
99.16%	99.73%

B. Precision Metrics

Precision is a metric that quantifies the number of correct positive predictions made. Precision, therefore, calculates the accuracy for the minority class. It is calculated as positively predicted ratio, examples divided by the sum of number of the positive examples that were predicted. Recall is the ratio of the number of relevant records retrieved to the total number of relevant records in the database. It is usually expressed as a percentage. The results are shown in Table 2.

Precision =   TP/ TP+FP

Recall =   TP /   TP+FN

F1 Score =   2*(Recall*Precision)   / Recall+Precision

Table 2: Performance metrics

Units	SVM	CNN
Exactness	98.08	98.50
sensitivity	98.01	98.50
F-Score	98.07	98.50

C. Testing at Real Time

An interactional Graphical user interface is intended to the proposed System in the (Fig.4) user will be enabled to sign up in the registration page so that he can later on remember his credential and login when required.

Fig 3: System GUI

It consists of five module named as Predict Sign, Translate speech, Create Signs, the detail of developers, exit. Snapshot of the proposed system of real time video gesture recognition is provided Fig 3.

Fig 4: The proposed System snapshot

The alphabet and digit are predicted by the Predict Sign module.

V. CONCLUSION

An decent method which is used to recognise the sign and also to classify them which comprises of digits (from 1 to 9) and the alphabet(from A to Z) utilizing Convolutional Neural network as well as the Support Vector Machine which can be used as to   displayed enclosed in paper. A fundamental objective inherited by us is to work towards providing recognition system for the real time usage in the framework that is utilized from any place. It's seen to be accomplished with the development of personalised dataset. Framework is has been found to be succeeded in training it with the thirty six static letter sets as well as numerals amidst exactness about 97-99%. Future work, optimization of an algorithm would posses the focus of development. New module can be added such as gesture recognition which can predict facial emotion & gesture action. It can be scaled up to android /IOS application data collected could have extended also for including many more different type of sign including the newly updated sign in the sign language an approach towards including the other countries signs can be made as a sign of improvement in the future coming work or researches. Subsequently accomplishing better system to implement the real time system on any device. Gestures with a single action could eliminate the collective noun and also eliminate the time taken to process single word at a time.

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Vehicle and Pedestrian Detection using Deep Learning

Amal Nedumookkan Kandy[1], Sidharth V V[1], Sreelal V[1], Soorya Punnakkal Pavanan[1], Raghavendra G S[2]

[1]Department of CSE, Yenepoya Institute of Technology, Mangalore, Karnataka, India
[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Mangalore, Karnataka, India

ABSTRACT

The precision and clarity of human vision weakens at night, making objects or people more difficult to detect while driving. Which increases the risk of getting in an accident at night. To reduce the accidents that happen at night, an efficient and cost- effective method is necessary. This new method makes accurate pedestrian detection system that can operate within a moving vehicle to protect both the driver and pedestrians from accidental collisions at night. In the present work we proposed a Popular deep learning- based approaches using convolutional neural networks CNNs, such as YOLO and SSD, which will automatically learn to detect objects within frames. Our project is focused on a vision-based approach to detect vehicles and pedestrian in real-time videos by, using fast convolutional neural network. The developed YOLO- model is trained with the different data to detect vehicles and pedestrians, and the model also measures the distance to the detected objects. The deep-learning learning process combats overfitting and increases the speed and accuracy of model. With this method we were able to achieve a 97% accuracy in detecting pedestrian & vehicle.

Keywords-- yolo; deep learning; night; pedestrian detection; vehicle detection; real time;

I. INTRODUCTION

Recognition of vehicles and pedestrian are challenging even for human eye at night time. According to the report of Ministry of Road Transport and Highways, during night time driving is generally 3-4 times more hazardous as compared to daytime.

TABLE 1. ROAD ACCIDENTS AT NIGHT

Time\Year	2016	2017	2018	2019
18:00-21:00	84,555	85,686	86,986	86,452
21:00-24:00	50,970	49,567	49,162	48,370
00:00-03:00	25,976	25,050	25,407	23,573
03:00-06:00	29,944	27,580	26,571	25,187

(Source:https://morth.nic.in/sites/default/files/RA_Uploading.pdf)

Above table demonstrates that a number of the accident is very high at night time even if the traffic is very less. If we take accidents to traffic ratio the statistics of night time is quite frightening. According to the report, pedestrian accidents are of 25% of all accidents and over half of their death takes place during night time. To increase the safety of the night time traffic some automotive industries introduce modern solutions. The

fascinating solution in this field is a night vision system. It helps the driver by enhancing the driver nighttime observation ability. However recent Uber nighttime accident that kills a pedestrian challenges the accuracy of innovation in the field of nighttime detection.

Our work currently focuses on Indian road conditions. The detection of vehicle and pedestrian are very challenging in case of Indian roads as compare to developed countries roads. In case of Indian roads, there are many challenges such as inaccessibility of street lights, low visibility due to pollution, fog and smog, driver fatigue, unskilled drivers, unavailability of nighttime lane indicators, disgraceful behavior of pedestrian, wrong side overtaking and so on. So, executing isn't sufficient for the algorithm to run, we have to modify the algorithm using certain methods for better precision. As compared to works done till date, cost of using a thermal vision camera is very high. If we consider countries like India where everybody cannot afford these high-cost solutions so instead of using thermal vision camera we have to find a better alternative which is low cost but with high accuracy ie. Night Vision Cameras. Getting 100% accuracy in the night time is still challenging. Consequently, all such factors must be considered to construct a precise nighttime vehicle and pedestrian detection method.

II. RELATED WORKS

Pedestrian and Vehicle Detection Using Night-Vision Camera through CNN on Indian Roads (2018)- In the present work, Convolutional   Neural Network (CNN) based mostly changed Single Shot Multi-Box Detection
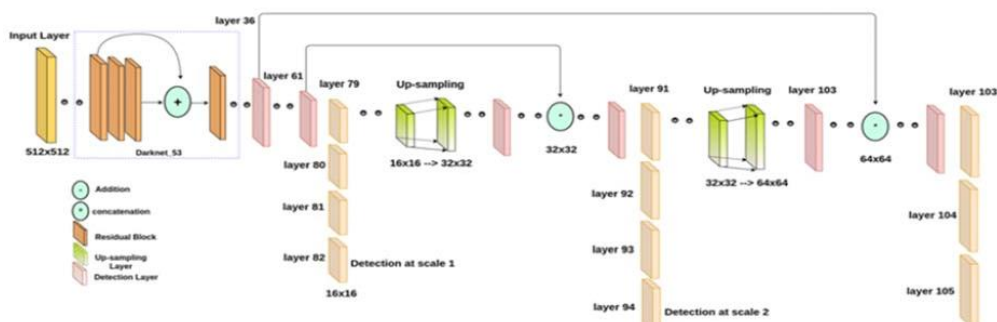

Fig 1.1 YOLO V3 Architecture

(SSD) methodology to spot the pedestrian and vehicles in the   dark   time   utilizing   night-vision   camera. They enforced certain filters as pre-treatment of sample videos (29fps, 1080p) before implementing the algorithmic program to enhance preciseness. They also used a GPU, monitor and a camera 2020 International Conference for Emerging Technology (INCET)Belgaum, India. Jun 5-7, 2020 Proposed an economical object detection module victimization fusion of thermal and visual pictures. They implemented MRCNN algorithmic rule for object detection of already dark pictures victimization thermal pictures and ascertained that MRCNN suffers from insufficient options extracted from it. For the objects having vasoconstrictor, it provides poor data.

