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In Association With

International Conference on

"Global Convergence in Technology, Entrepreneurship, Computing and Value Engineering: Principles and Practices"

(ICGCP—2022)

24th - 26th June, 2022

Conference Proceedings

Jointly Organized by

Department of

Electrical and Electronics Engineering

&

Electronics and Communication Engineering

Preface

Sapthagiri College of Engineering, Bengaluru was established in the year 2001 by Srinivasa Education and Charitable Trust with a vision to transform its students into competent, inspired and responsible professionals. It is one of the best Engineering Colleges in India.

It is our great honour and pleasure to publish the Proceedings of the **International Conference on Global Convergence in Technology and Entrepreneurship, Computing and Value Engineering, Principles and Practices - 2022 (ICGCP – 2022).** The conference was held on 24th and 26th June, 2022 in virtual mode. To encourage the young research minds and to bring all researchers, academics, scientists, industry experts, in common platform, the college organized this conference.

Present global scenario demands unprecedented actions and efforts across multiple convergences of social, economic and environment issues. Science, Technology and Innovations in the area of Internet of Things, Artificial Intelligence, Bio-Technology, Nano Materials and Renewable Energy must play a key role in achieving these goals. Also this is the era of start – ups, to achieve ambitious dream of Make in India concept. The conference covered all emerging areas of Science, Engineering and Technology.

The response to call for papers was excellent. More than 500 papers were received across the country, out of which 300 papers were selected for presentation and publication in the proceeding. These papers provided wide spectrum of research covering all the areas for which the conference was intended for.

We would like to express our gratitude and appreciation to the authors for their contributions. Many thanks go as well to all of the reviewers who helped us maintain the quality of the research papers included in the Proceedings. We also express our sincere thanks to the members of the organizing team for their hard work.

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Conference Co-Chair
Dr. Tulsidas.D
Prof. & Head, Department of Mechanical Engineering
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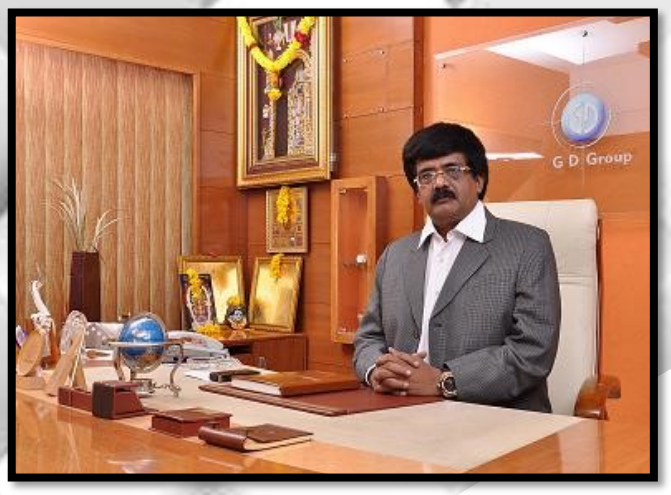

Message from Chairman

It gives me immense pleasure in congratulating the Chairman and team members of ICGCP- 2022, on successfully hosting the two days international conference at Sapthagiri college of Engineering. We are overwhelmed by the kind of response received by the research scholars across the country and I wish all of them a bright future and successful career. Also I would like to appreciate the contributions from the Principal, Heads of department, teaching and non-teaching faculties and other supporting staff of Sapthagiri college of Engineering for joining their hands in successful execution of the international conference.

Message from Managing Director

On this occasion, I express my heartiest congratulations to all the participants of ICGCP-2022 for publishing their research findings in the international conference. I hope that, the two days international conference has motivated faculties, research scholars and students to continue their research work. Also on behalf of management, I would like to extend my appreciation towards the sincere efforts of Principal, Heads of Department and Staff members of Sapthagiri College Engineering.

Message from Principal

At the outset I would like to congratulate the entire team of ICGCP-2022 for the successful conduction of international conference that witnessed an active participation of more than 350 research scholars across the state and also from outside Karnataka. On this occasion, I would like to thank our Chairman, Shri. G. Dayananda and executive director, Shri. G.D.Manoj for the magnanimous support extended in organizing the international conference. I would also like to congratulate all the faculties, research scholars and undergraduate students for publishing their research works in the conference and I hope that the two days interaction has motivated them to further pursue their research work and contribute to the society. Also I would like to appreciate the efforts of session chairs / reviewers / heads of department / technical support for their contributions in adding value to each session. Finally, I would like to congratulate the team ICGCP-2022 for bringing out the proceedings of international conference in a precise manner and for making it available for the researchers' community across the globe.

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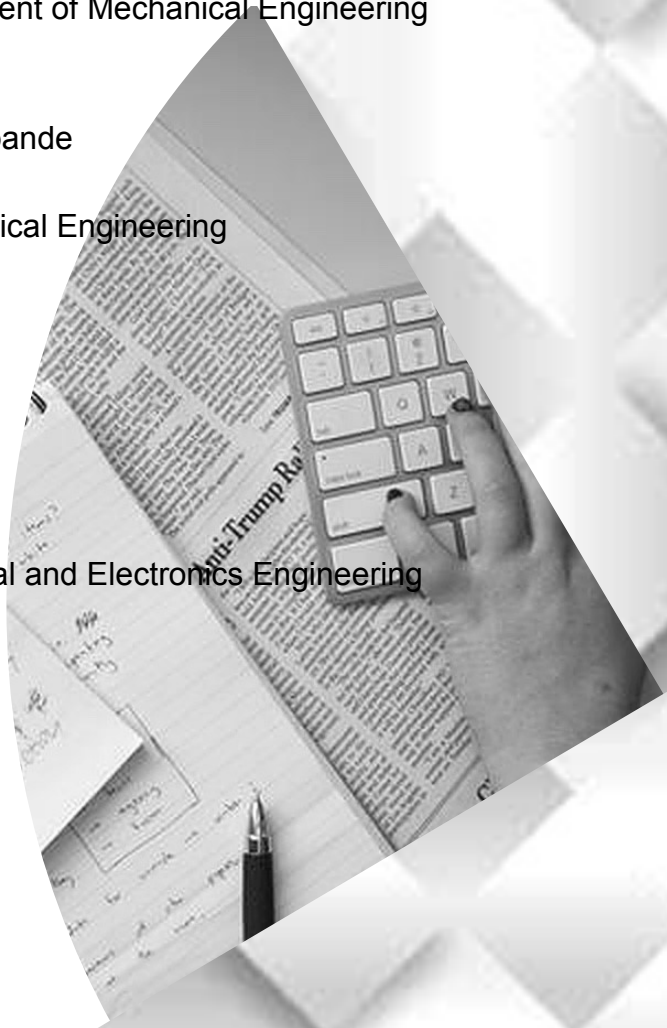

Glimpses of ICGCP - 2022

ICGCP-2022

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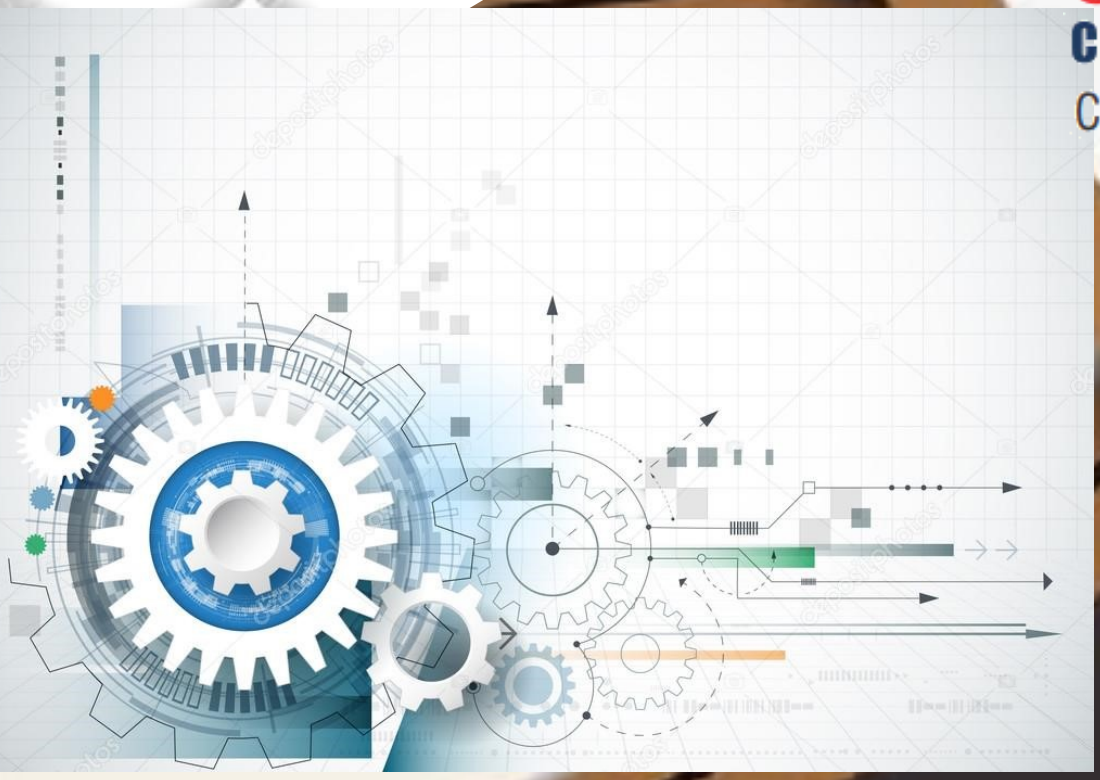

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Google Map

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INDEX

Electrical Sciences Proceedings

Automatic and Manual Floor Cleaning Robot using Arduino and Ultrasonic Sensor

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***Abstract* — Manual work is taken over the robot technology and many of the related robot appliances are being used extensively also. Here represents the technology that proposed the working of robot for Floor cleaning. Households of today are becoming smarter and more automated. Home automation delivers convenience and creates more time for people. Domestic robots are entering the homes and people's daily lives, but it is yet a relatively new and immature market. However, a growth is predicted and the adoption of domestic robots is evolving. Several robotic vacuum cleaners are available on the market but only few ones implement wet cleaning of floors. The purpose of this project is to design and implement a Vacuum Robot for Autonomous dry and wet cleaning application using mop, cleaning process become easier rather than by using manual vacuum by using components such as Arduino Uno, Motor, Ultrasonic Sensor, and IR Sensor to achieve the goal of this project. The whole circuitry is connected with 12V battery.**

***Keywords* — Arduino Uno, H-Bridge, Sensors, ESP 32 Camera and Embedded C.**

1. INTRODUCTION

Autonomous floor cleaning robots are common nowadays in the market. These technological devices are built to work without any human assistance. Furthermore, these devices are programmed in such a way that they perform their tasks in a timely and precise manner. Floor cleaners have evolved over the years. From only vacuum cleaners to autonomous floor cleaners having both vacuuming and mopping features, these devices also feature an application for navigating and controlling them. However, due to their high costs, these are still beyond the budget of many families, especially the lower classes. Our project aims to bridge this gap by proposing a working prototype of a cleaning and mopping robot that could eventually be developed as a low-cost robot with the majority of functionalities proposed by commercial robots**.** The robot is successfully operated in manual mode. Automatic obstacle avoidance and Manual control. RF modules have been used for wireless communication between mobile and robot. This robot is incorporated with Ultrasonic sensor for obstacle detection.