Global Journal Of Engineering Science And Researches ISSN- Image enhancement and object recognition for night-sight surveillance. The image is taken in low light condition using an Infrared Camera and therefore the image is increased to get a picture with higher distinction victimization   totally   different   enhancing

algorithms. They also used the radial and tangential distortion parameters to undistort the image. These parameters square measure won't correct the bulging impact. AHE- adaptational histogram equalization and CLAHE are used.

ICTACT Journal on image and video processing, volume:03, issue:02- Motion based object detection and classification for night surveillance. The first technique designated divides the image into regions. Longer vertical length of the region is chosen as height of the body, therefore eliminating the necessity for merging regions The second proposed technique finds the center of mass of the item, therefore locating close objects additional simply and exactly and proves to be additional precise.

III. PROPOSED METHODOLOGY

We using a employing a Convolutional Neural Network primarily based Single Shot Multi-box detection algorithmic program for detection of vehicle and pedestrian. First off pre-treatment of the video is going to be carried out before implementing the algorithmic program. Single shot multi-box detection is that the technique supported a pre-trained model for object detection. It's a based on a deep neural network that doesn't resample pixels and it's very precise than alternative strategies.
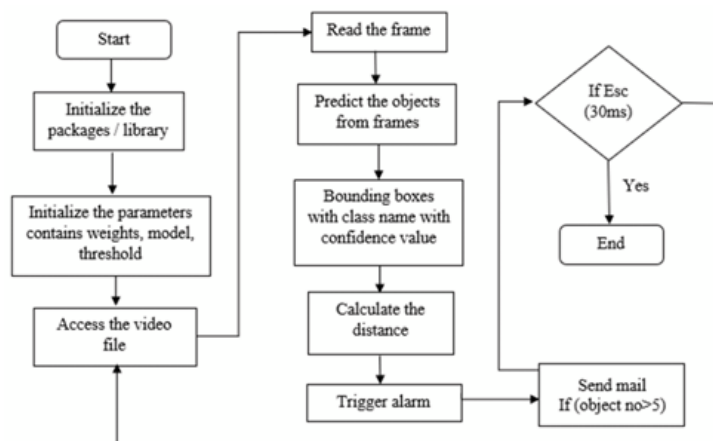

Fig 3.1 System design

A. Vehicle detection

In the world of image processing, recognizing a vehicle from an image has been a risky situation. The issues encountered were the state of the vehicle approaching from sides are hard to detect. Before detecting the vehicles in the frame, several image processing steps were done to the video sequences, and it was discovered that the properties produced using various methods employing the information included in the image itself provide a lower detection rate for vehicle detection. Deep learning algorithms such as CNN have recently taken on vehicle detection, and they are identical to hand-crafted features. When compared to other deep networks like CNN, fast R-CNN, and YOLO, the faster R-CNN increases the recognition rate of vehicles. We used footage from dash cam and mobile camera. We then use open-CV source python code to detect objects (based on faster R-CNN), and if the system detects the presence of a vehicle, it first examines the vehicle then the distance from the vehicle. The relevant section from the frame is then removed and further examinations are performed.

Fig 3.2 Vehicle detection

B.   Pedestrian detection

We identified the required frames from the images (utilizing faster R-CNN). If the model detects the pedestrian's proximity, a bounding box is created around it. This zone is then removed from the current frame and sent to the image classifier for later processing (image acquisition, image restoration, linear filtering, and so on). The image classifier separates the test picture from the captured frame and assigns it to one of two objective classes. A pre-trained model could distinguish humans or things such as horses, and chairs using a faster R-CNN. It consistently recognizes the pedestrian in a variety of environments.

Fig 3.3 Pedestrian Detection

C.   Alert system

Here, the text-to-speech (TTS) method is used to alert the driver during detection. The program takes number of vehicles detected as input text from the user, and using methods of natural language processing understands the linguistics of the language being used, and performs logical inference on the text. This processed text is passed into the next block where digital signal processing is performed on the processed text. Using many algorithms and transformations this processed text is finally converted into a speech format. This entire process involves the synthesizing of speech that gives an alert to the driver. Below is a simple block diagram to understand the same
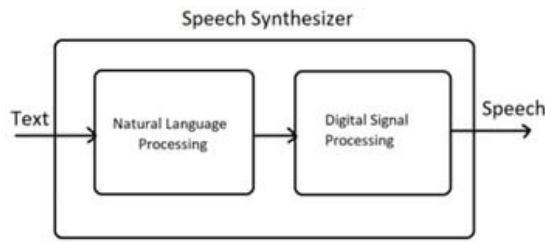
Fig 3.4 gTTS model

D. Email alert

We have also implemented an e-mail system for the driver, which sends a mail if the program detects a specific count of vehicles or pedestrians. This is achieved using SMTP protocol, where client session object that can be used to send mail to any Internet machine with an SMTP or ESMTP listener daemon. By this the alert system keeps track of the objects detected. And the driver or the receiver can access this information anytime.

IV. RESULT

Fig 4.1 Detection of Pedestrian and vehicles

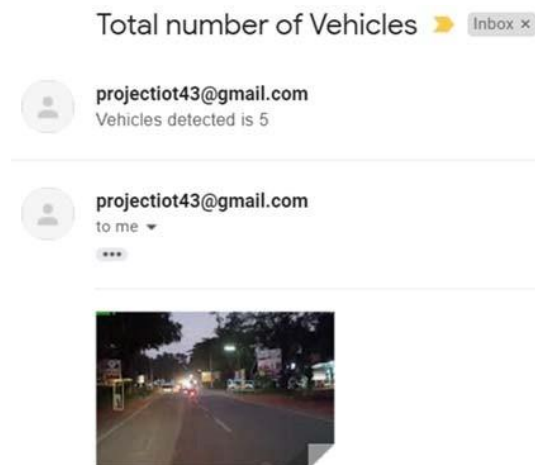The algorithm detects the objects without any issue in darker region.

Fig 4.2 The email send to receiver's mail id

V. CONCLUSION

In this paper we have presented object detection algorithm for pre-processing the images. Our system can effectively detect pedestrian and vehicle during night- time on roads with an overall accuracy of 92.28% despite several challenges. Our main aim is to develop a system which offers low cost solutions and alert system for pedestrian and vehicle detection which can be further used in the developing countries and save millions of lives. The e-mail send by the program creates an image as backup of the footage in Gmail, that provides the receiver with evidences if required in the case of any accident. In the future despite everything we still need to consider environmental factor to optimize system performance and make it more useful in the coming time.

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Malicious URL Detection using Deep Learning

Kaushik S Nayak[1], Prajwal[1], Prasad Nayak[1], Sumanth P[1], Guruprasad G[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India
[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Karnataka, India

ABSTRACT

A very common method for delivering malware to potential targets is to host it at a particular URL. Instead of sending malicious attachments, the attacker embeds malicious links in the spear phishing e-mails for distribution to the target audience. They host indefensible content and tempt incautious users to become victims of scams and result in huge financial loss. Malicious URLs are also used to trap the private information of the people. Intruder uses email, web search or links from other websites, advertisements to drive the users to malicious sites. On clicking the link, user's browser is directed to the malicious domain created by the attacker to gain information about the user. It is important to note that websites can also be compromised, which can lead users to click on malicious URLs online and provide sensitive information directly to fraudsters. Prevailing phishing scams have caused serious network security problems. The cyber attackers are able to disguise their malware in various forms, making it easier to steal personal identity and property. This paper proposed an inventive approach to detect malicious URLs by employing a Bidirectional Long Short-Term Memory (B-LSTM) network.

Keywords— malware, phishing, deep learning

I. INTRODUCTION

URL is the abbreviation of Uniform Resource Locator, which is the global address of any resources on the World Wide Web. Malicious URL is a link created with the purpose of promoting attacks, scams and frauds. Attacker uses any form of medium to attract users, such as adding persuasive ads or pop-ups in social network services, embedding fake links in emails or compromising an authentic website. Attacker use any form of medium to attract users, such as adding persuasive ads or pop- ups in social network services, embedding fake links in emails or compromising an authentic website. By clicking on an infected URL, you can download virus, trojan, or any other type of malware that will bargain your system or even your network, in the case of an organization. Malicious links may also be hidden in believably safe download links and may spread quickly through the sharing of files and messages in sharing networks. Information security has become a trendy subject since many people have suffered from leakage of personnel information. The research on identifying malicious URLs has been carried out widely in recent years. Using blacklisting to detect malicious URLs is a fast and effective method. As new URLs emerge daily and to break through the drawbacks of blacklisting method,

researchers have tried to sort out this detection problem through the use of machine learning. Since machine learning uses feature engineering, the selection of features has become increasingly difficult. Deep learning can extract and learn features from the most primitive inputs and can be more flexible in adapting to more complex attack behavior. In this paper, we propose a deep learning based model Bi-LSTM for malicious URL detection. Deep Learning uses layers of stacked nonlinear projections in order to learn portrayal of multiple levels of abstraction.

II. RELATED WORK

This study gives a brief overview of the existing detection technology of malicious URLs and the development of attention mechanism in this section.

Studies on URL detection have gone through three main stages: blacklist method, traditional machine learning method, and deep learning-based methods. Prakash [1] improved blacklist technology and built a system called PhishNet. By analyzing the structure and similarity of URLs in the blacklist, PhishNet can find out the malicious URLs. But the method relies on the size of the original blacklist, and as the blacklist gets bigger, updating new rules manually was required. Bo Sun [2] built an automatic blacklist generator (AutoBLG) by adding prefilters to ensure that the blacklist is always valid. Various machine learning methods have been used on malicious URL detection. MA [10] proposed a classifier by using the vocabulary feature and the host information of URL, which can adapt to changing new features of the malicious URL, but the used model ignores the relationship between the order of the words, and cannot capture the relevance of words before and after. Sang [11] extracted new features such as the length of redirected link length from the behavior of URL redirection, and built a real-time URL detection system by using logistic regression classifier. Lin [12] proposed a segmentation model that quickly calculates malicious URLs by constructing a 3-g inversion index as a term. This method uses a random domain name recognition technology based on Jaccard to determine a malicious URL generated by a random domain name. However, it is not perfect to detect malicious URL containing a random domain name by simple Jaccard index.

III. PROPOSED METHOLOGY

In this work, we propose a model Bi-Directional LSTM with attention mechanism for malicious URL detection. A bidirectional LSTM (Bi-LSTM) layer learns bidirectional long- term dependencies between time steps of time series or sequence data. These dependencies can be useful when you want the network to learn from the complete time series at each time stage. The Bi-Directional LSTM composed of five layers: the input layer, embedding layer, Bi-LSTM layer, attention layer, and output layer. Before the output layer, we train the URL sequence and adopt drop-out strategy.
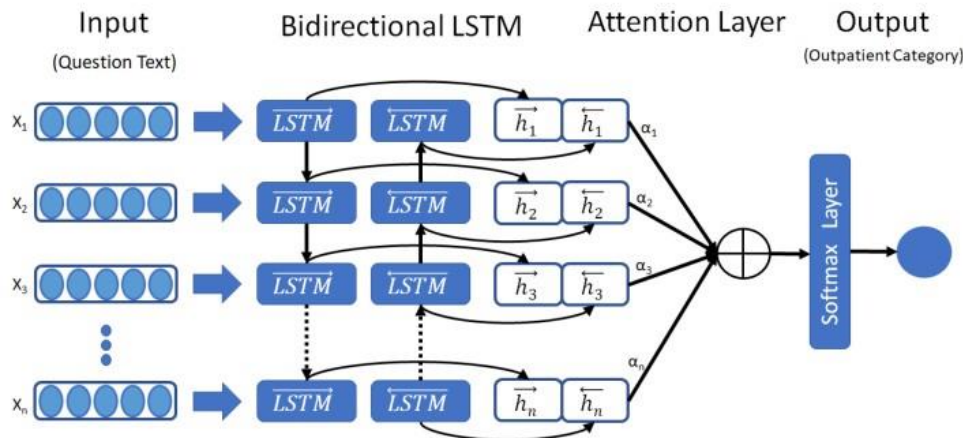
Fig. 1 Architecture of Bi-Directional LSTM

A. **Input layer :** An URL is composed of a sequence of characters. Since the protocol " http/https " and "www" part of an URL has little impact on differentiating between normal URLs and malicious ones. That means these protocols don't contribute in classifying an URL and hence we remove the two parts first.

B. **Embedding layer :** The preprocessed and tokenized URL is then broken down into whitespace-separated words and symbols, and a URL can be regarded as a sentence made up of them. The input sequence accepted by neural network model is fixed length vector and the URL is a word sequence. Hence it is necessary to introduce sequence vectoring.

C. **Bi-LSTM layer :** In order to capture the long-distance dependence information within the URL sequences and solve the problem of bias of RNN on extracting deep semantic expression, we use the Bi-directional LSTM (Bi-LSTM) to model the URL sequences based on word vector representations. In the Bi-LSTM architecture, there are two layers of hidden nodes from two separate LSTMs. With this form of generative deep learning, the output layer can get information from past (backwards) and future (forward) states simultaneously.

D. **Attention layer :** We apply the attention mechanism to capture relevant features from the output of Bi-LSTM. This is crucial for prediction and required to attend over while reading the input sequence and collecting to a representation in the cell state.

E. **Output layer :** The output of the dense layer is then given into the second dense layer with 1 hidden neurons, then we feed the attention vector after dropout into a softmax function.