2. AIM

It presents the design and implementation of an autonomous floor cleaning robot with both mopping and vacuuming functions. Besides being autonomous, the robot can also be controlled by an android application via Wi-Fi. The main objective is to provide users an easy-to-operate, battery charged and avoids obstacles and can prevent itself from collision, for example sofa or table, through the use of ultrasonic sensors. The robot has been designed to be as quiet as possible during operation.

3. Hardware Used

I. Arduino Uno:

Fig 1: Arduino Uno circuit.

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 1016 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. Fig1, represents the circuit of Arduino Uno. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started Arduino is open source prototyping platform based on easy to use hardware and software.

II. DC MOTOR:

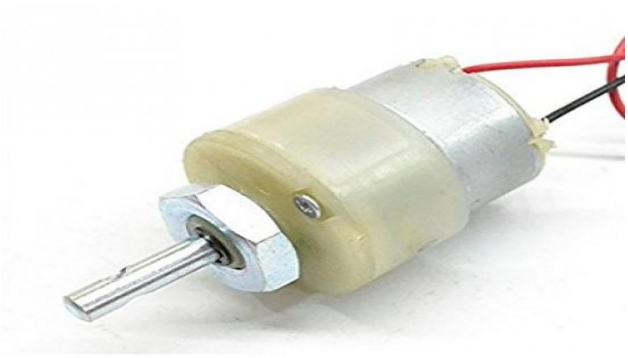

Fig 2: DC Motor

A DC motor is a class of electrical machines that converts direct current electrical power into mechanical power. The most common types relay 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 flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line. Fig 2, shows how the DC motors looks. These were the first type widely used, since 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.

III. Ultrasonic Sensor:

Fig 3: Ultrasonic Sensor

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function. The modules includes ultrasonic transmitters, receiver and control circuit. An ultrasonic sensor is used to guide the robot as well as to prevent collision against walls or obstacles. Fig 3, shows the outlook of the sensor. The sensor head emits an ultrasonic wave and measures the distance to the wall, through the reflected wave back to the head. The distance measurement occurs by measuring the time between emission and reception.

IV. Battery:

A sealed lead-acid rechargeable battery of 12 V is used to provide direct current to the circuit. Due to the size limitation of the chassis, a relatively light weight and small battery is used, that provides power supply for at least five hours continuous work of the robot.

V. Water Pump:

Fig 4: Water Pump

This pumps water from the water container into a mop cloth that is used to mop the floor. A 12V dc water pump is used. Fig 4, represents the water pump design. The water

is pumped out from the container after the vacuum cleaning and mop the floor using the roller.

VI. WI-FI Module:

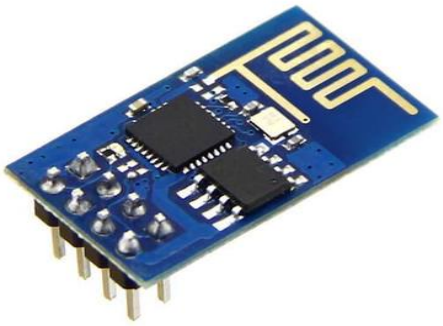

Fig 5: Wi-Fi Module

Wi-Fi modules (wireless fidelity) also known as WLAN modules (wireless local area network) are electronic components used in many products to achieve a wireless connection to the internet. Fig 5, shows the Wi-Fi module component. The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. It uses a serial communication. The full form of ESP is "Espressif Systems".

4. Software and Control Design

- **Arduino IDE:**

The Arduino IDE is open source software. IDE stands for Integrated Development Environment. It contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

- **Embedded C:**

Embedded C is an extension of C language and it is used to develop micro-controller based applications. The extensions in the Embedded C language from normal C Programming Language is the I/O Hardware Addressing, fixed-point arithmetic operations, accessing address spaces.

5. Mechanical Design

The chassis of the floor cleaner robot is made using readymade metal sheet. Metal sheet is sufficiently strong to hold the two motors, wheels, H-bridge, Arduino Uno and other components. The electronic components are mostly fixed onto the ground chassis. The mechanical designs of the robot structure was designed. The structure of the robot is then built according to dimensions in the designs.

A. Wheels:

For the free motion of the robot, a four wheels. The two in front and two in back of the robot are utilized. The wheel is attached to the chassis using bolts, nuts and washers. The back wheels are attached to two dc motors using bolts and nuts. The height of the robot can be managed. After fixing the wheels of the robot, the top part of the robot, the hardware devices is placed on the chassis. The front two wheels are free to rotate, depending on the movements of the back wheels it will rotate.

B. Water Tank:

The mopping system of the robot is designed using the water tanks where the water pump is placed inside the tank would provide water to the mop and the second tank would push the water to the roller to mop the floor. The water is distributed across a large surface of the floor.

C. Vacuum cleaner and Roller:

The vacuum cleaner is placed in the front of the robot to collect the dust and roller is placed at the back side for the wet cleaning of the floor. Water is used from the water tank placed on the top of chassis.

6. Methodology

1) **To implement the fire and gas leakage sensing system and sending alert message to the user.**

The system is designed to detect the fire and gas leakage around the robot while cleaning process. The sensors will be operated in the serial manner. It will sends the alert message to the user about the sensors. Fig 6, represents the alert message given to the user through the Wi-Fi module connected to the mobile, whether the fire and gas is detected or not.

Fig 6: Alert message of fire and gas sensor

2) To design Vacuum Robot for Autonomous dry and wet cleaning.

TO design the robot for both Autonomous dry and wet cleaning of the floor. In the single move it will perform both the dry cleaning by vacuum cleaner and wet cleaning using water pump and roller. Fig 7, represents to perform of the dry cleaning.

Fig 7: Autonomous dry cleaning

3) To develop both manual directional control and automatic obstacle avoidance.

The developed robot can be controlled by manual control and automatic obstacle avoidance. In the manual control system the user has to control the movements of the robot by giving the commands through connected Wi-Fi module. $F→Front, $B→Back, $R→Right, $L→Left and $S→Stop. These are commands to the robot for the movement. $ is used to avoid the garbage value. Fig 8, shows the manual control commands through mobile. In automatic obstacle avoidance of robot the ultrasonic sensors are used to detect the obstacle and get paused.

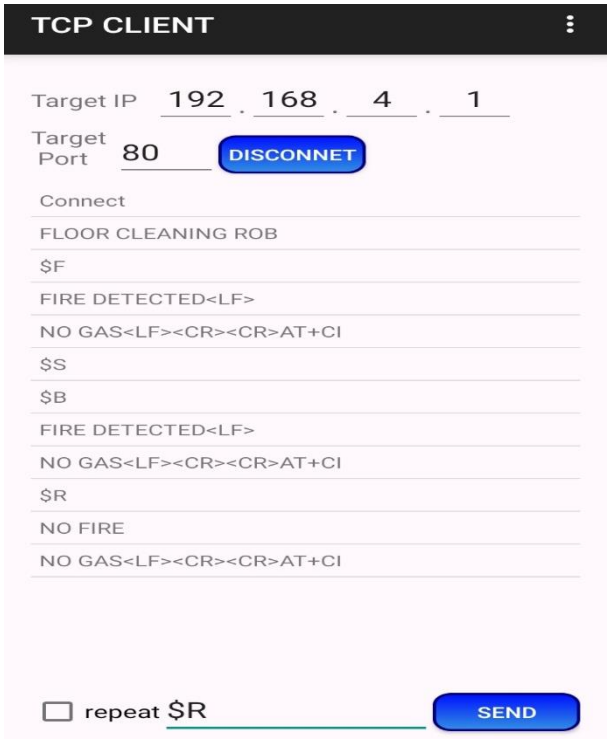

Fig 8: Manual Control Commands

4) To implement live streaming of robot environment using ESP32 camera.

By using the ESP32 camera the user can view the surroundings of the robot through mobile by sitting at one place. It is operated while manual controlling the robot.
It is used to detect the oily surface or more dust floor and can be cleaned properly. It is placed at the top of the robot for proper view. Fig 9, shows the structure of the ESP32 camera.

Fig 9: ESP32 Camera

7. Conclusion

The design and implementation of a hardware with a combination of software gives better accuracy and reduces the work load. The smart autonomous cleaning and mopping robot is presented. The man power is minimized. It is Low cost and Time Consuming. The system is powered by a rechargeable dc battery of 12V. Device making a small machine brings a flexibility to do work. The Arduino Uno board is used in this project due to its large number of GPIO pins and a better flash memory storage of 256 kb. It provides Wi-Fi connectivity to pair able device or component. The range of wireless control limits at 10 meters, sufficient to control the device across a house. Each individual system is first tested thoroughly and subsequently, the whole cleaning system is implemented and tested. It is observed that the system performs the desired task successfully and works both on an autonomous mode or application-controlled mode. The whole system is programmed and designed on Arduino Integrated Development Environment (IDE) and Android Studio which are open source development software. The aims and main objectives of the project are achieved successfully. This cleaning device can be taken to the next level by integrating smart navigation systems or even making them compatible with voice-controlled systems such as Alexa or Google Assistant. Thus relevant cleaning data and statistics may be sent, in real time to a database, which could be used to monitor the operations, detect malfunctions, and further enhance the functionalities of the robot. Fig 10, shows the initial model of the robot.

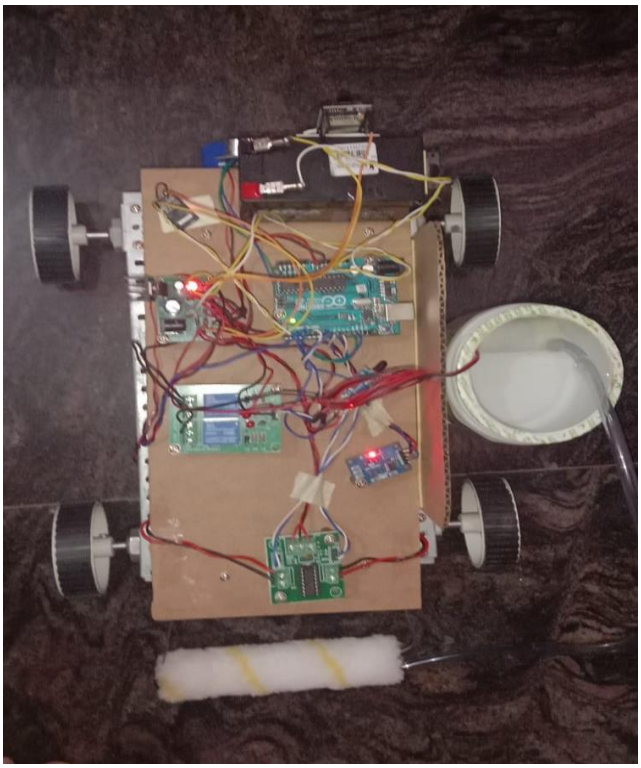

Fig 10: Model of floor cleaning robot

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Solar Floor Cleaner

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Abstract **– The manual work is taken over by the robot technology and many of the robot related appliances are being used extensively. Households of today are becoming smarter and more automated. Home automation delivers convenience and creates more time for people. The purpose of this project is to design and implement a Vacuum Robot for Autonomousdry and wet cleaning application using mop. The entire floor cleaning robot is divided into several parts, namely consisting of an Ultrasonic Sensor, Motor Shield L298, Arduino Uno microcontroller and Dc Motor. This tool works when the Arduino Uno microcontroller processes the ultrasonic and cliff sensor as a distance detector and DC motor as a robot driver. The distance value of the sensor has been determined that is, when the distance read by the ultrasonic sensor is below 15cm. When an ultrasonic sensor detects a barrier in front of it, the robot will automatically look for a direction forthe floor cleaning robot. DC motor is driven by the Motor Shield L298**

INTRODUCTION

Robot is an intelligent device having its own brain fed with computer logic so that it can do the work according to the algorithm designed. Autonomous movement of vehicle is guided by the logic controller designed. Robots plays an important role in each ever field of life. It is used in industries,in households and in institutes. The robots are just becoming as intelligent as human now a days. Mostly an average humanuses 2-3 robots per day in his day-to-day life. Various roboticsparts are: - Pneumatic devices Actuators Sensors Mechanical control devices like valve. Microcontroller – Controlling unit Mechanical control devices are used to control the flow or movement of materials or any other parts present in the device. Actuators are used for controlling a mechanism which ultimately controls a part of the device. Sensors are the sensing devices which transmit a signal and receives the signal and accordingly used to accumulate the various environment information which is ultimately fed to microcontroller for deciding the working of machines. Microcontroller is the brainof robot where program is written and sensors are connected as input and actuators as output. The controlling of the robot is governed by various algorithms like fuzzy controller, machine learning based practices and artificial neural network-based algorithms. Depending upon the environment value received to the controller it eliminates the error and transits from one state to another. Basically, there are two types of controllers, one is continuous controller and another is PID based controller. Continuous controller is more direct and less effective while PID controller is more advanced and varies according to the current state and gives efficient result.

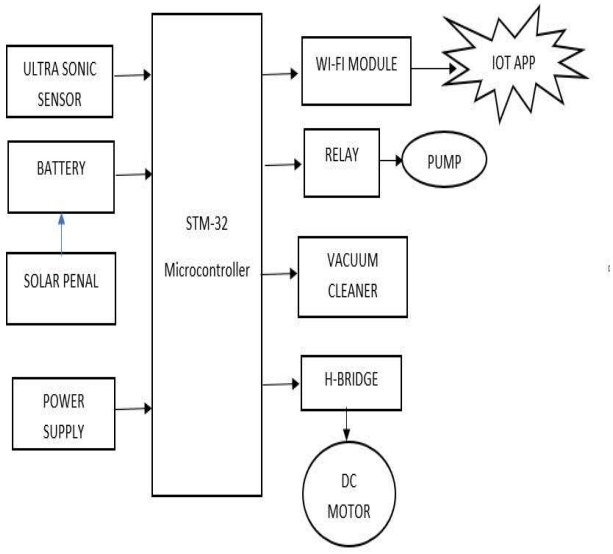
OBJECTIVE

- To design Vacuum Robot for Autonomous dry and wet cleaning.
- To develop both manual directional control and automatic obstacle avoidance.
- To implement the fire and gas leakage sensing system and sending alert message to the user.
- To design Vacuum Robot for Autonomous dry and wet cleaning.
- To develop both manual directional control and automatic obstacle avoidance.
- To implement the fire and gas leakage sensing system and sending alert message to the user

METHODOLOGY

- In this project we will use the power of Embedded Systems and Electronics to make our own robot which could help us in keeping our home or work place neat and tidy. This robot is simple four wheeled Vacuum Cleaner which could smartly avoid obstacles and vacuum the floor at the same time. Robot runs on a 12V 20Ah DC system. Our vacuum should also be a 12V DC vacuum cleaner.
- The IoT based technology made ease of the system for the end users. The motors were successfully controlled and the robot works according to the commands. Control Unit Control unit contain Arduino Uno and its software platform that is used totake all the decisions and data processing. Direction Controller Direction controller decides the direction of the robot forward, backward, left or right. For this purpose, we have used Wi-Fi device.
- Gas sensor senses LPG leak and produces sound alarm. The project also has a relay system which turns ON or OFF a particular device upon gas leak (say we can turn the main electrical supply OFF upon gas leak to prevent fire). The flame sensor detects the presence of fire or flame. It uses the infrared flame flash technique for working. This explicit flame detector is consists of a Photo Transistor. It is often located at the front of the module in the form of a black LED. As a flame detection system works within the infrared spectral band, it ranges between 4.3 to 4.4 micrometers. This range covers the resonance frequency of Carbon Dioxide, which is generated by the burning of organic compound materials. All the sensor value stored in the cloud and goes alert with the help of wireless communication device WI-FI.

BLOCK DIAGRAM



RESULT AND DISCUSSION

So, there is definitely current scope for improvement and optimization till the most effective product is being developed. After optimizing the algorithm and taking it to the heuristic-based search like bee algorithm it will be a great product and can revolutionize this industry. Definitely it has very huge potential. Also, we can use 1 vacuum pump instead two so thatit will be cost effective and very energy saving product with less vibration and much control over the robot. The robot having 33*30*8 cm in dimension is very compact in nature and can go beneath any furniture and bed. This is also very handy in portability. The scrubber of the robot now consists of small plastic fibers. But it can be further improved so that thesurface area of the scrubber will come 90% in contact with thefloor.

CONCLUSION

This research facilitates efficient floor cleaning with sweeping and mopping operations. This robot works in two modes automatic and manual for user convenience. This proposed work provides the hurdle detection in case of any obstacle that comes in its way. An automatic water sprayer is attached which sprays water for mopping purpose for the convenience of user. User can also operate this robot manually with the help of smartphone. It reduces the labor cost and saves time also and provides efficient cleaning. In automatic mode, the robot operates autonomously. The operations such as sweeping, mopping and changing the path in case of hurdle are performed automatically Nevertheless, there are still new ideas to improve the developed system and to add new functionality to it. A cheaper and user-friendly Vacuum Cleaner robot can be developed with two different mode of controlling (Manual and Autonomous mode) using an ESP-32 Board with more electronics functionality. Battery monitoring, self-charging, lighter body weight and to set alarmon/off time manually are the future scope of this project.

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A REAL-TIME POT HOLE DETECTION AND REFILLING ROBOT

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ABSTRACT

Developing and under developing countries such as India, China, and so on have terribly maintained roads. Identification of potholes helps driver to avoid tragic accidents. In this project, we have developed an Arduino Uno-based sensing model, which detects pothole and depth-estimation can be done. The model will discharge the required amount of gravel, sand or cement which is needed to fill the detected pothole and using the levelling process pothole on the road can be filled completely. This model also provides the manual control if the user doesn't want to use the automatic control, then he/she can control the model using mobile application which can control the model, like backward, forward, left, right, fill, roll.

Keywords - Potholes, Arduino Uno, Ultrasonic sensor, GPS, WIFI, DC motor.

INTRODUCTION

The important means of transportation in developing countries are roads. As compared to other countries, India being one of the most populated countries has a booming economy and is largely associated with roads for transportation. Due to seasonal changes in India, it results in heavy rainfall which in turn leads to breakdown of roads. "Evidently the key reason to road accidents happens to be faulty roads and unanticipated occurrence of potholes.

Fig. 1 Pothole

Fig 1 shows the pothole. The safety of the motorists should be prioritized and a smooth commute should be ensured for everyone. Thinking along such lines we came up with the idea of integrating a hardware system which detects the potholes using an IR sensor and ultrasonic. Filling of the pothole. In this fast-moving world that we live in, safe commute is not only everyone's priority but also to provide a hassle-free shuttle between places is the government's duty. Over the recent years, there has been a rise in vehicle population. This increase in vehicle population has led to increase in road accidents and also traffic problems. Therefore, it is important to collect data regarding these poor road conditions in order to reduce accidents caused by potholes A system is developed based on IOT to detect Potholes and the data regarding road will be uploaded on server using which all the users will be notified.

I. OBJECTIVE

In India roads we often come across pot holes which can be either dry or water filled. So, to ensure safe driving, it is necessary to detect potholes and fill them as soon as possible few objectives are proposed in the present work. The main research objectives are listed below

1. To detect pothole using Ultrasonic sensors.
2. To fill the pothole using motor mechanism.
3. To level the potholes which are filled by the robot.
4. To control the model manually and automatically by sending message to concerned authorities using WIFI module and locating the pothole using GPS.

II. LITERATURE SURVEY

Rashmi Deshpande et al. presented a model called Pothole Detection Using Ultrasonic Sensor & Arduino [1] which detects the potholes and alerts the driver about the pothole and humps on the road. This system can have sensors (ultrasonic sensor), which will detect the potholes & network connection is required. Survey will be conducted and data will be stored on database. Which can be manually updated.

B. G. Shivaleelavathi et.al. presented a model called Detection of pothole using ultrasonic sensor [2], which detects the pothole using ultrasonic sensor. This model detects the Humps and the pothole, the sensor works with formula: distance=time*speed. Using this formula, it calculates the depth of the pothole.

Rajeshwari Madli et.al, presented a model called Automatic Detection and Notification of Potholes and Humps on Roads to Aid Drivers [3], this model uses Ultrasonic sensor to sense the pothole and sends the information to Arduino board. The detected pothole sends the notification to the linked device through WIFI module.

Rohith V L et.al. Presented a model called Design and fabrication of pothole detection and levelling robot [4]. This model will fill the pothole by sensing the depth using the distance formula. The filling material used here are gravel, cement etc.