IV. SYSTEM DESIGN

We aim to use Deep Learning for Malicious URL Detection, in order to directly learn representation of the raw URL string, without using any hand designed expert features. The input URLs may consist of malicious and benign websites. A URL is malicious if the corresponding website content is malicious or any of its redirects leads to a URL that corresponds to malicious content, otherwise, it is benign. In this, the terms malicious URLs and malicious websites are used interchangeably.
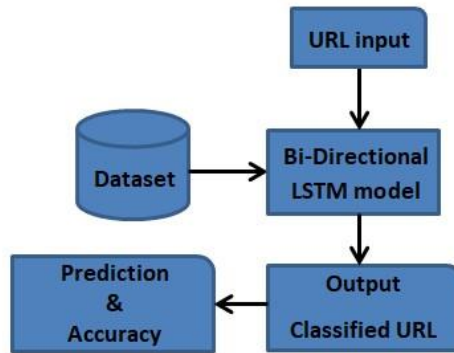
Fig. 2 URL classification system

We replace the last Fully Connected convolution layer by Bi- directional LSTM model to maintain the sequence information of URL and classified it. Our requirement are both, CNN model extract the unlabeled features from URL and Bi-LSTM model keeps the sequence information, since every URL followed some standard sequence. Dataset consists large number of URLs each labeled with either 0 or 1 where 0 represents safety URL and 1 represents malicious URL. Input URL is taken from front-end broker. After feature extraction this URL is fed into Bi-LSTM model. Initially, Bi-LSTM model is trained using URL dataset. The output from Bi-LSTM model is used to classify the nature of the input URL.

V. IMPLEMENTATION

To solve the above-mentioned problems, we introduce a deep learning system to detect doubtful URLs. The goal is to make a system using a prediction model that can be trained and fitted to detect new and established malicious web links. The system consists of the following modules - data collection, feature extraction, training, prediction. In our experiments, we considered TensorFlow in conjunction with Keras as software framework. By constantly adjusting and optimizing the parameters in our experiments, the most effective hyperparameters are set.
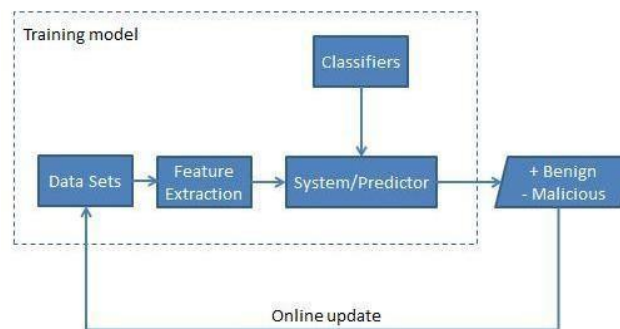

Fig.3 Implementation

The set of data is extracted from the web and assigned with a label for each. The data set is then pre-processed. Records having missing values are removed. We Check if all the records have a labeled class. A spoof URL and its webpage have many attributes that can be distinguished from a malignant URL like- an attacker can register for the lengthy and confusing domain to cover the actual name of websites. There are cases where the attackers instead of using domain names use direct IP links. There are many types of attributes that are used in deep

learning techniques for the detection method. There are 2 attribute- URL & Class. The implemented system uses Bi-Directional LSTM algorithm to classify the URL like malicious or non- malicious and then we can get the accuracy. The dimension of the word embedding vector was set to 100 in the embedding layer. The neural models were trained using a batch size of 128 on the training set. The number of hidden layer nodes in Bi-LSTM model was set to 128. RMSProp was employed as an optimization algorithm. The dropout rate was set to 0.2. There are several baseline methods including feature-based LR model, LSTM model, Char AB-Bi-LSTM model, and AB-LSTM model.

In order to evaluate the performance of the models, we used a n-fold cross-validation strategy over the dataset. First, the dataset is split into n folds, then the n-1 folds are trained and the remaining one is used for verification. This process uses each fold for validation once and is repeated ten times. Finally, all the metrics on validation folds are averaged and a better estimate of the performance is achieved.

Bi-LSTMs are good at temporal or otherwise sequential data. Could be letters or words in a body of text, stock market data. LSTMs are a variety of RNNs that allow for controlling how much of prior training data should be remembered, or more appropriately forgotten. CNNs could learn useful structural information in text from raw values of word or character embedding. In this model, CNNs are used to learn structural information about the URL. Specifically CNNs are applied at both the character-level and word- level. After getting features from Character-Level embedding, Word-Level embedding and some manually selected characteristic features. We concatenate all together and give input to the Bi-LSTM model to keep the sequence information of URL.

VI. RESULT

The comparisons of accuracy, precision and epoch score of the methods are displayed in Figure 5. For the accuracy and precision measures, on average, the Bi-LSTM model was 3% higher than the feature-engineer model with LR. The F1 score of Bi-LSTM was 6.5 % higher. The recall is nearly 10% higher than the LR model. On the one hand, the feature based model relies on other natural language processing (NLP) tools, the accumulated bugs have a great impact on performance and the effective feature extraction is insufficient. On the other hand, external semantics such as word frequency have limited effects on the malicious URL detection task, while neural networks can encode semantic information into high dimensional hidden feature space and extract more features.
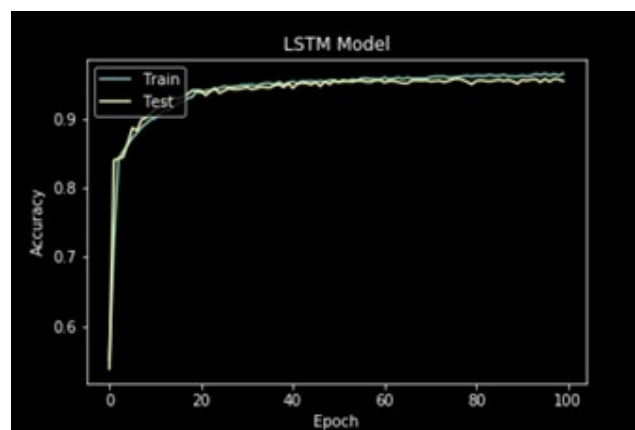

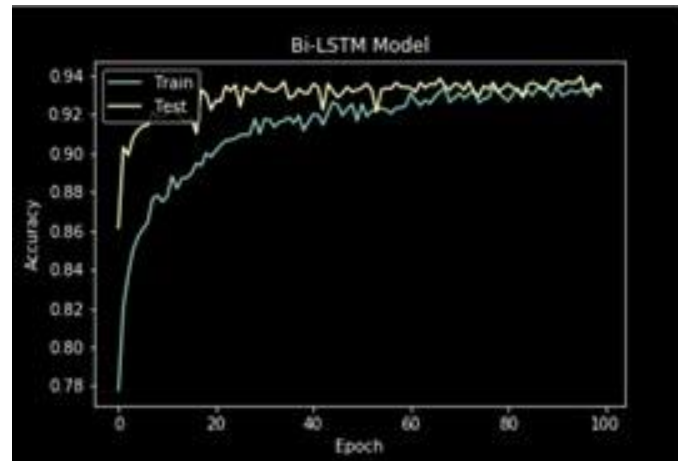Fig. 4 Accuracy vs epoch in LSTM model

Fig. 5 Accuracy vs epoch in Bi-LSTM model

Compared with the LSTM model, the F1 value of Bi-LSTM model is 4 percent higher. The Char- Bi-LSTM model also has higher accuracy and F1 score than Bi-LSTM model. This is because the Bi-LSTM model and Char Bi-LSTM model combines the advantages of Bi-LSTM and attention mechanism, which can capture the long-distance dependence information within the URL sequences and give relatively large weight to important features through the attention mechanism at the same time. Compared with the Char Bi- LSTM model, the F1 value of Bi-LSTM model is 2 percent higher. And the recall is 5 percent higher. Since the two models differ only in the embedding layer, the Char Bi-LSTM model use character level embedding while the Bi-LSTM model adopted word level embedding. However, there is still a big gap between character embedding and word embedding models, which could come from the fact that we used pre- trained word embedding, and that helps improve the performance. Since the word vector generated by using the pre-trained Word2vec can acquire a better representation of the context information of the URL, This indicates that the word embedding methods effective for the malicious URL detection task.