Sujay Dev et.al. presented a model called Design and Fabrication of a Pothole Filling Machine [5]. The principal parts that have been used in this system are: Roller, chassis, engine, hopper and chain drive system. The roller of diameter 400mm and length of 500 mm is selected based on the average size of pothole we must clean. It is made up of mild steel and it is hollow and it can be filled with sand to get extra pressure on the tar mixture.

Manoj. A. Deshmukh et.al. Proposed a system called Automatic Potholes and Humps Detection and Alerting through SMS [6]. Ultrasonic sensor has sensed height of humps or depth of potholes effectively and has discovered the accurate position of them with the help of GPS and got this information in terms of latitude, longitude. The GPS and GSM used during this system could also be an extra advantage because it notifies to the government on time so that they will take necessary action as early as possible.

Arun Kumar G et.al. proposed a system called Road Quality Management System using Mobile Sensors [7], the components used here are Arduino, ultrasonic sensor, GPS. In this model the system sends the particular location using the GPS module by sending the exact latitude ad longitudinal position.

Ashish Gaikwad et.al. presented a model called Path hole Detection System: Using Wireless Sensor Network [8]. In this model the detected pothole sends signal to Arduino board. Using the formula, the depth is calculated and sends it to the particular authority using wireless system.

Parag Kadale et.al. presented a model called Automatic Detection of Potholes and Humps on Road [9]. In this model, the ultrasonic sensor is used for measuring the depth of a pothole and height of a hump. Ultrasonic sensor is used to measure the distance in analog format and is converted into digital format using the ADC, the obtained result is transformed to PIC microcontroller. This model is based on IoT and distance sensor. The result is displayed on the LCD display and sent to the Wi-Fi module by the PIC microcontroller.

Swetha K et.al. presented a model called Automatic Detection and Notification of Potholes and Humps on Roads using IoT [10]. In this model, HC-SR04 ultrasonic sensor is used which is a 4-pin module, and has a pin named Vcc, Trigger, Echo & Ground respectively. Two projections are used, in which one transmits the ultrasonic waves, while the other receives the echo that is reflected. The distance is calculated using the time taken by the ultrasonic pulse to travel a particular distance, which is as follows

$D = (T * 343m/s)/2.$

Rahimraja Shaikh et.al. Presented a model called Detection of Potholes, Humps and Measuring Distance between Two Vehicles using Ultrasonic Sensor and Accelerometer

[11]. In this model, HC-SR04 a ultrasonic sensor is used which contains a transmitter and a receiver. Using this model, the distance at which humps are present can be measured. Ultrasonic sensor is used to transmit high frequency sound waves and waits for a certain time for the reflected wave to reach the receiver. Doppler Effect is the principle on which ultrasonic sensor works. The distance is calculated based on the time taken by the ultrasonic pulse to travel a particular distance. The frequency at which HC-SR04 works is at 40 KHz and can measure distance of objects in the range 2cm-400cm with a 15degree angle of detection.

Chinmayi Srikanth et.al. Presented a model called Design and Development of an Intelligent System for Pothole and Hump Identification on Roads [12]. In this model, the Potholes are detected using Image Processing Technique and Ultrasonic Sensors are used to detect humps. Controlling device used is Raspberry Pi. The system acquires the geographical position of potholes using WiFi and transmits it to authorities to take corrective measures.

R.M.Sahu et.al. - Presented a model called Automatic Detection of Potholes and Humps on Roads to Aid Driver [13]. Advanced cameras that are used to capture motion as well as images from a very far distance. During the time of its invention images could be taken only in a room and could not be portable. The instrument should be kept in a dark chamber or box and the room should function as a real-time imaging system.

Shruti Ambekar, et.al.,- Presented a model called Potholes Detection System for The Safety Of Pedestrians[14]. The purpose of this paper is to devise a system that will give prior warnings to a pedestrian thereby ensuring safety. The potholes are invisible to eyes during floods this increases the risk of fatal accidents. The system works on surveying method where the device will detect potholes and save location on a cloud server and during flood while surveying.

III. METHODOLOGY:

Objective-1: To detect pothole using Ultrasonic sensors.

The first objective is to detect the pothole and is done using Ultrasonic sensors as shown in Fig. 2.

Ultrasonic sensors measure the depth and height of pothole.

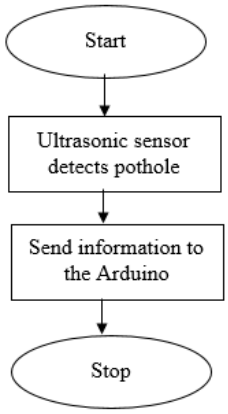

Fig. 2 Flowchart for pothole detection

Objective-2: To fill the pothole using DC motor mechanism.

After achieving the first object, the next step is to fill the detected pothole. Detected pothole is filled using DC motor mechanism as shown in Fig. 3.

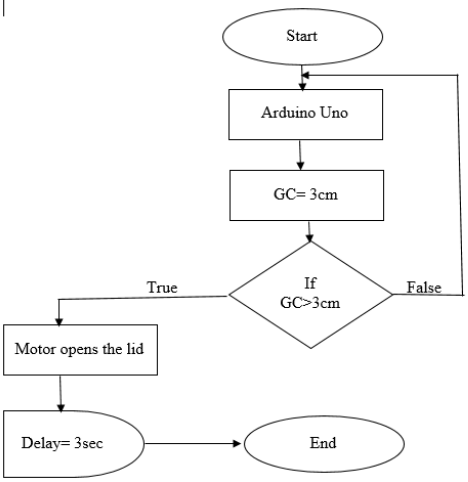

Fig.3 Flow chart to fill the pothole

Objective-3: To level the potholes which are filled by the robot.

The third objective is to level the pothole as shown in Fig. 4. Leveler connected at the end of robot will level the pothole according the level of the normal road.

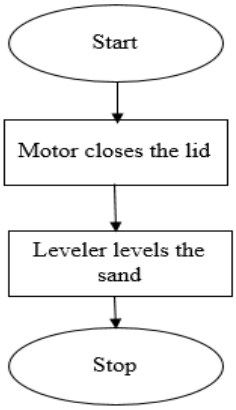

Fig. 4 Flow chart to level the pothole

Objective-4: To control the model manually and automatically by sending message to concerned authorities using WIFI module and locating the pothole using GPS.

After filling and levelling the pothole, the next step involved is to control the load. The movement of the model can be controlled both manually and automatically as show in Fig. 5. Message can be sent to concerned authorities using WIFI module and location of the pothole can be detected using GPS.

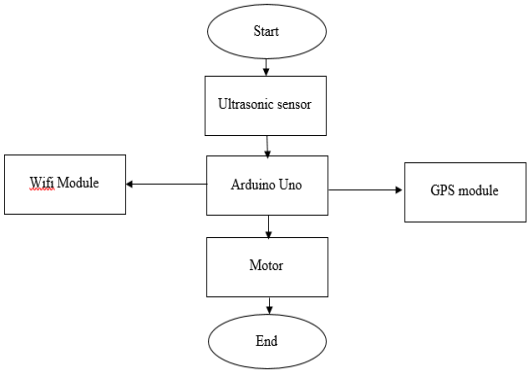

Fig. 5 Flow chart to send message and locate pothole

IV. CONCLUSION

The system detects the potholes, humps and sends the data to the vehicle drivers, so that they can avoid the tragic accidents. This is a practical solution for detection of potholes and very effective even in rainy season when roads are filled with rain water as well as in winter, as the alerts are directly sent from the stored data in the server/database. The data can also be used by the Government authorities for the maintaining the roads.

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Smart Medical Mirror

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***Abstract*— In this world everybody are busy and keeps running behind the solace and comfort. Present day man has multiple tasks to perform and ignore the importance of health. To boost people to overcome the trouble of making regular visits to the clinic, hospitals etc.. the concept of smart mirror is proposed. A Smart Mirror is a novel interactive interface that tracks and displays user's heart rate, body temperature and body mass index. It is an method to make people to have control over their own health. This project work proposes an interface with the fingerprint sensor near the smart mirror for real time measurement. Measuring of each health parameters individually is an challenging task and requires various equipments. The Smart Mirror proposed here integrates these measuring aspects at one place. It records the measured data and will be displayed on the mirror. The Smart mirror fits seamlessly into the home atmosphere. Smart mirror will ease the user interface. Digital medical devices promise to transform the future of medical science because of their ability to produce exquisitely detailed individual physiological database. When people start accessing these techniques, they can easily monitor their physiological conditions comfortably.**

I. INTRODUCTION

Mirrors are part of everyday used items that have been so far eluded from the idea of being smart. The idea of combination of mirror with intelligence and technology, discussing further possibilities and uses are some objectives of this project work. The Smart Mirror may seem to be similar to that of various other smart devices available like smart phones, smart televisions, smart lights etc. but have some certain and specific advantages because of its usage as a mirror.

This smart mirror is a still complex to that of an ordinary mirror, having a display inside a glass that one can interact with using voice commands. Here the mirror is designed using a RASPBERRY PI Model 3B+ to make it smart and display the basic amenities like date, day, humidity etc… Smart Mirror is a novel interactive interface that tracks and displays a user's heart rate, body temperature and body mass index in real time. To encourage people to keep track of their vital health parameters on a daily basis, a Smart Mirror with natural user interface design is proposed in this project report.

II. PROPOSED WORK

The maintenance of health and fitness helps a person to be in the general state of health and well-being. It provides ability to perform actions restlessly. Present day man has multiple tasks to perform and ignore the importance of health. To reduce all these problems a smart mirror is designed which facilitates the user to measure the health parameters and to encourage people to minimize the regular visit to the hospitals. Finally, the objective of this proposed work is to design a Smart Mirror which will be easy to use, have a compatible user interface and to display the measured parameters on the mirror itself.

The model of Raspberry Pi is specifically used to perform multiple tasks and can also be connected to the internet easily without external hardware devices with a much faster processing. A heart rate sensor is used to measure pulse waves, that occurs when heart pumps blood due to the changes in volume of the blood vessel. LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. A two-way mirror is reflective on one side and clear on the other, giving the appearance of a mirror to those who see the reflection but allowing people on the clear side to see through, as if at a window. A python script is written to get the basic amenities like time, date,

day, weather, news etc. These amenities are displayed on the mirror once the Raspberry pi is booted. Along with this a welcome message is also displayed.

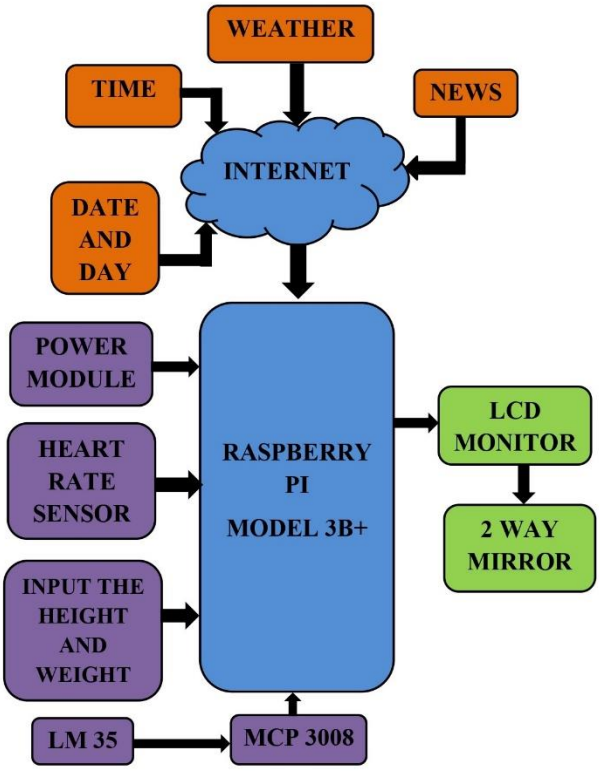

Fig. 1: Block diagram of proposed smart medical mirror

The above Fig. 1 shows block diagram of proposed system. The system has heart rate sensor, LM 35 to measure the body parameters. The sensor data is sent to an Raspberry pi 3B+ for processing the data. A special python script is written to measure the Body Mass Index wherein the user is asked to input the height and weight. Then the BMI is calculated and gives the output.

III. ADVANTAGES

1. The Medical Mirror fits seamlessly into the ambient home atmosphere.
2. Inexpensive than other methods.
3. Blending the data collection process into the course of our daily routines.

IV. APPLICATIONS

1. It can be used as a precautionary medical tool.
2. It can be used in hospitals, clinics etc.
3. It can be used in military camps, community gatherings etc.

IV. CONCLUSION

The smart mirror which acts as a smart home control platform is a futuristic system that provides users with an easy-to-use mirror interface, allowing users access to customizable services in a highly interactive manner, while performing other tasks simultaneously.

The Smart Mirror displays the predefined information and also does the job of a mirror i.e. reflection. It displays the basic amenities like time, date, day, weather, news etc.. When required it measures the user Heart rate, Body temperature and Body mass index and displayed. This proposed work illustrates an innovative approach to pervasive health monitoring. The system is efficient for personal use. Smart Mirror can be installed in homes, colleges and offices. Overall, the proposed smart mirror system incorporates various functionalities to grant users access to personalized information services.

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Smart Cradle System using Arduino Uno

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Abstract: ***The current number of working mothers has greatly increased. Subsequently, infant care has become a daily challenge to many families. Thus, most parents send their infants to their grandparents' house or to infant care houses. However, the parents cannot continuously monitor their infants' conditions either in normal or abnormal situations. Therefore, an Internet of Things-based Infant Monitoring System is proposed as an efficient and low-cost IoT-based system for monitoring in real time. So the proposed algorithm plays a key role in providing better infant care while parents are away. In the designed system, Node Micro-Controller Unit Controller Board is exploited to gather the data read by the sensors and uploaded via Wi-Fi to the Server. The proposed system exploits sensors to monitor infant's vital parameters, such as moisture, and crying. The system architecture consists of an infant cradle that will automatically swing using a motor when the infant cries. Parents can also monitor their infants' condition through an external web camera and Switch on the fan and also swings the cradle when the infant is crying. The proposed system prototype is fabricated and tested to prove its effectiveness in terms of cost and simplicity and to ensure safe operation to enable the infant-parenting anywhere and anytime through the network. Finally, the infant monitoring system is proven to work effectively in monitoring the infant's situation and surrounding conditions according to the prototype.***

Keywords: ***SIDS, Infant-parenting, Arduino UNO***

I. Introduction

At present, female participation in the work force in the industrialized nations has greatly increased, thereby affecting infant care in many families. Both parents are required to work due to the high cost of living. However, they still need to look after their infants, thereby increasing workload and stress, especially of the mother. Working parents cannot always care for their infants. They either send their infants to their parents or hire an infant care giver while they are working. Some parents worry about the safety of their infants in the care of others. Sudden Infant Death Syndrome (SIDS) is also known as crib death, because many infants who die of SIDS, are found in their cribs. It occurs to infants younger than 12 months old. Most SIDS deaths occur in infants younger than 6 months old. In winter or cold

weather, the risk of SIDS increases, because the parents overdress their infants or place them under heavier blanket, thereby overheating them. Therefore, if the room temperature is comfortable for an adult, then it is also appropriate for the infant.

II. Literature Review

[1] Goyal et.al introduced an E-baby cradle that can swing automatically when it detects crying and stops swinging when the crying stops.

[2] A similar automatic baby monitoring system was proposed by R. Palaskar, et.al. The authors developed a low-budget system that swings the cradle when the crying sound is detected, and the cradle stops when the baby stops crying.

[3] An Arduino-based resonant cradle designed with infant cry recognition was proposed by C.-T. Chao, et.al A ball bearing design is adopted to reduce system damping and allows the cradle to swing freely even without electricity.

[4] Kaur et.al proposed a system that can monitor the pulse rate and body temperature of the Baby.

[5] Air temperature and humidity levels in the infant' incubator are monitored remotely by means of Arduino microcontroller with different sensors

[6] M.Suruthi[1]. et.al was proposed, measurement of temperature is one of the fundamental requirements for environmental control, as well as certain chemical, electrical and mechanical controls with the help of microcontroller.

[7] A. F. Symon, et.al designed a system for baby monitoring based on Raspberry Pi and Pi camera.

[8] Child safety and tracking is a major concern With this motivation, a smart IoT device for child safety and tracking is developed to help the parents to locate and monitor their children.

[9] To detect the child motion and sound simultaneously, it also displays the position of the child on the display monitor.

[10] Fluid bed drying and near infrared (NIR) spectroscopy are technologies widely used to dry and measure moisture content

[11] The main purpose of this work is to support research on the prevention of pressure ulcers in people committed to bed rest or using wheelchairs

[12] Detection of motion can be achieved by electronic devices or mechanical devices that interact or quantify the changes in the given environment.

[13] With the advancement in technology, motion can be detected by measuring change in speed. This can be achieved either by mechanical devices that physically interact with the field or by electronic device that quantifies and measures changes in the given environment.

[14] Motion detection plays an important role in Video Surveillance System. This paper analyses the key technology and needs about it and gives a basic target. Based on analysis, a motion detection system is put forward and an implementation is given.

III. Block Diagram

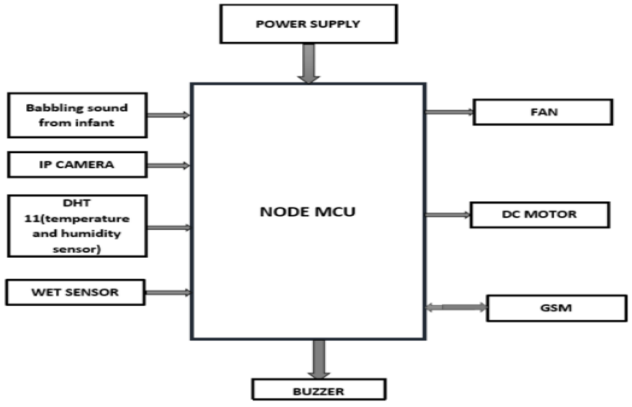

Figure 1: Block Diagram

This proposed system will give the parents relaxing time and allow them to take less stress

about well-being if the baby when they are away as they can get update about status of infant inside the cradle.

IV. Objectives

1. To detect if the baby is trying to come out of the cradle: - The HC-SR04 uses non-contact ultrasound sonar to measure the distance to an object, and consists of two ultrasonic transmitters, a receiver, and a control circuit. If the sensor detects the baby, a notification message will be sent to the registered mobile number.

2. To check the temperature of the surrounding of the baby: - We use LM35 temperature sensor to check the surrounding temperature of the baby. When the surrounding temperature increases the notification sent to the microcontroller intern it turn on the fan through relay module.

3. To check bed wetness using wet sensor: -Wet sensor is used to detect any wetness in the infant's surrounding. It consists of two modules - a wet board that detects the wetness and a control module. Depending on the wetness it generates a digital value.

4. To design swinging mechanism when infant cry is detected: - Sound sensor (MIC) is employed to detect the sound level of the infant's cry and contrasts it with the threshold limit.

5. To detect the crying of the baby: -LM386 or LM393 are used as the sound sensor to detect the crying. When the sensor detects crying of the baby the signal is sent to the microcontroller intern it turns on the music through speaker using relay and it also sends notification to parents using gsm module.

V. Implementation

Flowchart:

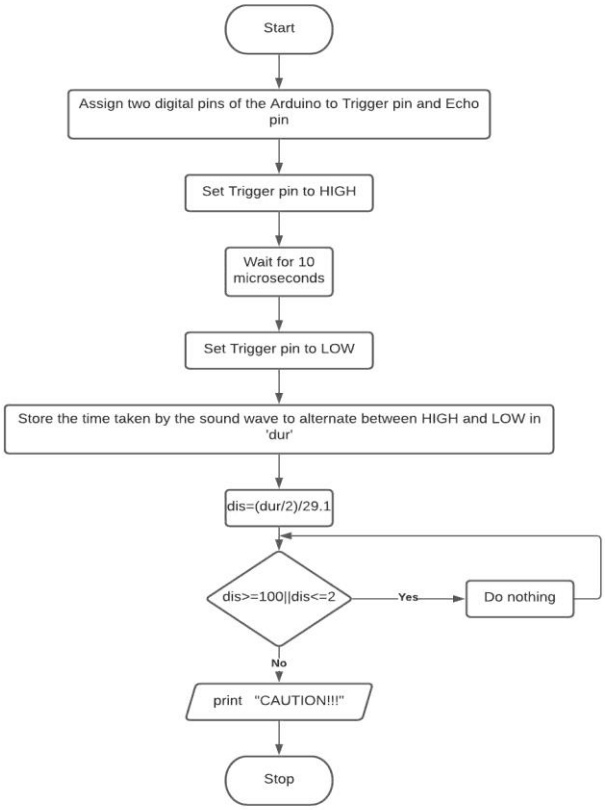

Figure 2: Flowchart to detect baby trying to come out of the cradle

Algorithm:

Step1: Start

Step2: Assign the two digital pins of the Arduino to trigger pin and echo pins

Step3: Set the trigger pin at high or "1"

Step4: Wait for 10 microseconds and continue

Step5: Set trigger pin to low or "0"

Step6: Store the time taken by the sound wave to alternate between 1 and 0 in 'dur'

Step7: dis>=100||dis<=2

If yes "Do nothing" and again go back to step7 else print "Caution"

Step8: Stop.