VII.   CONCLUSION

In this work, we proposed the Bi-LSTM model for malicious URL detection. The model learns the features automatically and uses the attention mechanism to capture the abnormal segments of the URL sequences. The results of the experiments demonstrate that the Bi-LSTM model outperforms traditional machine learning methods such as LR model and neural network methods such as LSTM and Char Bi-LSTM model. Moreover, the experimental results also prove that attention mechanism can achieve greater promotion to the accuracy of the malicious URL detection task.

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Recognition of Flower Species using CNN and Transfer Learning

Rasil KV[1], Ashwin S Kumar[1], Mrs. Akshatha Dange[2]

[1]Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India
[2]Assistant Professor, Department of CSE, Yenepoya Institute of Technology, Moodbidri, Mangalore, Karnataka, India

ABSTRACT

This Flower classification is a challenging task due to the wide range of flower species which have similar shape, appearance or surrounding objects such as leaves and grass. In this paper, we propose a novel two-step deep learning classifier to distinguish flowers of a wide range of species. Firstly, the flower region is automatically segmented to allow localisation of the minimum bounding box around it. The proposed flower segmentation approach is modelled as a binary classifier in a fully convolutional network framework. Secondly, we build a robust convolutional neural network classifier to distinguish the different flower types. Our classification results exceed 97% on all datasets which is better than the state-of-the-art in this domain.

Keywords—Deep Learning, Artificial Intelligence, Convolutional Neural Networks, Transfer Learning, Flower Recognition

I. INTRODUCTION

Flower species recognition remain a challenge in Image processing and Computer Vision community because of vast existence, complex structure and unpredictable classes in nature. It is highly undesirable to perform normal segmentation or feature extraction or combining shape, texture and color features which results in moderate accuracy on benchmark datasets. Although there are some techniques in classifying flowers ,there is a need for robust and efficient system to identify recognize flower species in a complex environment. In most cases, some of the questions are related to internal structure that can only be made visible by dissecting the flower.which is not possible by simple human visual object classification. So for these all, we need a model or a system that able to process and memories these large amounts of flower species data and can be trained easily and through which these above problems can be solved. We can develop these models with the help of image processing, where content-based image indexing techniques are used to analyze and describe images based on their visual content and appearance. Those techniques can provide the necessary tools, such as color, shape, and texture features, describing the visual appearance of flowers

II. LITERATURE SURVEY

Here we have presented the review of our working related area of flower classification and also present the methods used for to classify the flower images.

1. Fadzilah Siraj, Muhammad Ashraq Salahuddin and Shahrul Azmi Mohd Yusof proposed the system for classification of Malaysian blooming flower[4]. In this paper they presents the application of NN and on image processing particularly for understanding flower image features. For predictive analysis, they have used two techniques namely, Neural Network (NN) and Logistic regression. The study shows that NN and on image processing particularly for understanding flower image features. For predictive analysis, they have used two techniques namely, Neural Network (NN) and logistic regression. The study shows that NN obtains the higher percentage of accuracy among two techniques. The Otsu's method was applied in order to compute a global threshold.The image is then converted to RGB color space again. In color extraction, the images were transformed from RGBcolor space to HSV color space the image texture is calculated based on gray-level co-occurrence matrix (GLCM) to obtain the contrast, correlation, energy and homogeneity of the image.The prediction accuracy of logistic regression is 26.8%. Therefore based on 1800 samples of Malaysian flower images, NN has shown a higher average prediction results vs. logistic regression.

2. Pavan Kumar Mishral, Sanjay Kumar Maurya, Ravindra Kumar Singh and Arun Kumar Misral present a semi automatic plant identification based on digital leaf and flower images[5]. They proposed an algorithm for identification using multiclass classification based on color, shape volume and cell feature. Each stage further also divided into three steps. First stage comparison based on extracted features from RGB component. Second stage based on shape feature Area Convexity, Perimeter Convexity, sphericity and Circulatory. And last stage based on cell and volume fraction feature. Experiment is performed on a sample of diverse collection of 1000 leaf and flower and recognition rate is up to 85% on an average. In proposed system entire feature cannot be taken at a time because it will take lot of time for computation and space. So multi stage comparisons are used for identification of image.Its multi stage comparison so required more tables to stored results and its long process. They used Unsupervised learning algorithm which has less accuracy as compared to supervised classification algorithm.

3. Tanakorn Tiay, Pipimphorn Benyaphaichit, and Panomkhawn Riyamongkol proposed flower Recognition System Based on Image Processing[6].This system uses edge and color characteristics of flower images to classify flowers. Hu's seven moment algorithm is applied to acquire edge characteristics. Red, green, blue, hue, and saturation characteristics are derived from histograms. K-nearest neighbor is used to classify flowers.The system returns the top three most similar flower images.The Canny edge detection algorithm is applied to the cropped image to receive edge data. The edge data will be the input into Hu's seven-moment algorithm. Classification: All characteristic values will be classified by the K-nearest neighbor algorithm. The three most nearest flower characteristics are selected; the most nearest flower information is displayed. This system is based on color model so the accuracy is high if their color are distinct. But if colors are same then it may mislead to classify the image. So this system can be further

improved to yield more accuracy by combining other features, such as numbers of petals and flower texture. The accuracy of this system is more than 80%.

4. Prof.Suvarna Nandyal, Miss.Supriya Bagewadi proposed Automated Identification of Plant Species from Images of Leaves and Flowers used in the Diagnosis of Arthritis[7].The present work deals with identification and classification of medicinal plants that are used in treatment of rheumatoid.In the present work, plant parts mainly leaves and flower are taken as an object for identification, since these are available for all the time and have some 2D in nature size and shape.The proposed work deals with image processing techniques such as feature extraction and classification. The features namely height, width, margin and texture features are used for extracting leaf shape features. Similarly for flowers, the petal count and colors are extracted in RGB and Ycbcr color space. The obtained features are trained by neural network classifier. The classification results have shown an accuracy of 85% for leaf and 85% for flower. The present work deals with development of a system where a user in the field can take a picture of unknown plants, leaf and flower and the system to classify the species. In the proposed work, shape and texture features of sample plant images of five classes are used in the rheumatoid are extracted. Further the accuracy can be increased by taking an efficient shape features in frequency domain. The work can be extended by taking more features and other classifier.

5. Yuita Arum Sari and Nanik Suciati proposed Flower Classification using Combined a* b* Color and Fractal based Texture Feature[8].This research proposes a new method of flower classification system using combination of color and texture features.The first phase is getting the crown of the flower, which is localized from a flower image by using pillbox filtering and OTSU's thresholding.The color features are extracted by removing L channel in L*a*b* color space, and taking only a* and b* channel, because of ignoring different lighting condition in flower image. The texture features are extracted by Segmentation-based Fractal Texture Analysis (SFTA). Classification is done using kNN classifier.KNN classifier is used to assess similarity among image flowers. Cosine measure outperforms to all distance measures under k = 9.The combined a*b* features and texture gives the better performance when using cosine measure, than using L* color channel when combined with texture feature. The flower classification achieves the best result with accuracy 73.63%. Comparing the colour feature extraction, the accuracy of texture feature is better to stand alone, and help the performance to achieve the accuracy when all features combined with combined a*b*colour and texture feature. Beside the distance, choosing of k value in kNN method is quite critical. In this paper, the accuracy will be poor if the colour feature extraction independently used for classifying flower. Removing L, give the bad result for colour feature performance when the feature classifies in stand-alone. The proposed model is sufficient to overcome the image flower classification in different lighting condition and color in the same class.

6. M. Z. Rashad1, B.S.el-Desouky2 , and Manal S .Khawasik proposed Plants Images Classification Based on Textural Features using Combined Classifier[9].This paper introduces an approach of plant classification which is based on the characterization of texture properties. They used the combined classifier learning vector quantization. All plant images they use in their system are in 128×128 resolution. A learning rate is user-designated in order to determine how much the link weights and node biases can be modified based on the change direction and change rate. The higher the learning rate (max. of 1.0) the faster the network

is trained. If no. of epochs increases the accuracy increases. If learning rate increase the more accurate but the more time. It shows that accuracy is 98.7% compared to other systems. The system has an advantage of its ability of classifying and recognizing the plant from a small part of the leaf without depending neither on the shape of the leaf or on its color features, since the system essentially depends on the textural features. Hence, the system is useful for the botany researchers when he wants to recognize a damaged plant, since this can be carried out depending only on a small part of the damaged plant.

III. METHODOLOGY

The proposed flower recognition system is implemented by developing a convolutional neural network which is a very efficient model for image classification. CNN models are trained by initially feeding a set of flower images along with their labels. These images are then passed through a stack of layers including convolutional, ReLU, pooling and fully connected layers. These images are taken as batches. The model was trained using 150 epochs. Initially the model extracts small features and as the training process progresses more detailed features will be extracted. Most of the preprocessing is done automatically which is one of the major advantages of CNN. In addition to that input images were resized.
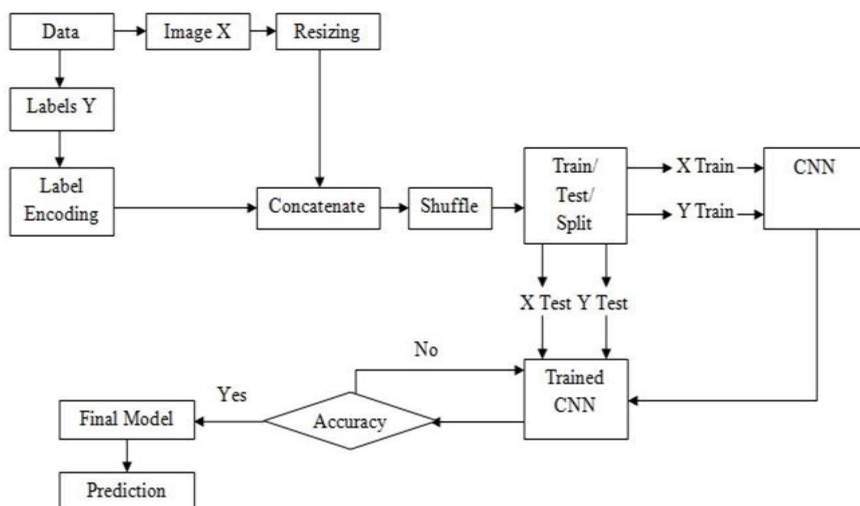

FIG : BLOCK DIAGRAM

IV. PROPSED SYSTEM

Figure shows the proposed system overview. The user captures a flower image using smartphone (assuming the flower as the only object in foreground with some random background).
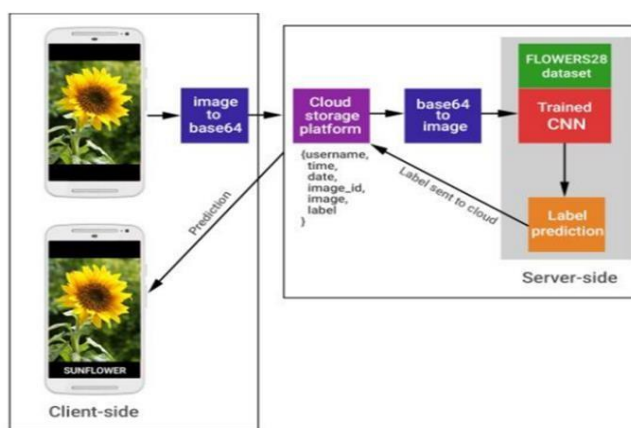
FIG : PROPOSED SYSTEM

The captured image is then converted to a base64 string format. It is then sent to a cloud storage platform called "Firebase" where it gets stored in a JSON format (username, time, date, image_id and image). At the server side, the trained CNN system on FLOWERS28 dataset receives the recent flower image in base64 format and converts it into a standard matrix form for processing. The converted image is sent to the CNN where its output class label is predicted. After prediction, the label name is sent to the same username with same image_id, from where the smartphone receives an automated response of the flower name from the cloud storage platform. This entire process of acquiring an image and getting the predicted label of the image takes around 1s tested with Moto G3 android smartphone running with a snapdragon quad-core processor and 2 GB of RAM.

V. SOFTWARE AND HARDWARE REQUIREMENT SOFTWARE REQUIREMENT

One programming languages are used to build the proposed system. Python 3.7 lang is used to build the CNN subsystem. The transfer learning from OverFeat network is developed using sklearn-theano library provided under Open source, commercially usable-BSD license. Simple, modular and efficient deep learning python library called "Keras" is used to implement Inception-v3 and Xception architectures.The cloud storage platform used to store the base64 format of input image is called "Firebase" which is owned by Google.

HARDWARE REQUIREMENT

Processor   :   INTEL Core i3
RAM   :   4GB Hard Dsik
Drive   :   50GB

VI. RESULTS AND DISCUSSION

The overall flower species recognition problem is divided into three parts. Firstly, features from the images in the training dataset are extracted using OverFeat CNN network (from FC-4096 i.e. 7th layer) and indexed into a