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Working:

Connect the Buzzer to positive terminal to the Arduino pin number 2 and the negative terminal to the ground. Connect the VCC pin of ultrasonic to +5v pin and the Gnd to the ground. Connect trig pin to pin 10 and echo pin to pin 9.

Here we use the ultrasonic sensor to detect whether the baby is coming out of the cradle, If baby tries to get out of the cradle sensor detects and sends the message alert to the care taker.

VI. Future Scopes

1. Sleep monitoring can be done using motion sensors.
2. Gas sensors can be used to detect gases and smoke, etc

VII. Result

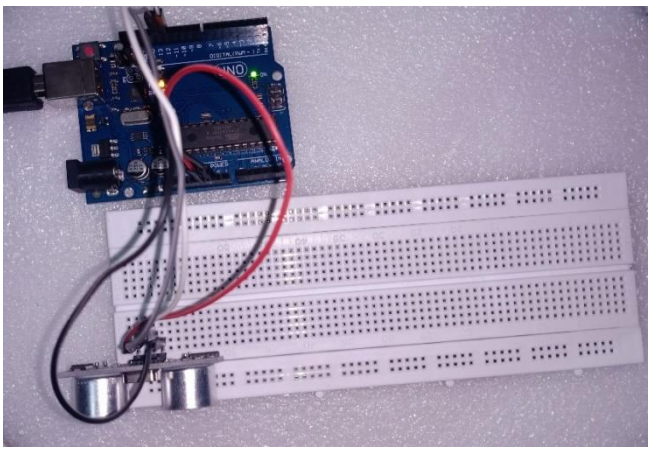

Figure 3: Implementation of Ultra-sound sensor

```
19:18:58.349 -> CAUTION!!!!
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19:18:58.494 -> CAUTION!!!!
19:18:58.494 -> CAUTION!!!!
```

Figure 4: Caution Message is displayed when the baby is trying to come out of the cradle

Implementation and result of the first objective is shown in Figure 3 and the output is shown in Figure 4.When the baby tries to come out of the cradle, the ultrasound sensor detects it and alerts the caretaker or parents.

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"Android Controlled Wildlife Observation Robot"

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Abstract: ***Now a days poaching and smuggling of animals have caused threat to the wildlife and has led to the endangerment of most of the species. To keep a count of this endangered species and their movement conventionally we have been using Geo tagging method which allows us to keep a track of the movements of the particularly tagged animals. But Geo tagging doesn't provide us a true data and where about of the particular animal. Therefore, we are here with some new concept: Wildlife Observation Robot. The robot has night vision camera which is being mounted for 360 degrees angle. The robot allows the user to control the Camera wirelessly and get required angle of the wild animals, and alert on illegal activities such as poaching, forest fires, traps for animals and human trespassing. The robot will be able to detect the animals using a pre trained module for better accuracy***

Keywords: Wildlife, Robot, Arduino UNO, Bluetooth, Raspberry Pi

I. Introduction

Android controlled wildlife observation robot is an autonomous robot that is android controlled robot used for better observation of wildlife. Nowadays poaching and smuggling of animals have caused a threat to the wildlife and has led to the endangerment of most of the species. Many of the endangered species have threat of becoming extinct. Wildlife observers need to get a close footage of wild animals by getting into their habitats. It is not always safe to get close to all wild animals. The use of automatic equipment for observing wildlife has become very common and there are several advanced cameras used for this purpose. Biology field work is highly labor intensive; however, it is becoming more sophisticated.

There are thousands of wildlife photographers exploring the beautiful forests around us and capturing stunning pictures of animals. To obtain superb shots, it becomes important to keep the camera in places where it may seem impossible. Conventionally, camera traps have been used, which are stationary cameras triggered whenever an animal breaks an invisible

infra-red beam. This method requires a lot of luck, patience and time.

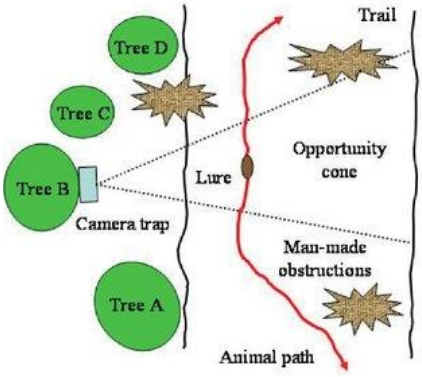

Fig 1: Conventional camera trapping technique

Camera with infrared and thermal sensor provides the ability for the camera to get footage during night too. The ability to track wildlife in natural environments while remaining undetected poses many technological challenges.

Something as simple as the observer's sound, scent or sight may also influence the animal's natural behavior and in turn invalidate the information gained from the research. But when it all works out, the footage and knowledge gained can be highly rewarding. By developing the technology to allow our robot to contend with the issues of maintaining constant observation of a target, we needed the robot to be able to move silently and purposefully when tracking a natural target without being detected.

II. Literature Review

[1] Atul Thorat et.al introduced a wildlife observation robot that was controlled by the user from a far distance and captured it.

[2] A similar surveillance robot was proposed by Nolan Hergert et.al. The authors developed an android controlled robot for surveillance which was used remotely.

[3] A range based navigation system for mobile robot was proposed by N.MacMillan which used Markov Chain Monte Carlo (MCMC) algorithms to enhance the navigable regions and routes in the environment to allow the robot to successfully complete the tasks.

[4] Achinta Das et.al proposed a system that can monitor the forest fires without disturbing the natural ecosystem.

[5] Three applications of wildlife monitoring: location tracking, habitat environment observation, and behavior recognition was proposed using GSM communication by Tao Yang. Et.al.

[6] Mohd Muntjir. et.al proposed a night vision technology using image enhancement and thermal imaging to be able to see in the dark.

[7] Zainab Hussein Yahya, et.al designed a fire fighter robot with night vision camera to be able to automatically extinguish fire from a safe distance and to capture live feed.

[8] To reduce the human victims, Ajinkya Jadhav, et.al. proposed a RF Controlled Spy Robot with a Night Vision using Rf technology that had a range of 200m.

[9] Robots used in military are long hauling anc can be operated from a far distance. So to track them, M M S Sulong, et.al. developed a Real Time Night Vision Camera Monitoring Robot integrated with DTMF and GPS System.

[10] A study by Franck Trolliet for the increasing needs for surveillance for prey animals have come up with a camera trap methods.

III. Block Diagram

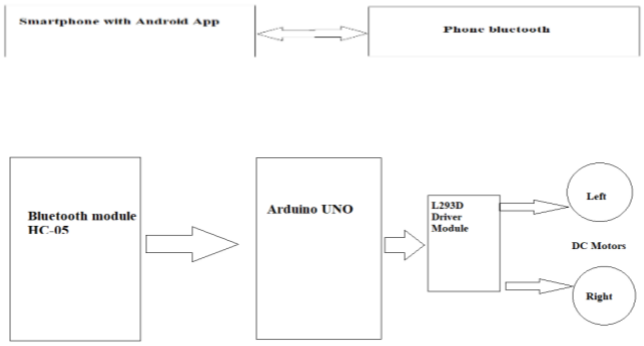

Figure 2: Block Diagram of Transmitter and Reciever section

This proposed system will give the user to sit in the base and monitor each and every activity inside the forest and alert the user for illegal activities taking place in the forests.

IV. Objectives

1. To design an application to control the robot: - All the operations of the robot are controlled by an application via Bluetooth connectivity using the Bluetooth module HC-05. The commands are loaded into the arduino at the beginning, a virtual joystick is prepared for the same command in order to control the robot in a desired manner.

2. To alert on forest fires: - Flame sensor is used for the purpose of detecting fire as sensor is more sensitive to ordinary light according to its reactions. This module is able to detect the flames of wavelength in 760nm to 1100nm extent of light source. The single-chip and small plate output interface can be straightly connected to the microcomputer (Arduino) I/O port. When the flame is detected, flame sensor senses and the Arduino sends the message to the user. The message is shown as an alert by sound and vibration.

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V. Implementation

Flowchart and Algorithm

Flowchart:

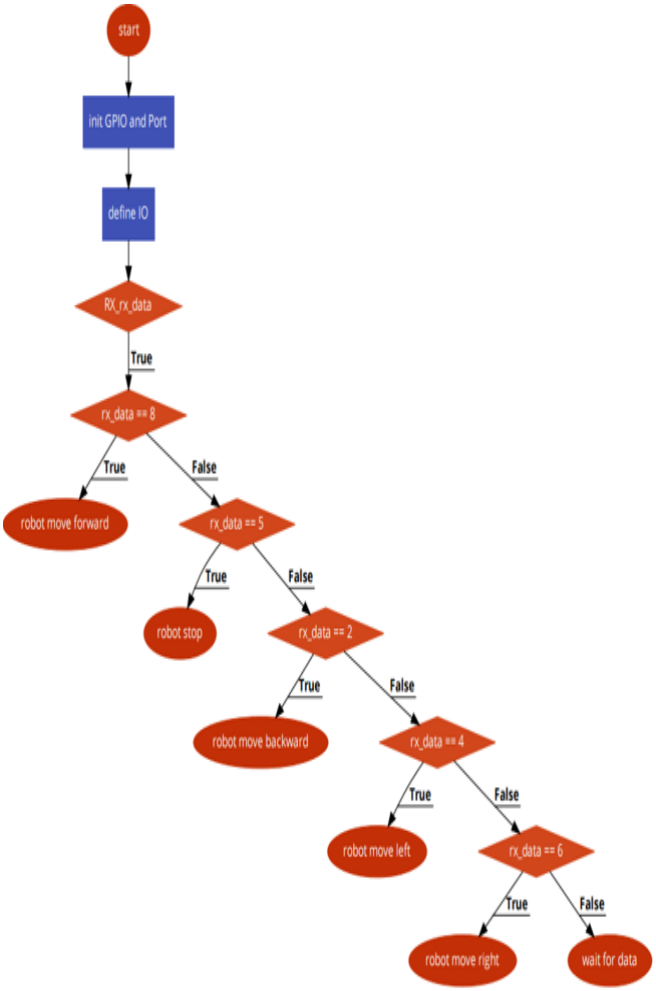


Figure 3: Flowchart of objective 1

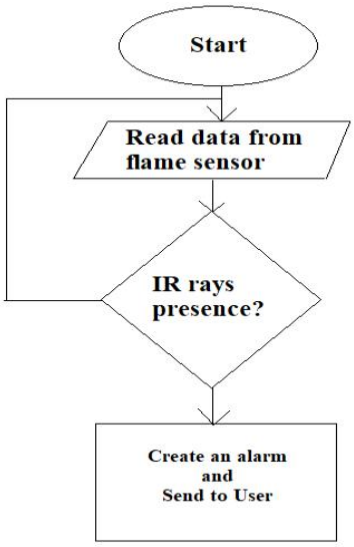


Figure 4: Flowchart of objective 2

Algorithm:

Objective 1

Step 1: Start the program.