HDF5 file format. Secondly, the network is trained using various machine learning classifiers such as Bagging trees, Linear Discriminant Analysis, Gaussian Naïve Bayes, K Nearest Neighbor, Logistic Regression, Decision Trees, Random Forests and Stochastic Gradient Boosting. Finally, random test images are given to the network for label prediction to evaluate the accuracy of the system. It is observed that the system correctly identifies flower species with a Rank-1 accuracy of 82.32% and Rank-5 accuracy of 97.5% using Logistic Regression as the machine learning classifier on FLOWERS28 dataset. The FLOWERS28 dataset is split into 1680 training images and 560 testing images. Figure 6 shows the accuracy obtained by training different machine learning classifiers on the CNN extracted features from the training images. It could be noted that bagging trees, logistic regression and random forests achieves a Rank-5 accuracy of 92.14%, 97.5% and 94.82%, respectively.
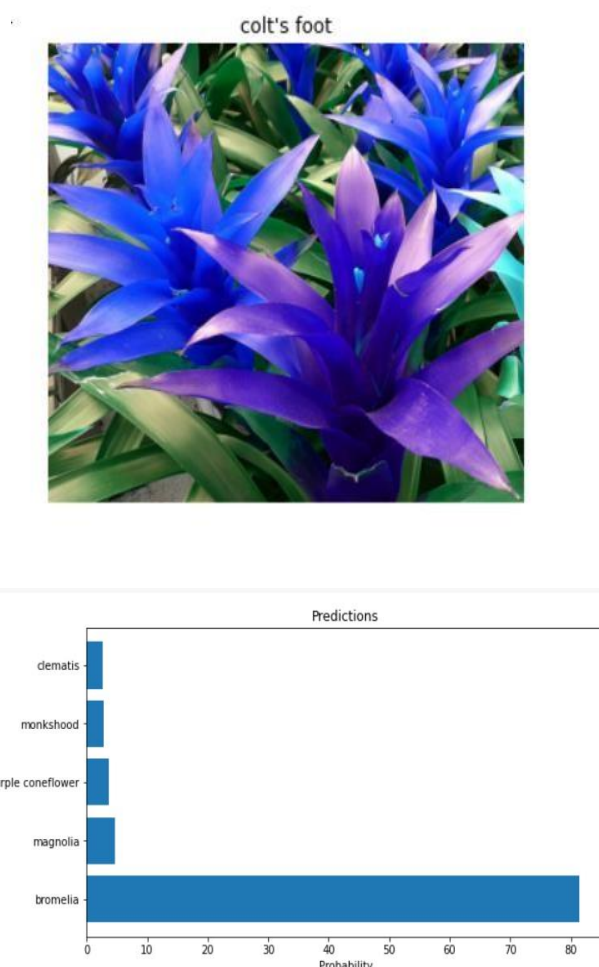

FIG : PREDICTION OF FLOWER

VII. CONCLUSION

In this work we have taken several papers under consideration for survey and describe a general model for flower recognition. For classification we notice that in many paper they took multiple feature attribute like shape, color, texture combinely with different feature extraction method and found improvement on

performance by taking multiple feature than single feature . So here we conclude that It is good to take multiple feature but it also very much important to choose the right set of features for the particular problem based on the characteristic of the problem and training dataset.

VIII. FUTURE WORK

The proposed work is a faster way to train a Convolutional Neural Network (CNN) with a smaller dataset and limited computational resource such as CPU. Thus, the future work would be to construct a larger database with not only flower images, but also with leaves, fruits, bark etc., collected from different sources around different parts of the world. This system would also be useful to identify plants for medicinal purposes such as in case of first aid. The crucial part in building such a system is the training dataset which needs to be prepared either by manually taking pictures of the plants around the city or by using public datasets.

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Smart E-Line Monitoring System Using IoT

Deeksha K R[1], Aleema Mehshina[2], Khathija Yusra[2], Mohammed Thayib N[2], Nisha Medona DSouza[2]

[1]Assistant Professor, Department of Information Science and Engineering, Yenepoya Institute of Technology, Mangalore, Karnataka, India

[2]U.G. Students, Department of Information Science and Engineering, Yenepoya Institute of Technology, Mangalore, Karnataka, India

ABSTRACT

Transmission lines are used to transmit power to large load centers in remote areas. These lines can fail as a result of natural disasters, short circuits, equipment failures, operator mistakes, human error, overload, and aging. To avoid this situation, you need the exact location where the error occurred. This problem is solved by a series of resistors that represent the length of the cable in KM and the distance and phase displayed on the LCD connected to the microcontroller. The readings are updated on the PC and monitored using an IoT-based application that is used as a reference for the date and time when the event occurs.

Keywords- IoT, WiFi module, Transmission line, node MCU.

I. INTRODUCTION

Energy systems are divided into energy generation, transmission and distribution. The power system is considered one of the most important parts of the energy system.Connect supply and demand. Today, the power infrastructure is extremely vulnerable to various forms of naturaland physical events that can affect the overall performance and stability of the system. Power grid failures are rattle the supply of electricity to consumers. Therefore,error detection and elimination in the transmission network needs to be done very quickly.

On other hand, there is much need to equip the aged transmission line infrastructure with a high performance data communication network that supports future operational requirements like real time monitoring and fault detection control necessary for smart grid integration. Many electric power supply companies have primarily relied on circuit indicators to detect faulty sections of their transmission lines and areas. Even though the sensors, breakers and other communication line is made the system look bulkier, costly and time consuming one for fault location and clearance of the fault. However, there are still challenges in detecting the exact location of these faults and errors. Although fault indicator technology has provided a reliable means to locate permanent faults and errors, the present scenario in identification of fault is very annoying and time consuming as the technical crew and service teams still has to physically service and inspect the devices for many hours to detect faulty sections and errors of their transmission lines and then have to clear the fault, which requires a

more human effort in identifying the fault location, errors and clearing the fault. Wireless sensor based monitoring of transmission lines provides a solution for several of these concerns like real time situational awareness, quicker fault localization, correct fault prognosis by identification and differentiation of electrical faults from the mechanical faults, cost reduction due to condition of preserving rather than maintaining it everyday, etc. These applications specify stringent requirements such as fast delivery of various amount of highly reliable data. The success of these applications depends on the design of cost effective and reliable network design with a fast response time. Demand of power has been increasing extensively in region of industrial, agriculture, medical ,school and colleges. But now a days problems with transmission line are more and it is difficult to find exact location. Therefore, it is not suitable for power transmission lines because it causes a heavy loss when recognize the location of an accurate faults. The longer the troubleshooting time, the shorter the useful life of the transmission line. The latest technology is highly developed to reduce power line problems. Currently in India, the system does not notify you in real time when an error occurs. I'm worried that without a real- time system. The underlying connected device poses a threat to the people around us. To do so void such accidents as much as possible, such as transmission maintenance and verification. This leads to more staff demands. The fact remains that the original intentions have not been achieved, as line failures are often caused by unexpected rain and fallen trees. Therefore, error detection and eradication in the transmission network should be very quick and smooth. To overcome this, this project proposes power lines based on the Internet of Things. Multiple error detection and display in EB. When the current threshold is outstrip, the microcontroller immediately initiates a message and sends it to the area line engineer and control station to indicate the exact position from pole to pole. This helps to realize a real-time system and real time faults .

II. OBJECTIVES

The objective is to provide a live monitoring of electricity line to the lineman.It will show the voltage varying across the line.To detect the exact location to the lineman It helps in order to give quality service to its customer without any kindof problem.To overcome from the human hazards and nature hazards.To give direct notification to the line man by using IoT Techniques.

III. LITERATURE SURVEY

"Automatic Fault Detection and Location of Electric Transmission Lines with the help of internet of things" Sajal Menon.et.al. This process is provided in a low cost and easy to find transmission line faults and also supports data enhancement. Therefore, you can apply this procedure to detect an error and retrieve the corresponding data at any time.

"Sag Calculation Difference Caused by Temperature Difference between the Steel Core and Outer Surface area of Transmission Lines"- Gang Liu et al, This paper presents an best establishment of a cost-optimized wireless network that can transmit time- sensitive sensor data over an electrical transmission line network.

"EPRI-sponsored transmission line wind loading research & development"- Phillip G. Landers et al. In this paper, we studied how wind calculations are calculated and how wind acts on transmission lines.

"Electric line and fault monitoring identification system by using internet of things"- S. Suresh.et al. In this paper, we explored how the IoT works and is used.

Transmission Line Fault Detection System".R Navaneth Krishna, This paper proposes a fault detection system using Arduino to save lots of time find the miscellaneous location.line failure monitoring is extremely important because delayed recovery can cause losses, deluge failures, and ultimately power outages. Next-generation monitoring analysis and control for the longer term smart control centre," P.Zhang et al, this paper presents a vision for next- generation inspection and control potentiality for further intelligent energy system center.

This paper first gives an sketch of current command center technology then provides a vision for subsequent generation of monitoring,and control capabilities. This paper also identifies the technology and infrastructure design gaps that require to be closed and develops a road map to realize the proposed vision.The vision of the center is predicted to be a crucial a part of the intelligent power system of the longer term.

Vehbi C. Gungor, "Sensor and Network Challenges in Smart Grids", in this article, experimental measurements provide valuable insights into the IEEE 802.15.4 sensor network platform, with the WSN-based Smart Grid Application Option Guide. Mentioned design arrangement.
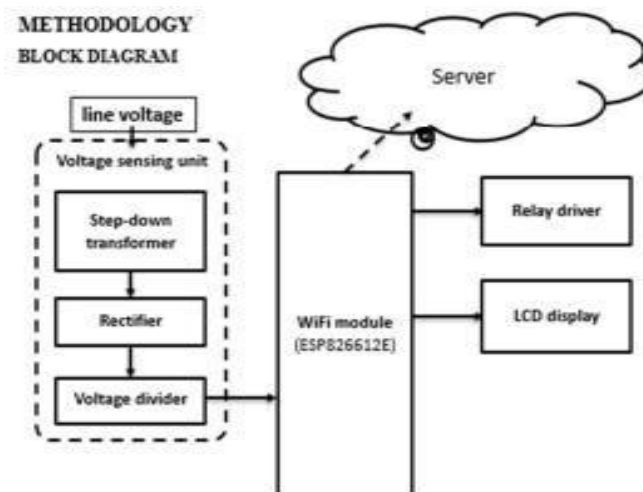
IV. METHODOLOGY

Fig3.Methodology design

Transmission line

A transmission line is used for the transmission of voltage from generating base station to the various distribution units. It transmits the voltage and current from one end to another end. The transmission line is made up of a conductor having a uniform cross section along the line to pass the electric power. Air act as an insulating medium between the conductors.
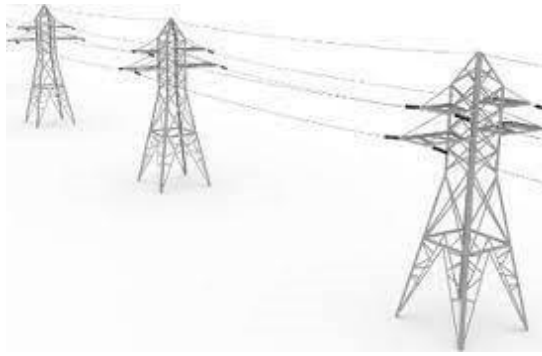
Fig3.1.a Transmission line

WiFi module

ESP8266-12E WiFi module is used here to monitor line voltage and update voltage status to sever

Fig3.2.a WiFi module

Voltage sensor

A voltage sensor is a sensor used to monitor the amount of current in an device or object. Voltage sensors can determine both the AC voltage and DC voltage level accurately.

Fig3.3.a Voltage Sensor

Relay Driver Unit

Relay is also known as electro mechanical switching device. Here relay is used to detach electric line if line fault accurs or in case of short-circuit.

Fig3.4.a Relay Driver Unit

IoT

The Internet of Things (IoT) describes the network of physical objects that are embedded with various sensors, software, and technologies for the need of connecting and exchanging data with other devices and systems using the internet. IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects, kitchen appliances, thermostats, baby monitors –to the internet via embedded devices logical communication is possible between people, processes, and things.

Fig3.5.a IoT

V. PROPOSED SYSTEM

If a power outage occurs in a specific location, it will show which line is out of power. The project is set up so that the current from the board is sent to the transformer, where the transformer receives a voltage of 12 volts and is given to the rectifier. The rectifier is given to a 1000 uF capacitor whose current is converted to DC form, and the output is given to the two resistors. As a unit resistor of 330 ohms and 10000 k, it receives the voltage across it and passes it from the node to the microcomputer unit. The WiFi module node MCU provides data when the power flows, the amount of current flowing, and the voltage flowing, which is relayed to the server and can be monitored by the app. The app has installed in phone, connected via a mobile hotspot and database, so you can record data about line and voltage. You can monitor errors over n lines.
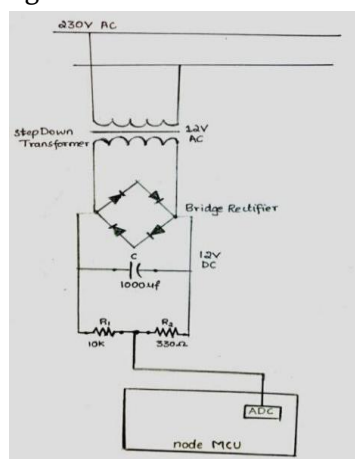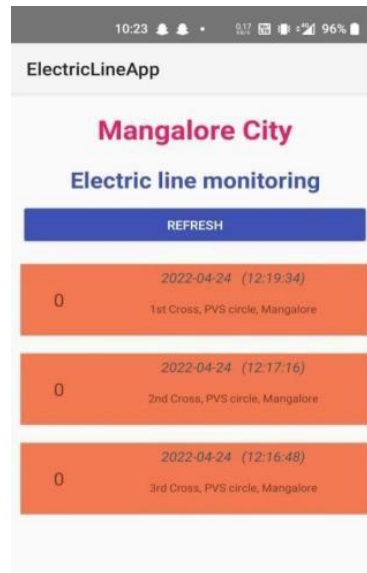

Fig 4. Circuit Design

Fig 5. Application

VI. RESULT

According to our project, we have obtained real-time fault monitoring results in the right place that can be monitored by a mobile application that displays grid voltage, location, date and time. Obstacles can be indicated by color. There are two colors, red and green, where green means that the correct voltage is flowing through the line, and red indicates a failure and a voltage break in the line.

VII. CONCLUSION

IoT has become a most anxious topic in the engineering field. As the number of smart objects grows, people are looking for ways to do more with smartphones, TVs and other wireless objects. The area of strong demand for integration into the IoT is transmission line systems based on live voltage detection. Monitor voltage lines so that you can easily find the exact location of an error using IoT (sensors) and embedded systems. Power outages due to line failures are common in rural and suburban areas of India. Power outages affect the lives of most people and small businesses operating in the area. Transmission line failures include not only voltage fluctuations, but also live lines that can be harmful to living organisms. The same problem can be addressed by using an embedded system (in this case a microcontroller as the control system) to detect the line failure and using the IoT to control the fault arising.

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