Step 2: Initialization of Bluetooth package.

Step 3: To get mac details.

Step 4: Check system for permission access and search for device.

Step 5: If the device is found, pair the robot.

Step 6: Input Bluetooth password, if the password is correct, the robot will get paired and communicate.

Step 7: If the password is incorrect, repeat from step 3.

Stop 8: Stop the program.

Objective 2

Step 1: Start the program

Step 2: Read the data from flame sensor

Step 3: If IR radiation detected in the flame, go to step4

Step 4: Send data to Arduino, create an alarm and send to the user.

Step 5: If radiations not detected, repeat from step 3

Step 6: Stop the program

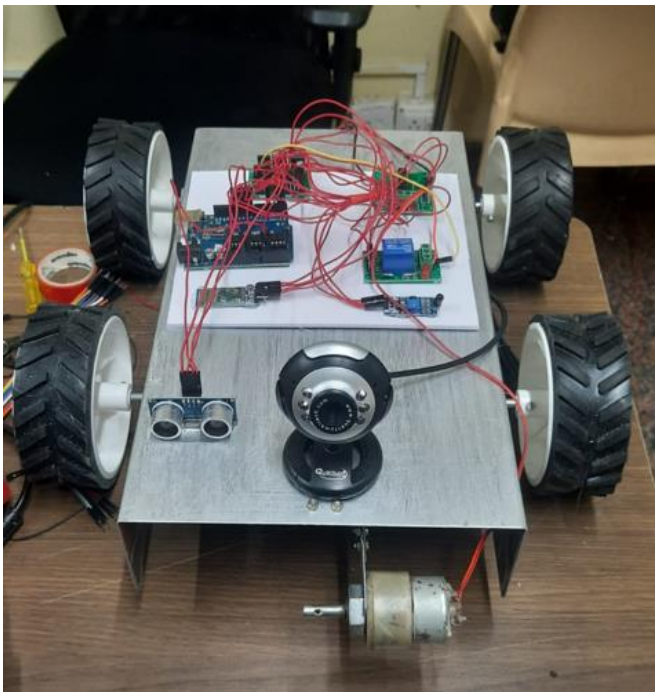
Working:

Connect the android application via Bluetooth to the robot. We open the virtual joystick which lets us to control the robot operations in a desired manner. When the flame is identified alert is created in the app by a buzzer. Neceesary actions are then implemented to control the forest fires.

VI. Future Scopes

1. Animal Detection using AI can be implemented.
2. Range of the robot can be extended using XBEE technology.

VII. Result



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Design And Analysis Of *Multiple -Input OTA Circuit* For VLSI Implementation Of Neural Networks

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***Abstract* — An Operational Transconductance Amplifier (OTA) is suitable for the VLSI implementations of artificial neural networks. This paper is mainly concentrating on design of MIOTA circuit modeling for one neuron. Keeping this as a main aspect, Opamp specifications are taken into account, i.e., Gain, phase margin, slew rate, power dissipation and others. This work presents a design and implementation of MIOTA circuit. It generates an output voltage which is sigmoidal like function of the linear sum of a number of weighted inputs. Weight of each input controlled by the bias voltage. Simulation process is carried out by using an EDA tool cadence virtuoso with 90nm technology.**

Keywords— opamp,Cadence,90nm technology, gain

I. INTRODUCTION

The Operational transconductance amplifier (OTA) is still a fundamental building block in modern microelectronics. In order to achieve high performance , OTAs with high DC gain, GBW and large output swing is required. The challenge faced in CMOS technology is mainly about scaling these devices to decrease their size and power consumption. However increase in the gain improves the performance and keeps up the stability of device.

Recently there has been an increase in interest in artificial neural networks for use in artificial intelligence applications. This will especially useful in the pattern recognition or optimization with many simultaneous constraints.

Work in this area is still developing still unknown about how biological networks work. In order to simplify the analyses , most work uses the simplest possible model of a neuron. The output function is mostly a nonlinear monotonic increasing function ,typically a sigmoid.

Working models of artificial neural networks have been demonstrated through , so far, they have been limited in the size. These circuits are much faster than software simulations running on conventional computers.

The circuit presented in the following paragraphs may be useful for the VLSI implementations of neural networks.it generates an output voltage which is sigmodial like function of the linear sum of a number of weighted input voltages. the weight of the each input which is controlled by the bias voltage which can be varied dynamically. The inputs have a wide linear range and the number of inputs for each circuit can be large.

II . BASIC CIRCUIT DIAGRAM AND ITS SPECIFICATIONS.

Fig. 1 shows the basic building block which represents one weighted input to the neuron. It sinks an output current, I, which is a linear function of the input voltage vgs1 and has transconductance which is controlled by the bias voltage vb.

(The transconductance is defined as *dI/dV*, and is the gain of the module.) When the outputs of a number of these blocks are connected to a common node, the currents sum according to Kirchoff's current law and an op amp can then be used to convert the current to an output voltage which is the weighted sum of the input voltages.

The following paragraphs develop this in more detail.

In Fig. 1, when MOSFET Al is biased in its active region, vgs1— vt1 > vds1, the current can be written as

$$I = \beta[(vgs-vt1)- vds1/2]vds1 \text{ ---------- (1)}$$

where *beta - (y C,,)W/L* is determined by the fabrication process and the size of the transistor. Vt1 is the threshold voltage of M1. When W2 /L 2 >> W1 /L 1 and M2 is biased in its saturation region. (Vgs2-VT2< Vds2) , then Vds1= Vb-VT2.

If vb is a constant voltage, and it is assumed that VT= VT1=VT2 then I can be written

$$I = \beta(V_b - V_T)\left[V_i - \text{ Vb/2+VT/2 }\right] \text{----------(2)}$$

Or

$$I = G (Vi- Voffset) \text{ ----------(3)}$$

when M1 biased in its active (ohmic) region, *I* is a linear function of the input voltage vi= vgs1 and has a transconductance, *G* controlled by the bias voltage Vb.

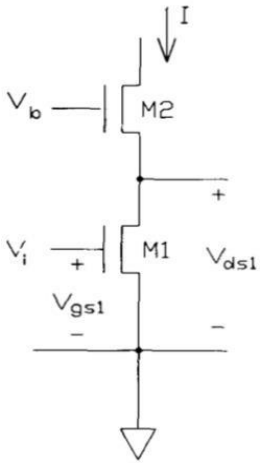


Fig 1. Mosfet structure representing one weighted input

From the Fig 1 shows a graph of the response I versus Vi as a function of Vb=VB for a test chip which was fabricated in the CMOS process. When Vgs1 < Vb , the response is nonlinear and I approaches 0. For Vi > Vb the linearity of the response is most strongly dependent on the ratio of the W/L with larger ratios giving a more linear response but generally requiring more circuit area.

These are much larger than the minimum size devices because the original circuit was designed for linearity and frequency response rather than the area efficiency. When the no of these blocks are connected to a common node , the currents sum according to kirchoffs current law. When these two modules are combined with unity gain current mirror the output current will be

$$I_{out} = \sum \pm G_i(V_i - V_{offset}) \text{ ----------(4)}$$

III. DESIGN AND IMPLEMENTATION OF MIOTA CIRCUIT USING TECHNOLOGY.

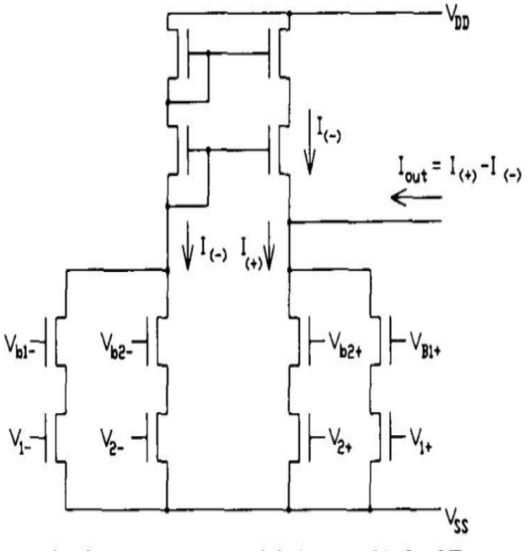


Fig 2 : Four input multiple input OTA (MIOTA)

The circuit of the fig 2 recognized as a four input OTA. The voltages Vi and Vbi has been reffered to a low supply voltage. Typically analog supply voltage of + or – 5V and Vbi = - 3.5V.The circuit in fig.2 was originally designed for use in conventional adaptive signal processing applications with special emphasis placed on obtaining a wide linear range and multiple inputs. The transconductance is controlled by the bias voltage in a continuous fashion and is used to tune the circuit. In order to remove the offset voltage which is undesirable in most applications, the groups of modules on either side of the current mirror are made symmetrical in size and bias voltage.

Certain optimizations of this circuit can be made for use in neural networks. First, the number of inputs can be greatly increased. Second, symmetrical excitory and inhibitory inputs are not required. This will give the circuit an overall offset but, typically, one or more inputs would be dedicated to setting the node threshold and these would be adjusted to account for the offset. Finally, since neural networks do not require a very linear response, the relative sizes of the input transistors can be reduced to save circuit area.

If the linearity requirement is removed altogether and M1 is operated in the subthreshold region . will still control the transconductance and the structure becomes similar to the links used. This will minimize current consumption but places a restriction on the allow- able input voltages. The analysis above ignores a number of second order error sources such as device size mismatches and differences in *VT* due to process variation and source—substrate bias.

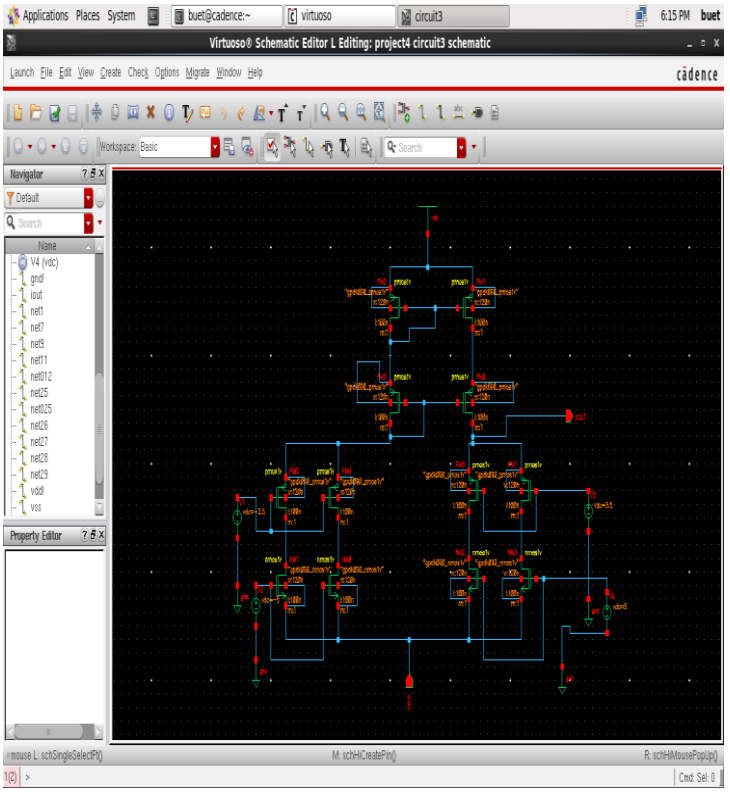


Fig 2 Implementation using 90nm technology.

IV. CIRCUIT FOR MODELLING ONE NEURON AND ITS IMPLEMENTATION

Fig 3 shows how the circuit can be used to implement an artificial neuron. The operational amplifier and resistor convert the output current to a voltage which, for equally sized devices, is given by

$$Iout = \sum \pm Gi\ (\ Vbi - VT)(Vi\text{-}Voffset) \quad \text{----------} \quad (5)$$

and

$$Vo = RF(\ Iout\ ) \quad \text{.....} \quad (6)$$

where *F(Iout)* is a nonlinear function describing the saturation behavior. (6) holds when each input Vi > Vbi,. When *Vi* < V_{bi} , the response becomes nonlinear and *dI /dV,* approaches 0. When the magnitude of *Igg,* is greater than some value, the output voltage Vo, will saturate at the supply voltage.

These natural limiting effects give the circuit response a sigmoidal shape. ("Sigmoidal" is used here in the sense of any smooth "S" shaped curve; it does not refer to a specific function).

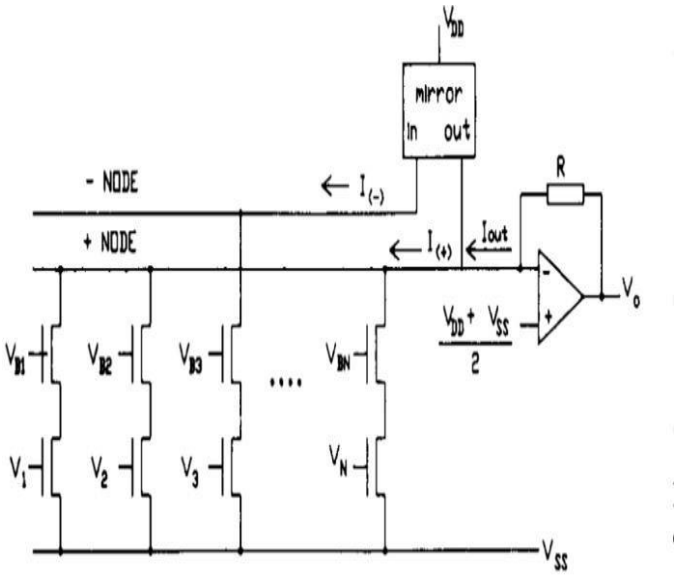
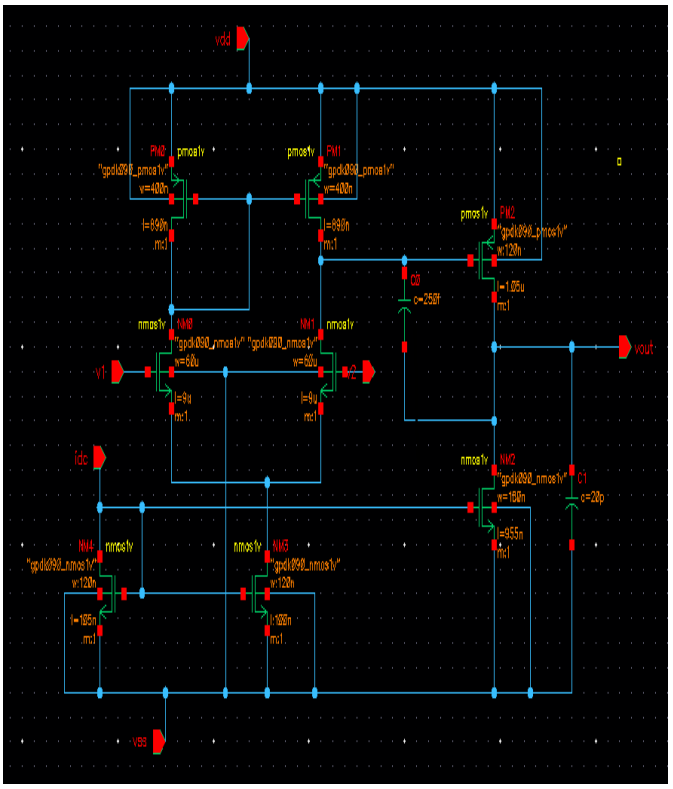


Fig 3. MIOTA circuit modeling one neuron.

This circuit appears to be useful for the VLSI implementations of neural nets because each weighted input or link can be realized with just two MOSFET transistors and all inputs are high impedances which respond to voltages rather than current. The advantage over typical op-amp voltage summing circuits because the weight of each input is continuously controlled by the bias voltage rather than the being determined by a fixed resistor or being switched in discrete steps.

The limited input impedance of each resistor in the typical op-amp summing circuit means that a node driving a large number of these inputs would be required to source a relatively



From Fig 3.Op-amp circuit diagram using 90nm technology

Fig 4. Op-amp circuit output using 90nm technology.

Regular arrays of these circuits can be laid out in a crossbar arrangement to create large VLSI networks.

This paper does not address the problem of how the *N X* M bias voltages needed to control the weights of a circuit with *N* inputs and If outputs would be generated and stored. One method would be to store the voltage on a capacitor which is periodically refreshed by another system addressing the capacitors in a row/column fashion.

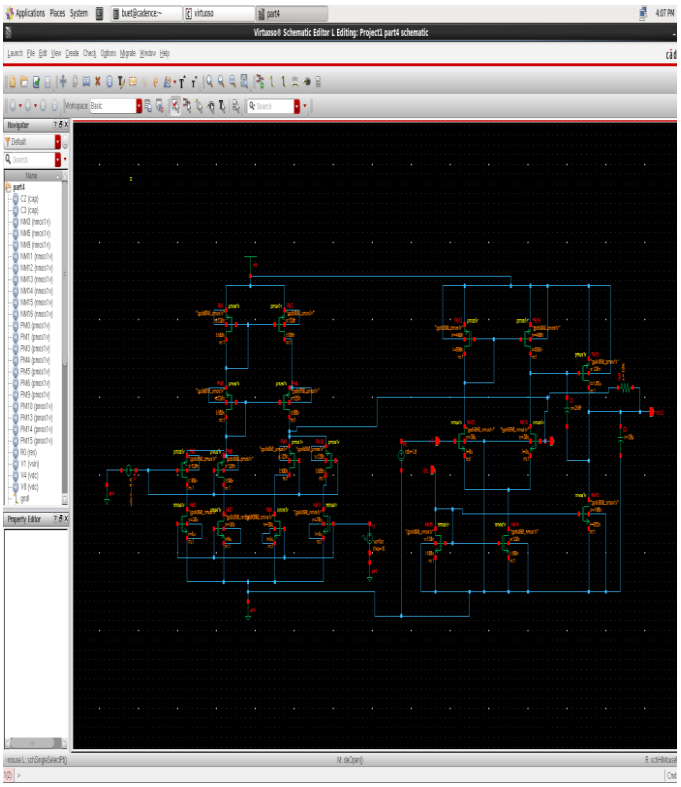


Fig 4 : MIOTA circuit modeling one neuron

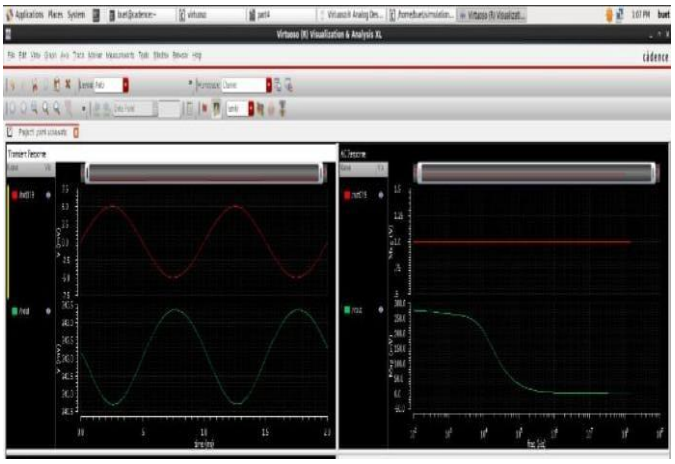


Fig 5: output of the MIOTA circuit modelling one neuron

This synapses circuit might also be used if, as in biological networks, pulses with a firing rate proportional to the signal are used rather than dc voltages. The circuit pro- duces a current proportional to the weighted sum of the input signals which could be integrated on a capacitance. The output pulses could then be generated by a simple op amp circuit.

V. CONCLUSION.

A multiple-input OTA circuit has been presented which may be useful in VLSI implementations of neural net- works. It generates an output voltage which is a sigmoidal function of the linear sum of a large number of input voltages, each input having a weight which is set by an externally controllable bias voltage. Large numbers of these cells can be fashioned in regular arrays. It appears to be efficient because each weighted connection is implemented with only two MOSFET transistors.

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Multi-Scale Wavelets for Quality Video Frames

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***Abstract*—** Immersive Multimedia or Virtual Reality as it is sometimes known, is the realization of real-world environment in terms of video, audio and ambience like smell, airflow, background noise and various ingredients that make up the real world. Virtual Reality remains in research and experimental stages. The objective of this research is to explore and innovate the esoteric aspects of the Virtual Reality like stereo vision incorporating depth of scene, rendering of video on a spherical surface, implementing depth-based audio rendering, applying self-modifying wavelets to compress the audio and video payload beyond levels achieved hitherto so that maximum reduction in size of transmitted payload will be achieved. Considering the finer aspects of Virtual Reality, we propose to implement like stereo rendering of video and multi-channel rendering of audio with associated back-channel activities, the bandwidth requirements increase considerably. Against this backdrop, it becomes necessary to achieve more compression to achieve the real-time rendering of multimedia contents effortlessly.

***Keywords*—** Discrete Cosine Transform (DCT), Quantization, Artificial Neural Networks, Root Mean Square Error (RMS), Peak Signal to Noise Ratio (PSNR),

I. INTRODUCTION

Audio has attained unimaginable clarity by splitting the spectrum into various frequency bands appropriate for rendering on several speakers or acoustic waveguides. The combination and synchronization of audio and video with better clarity has transformed the rendition matched in quality by 3D cinema. Multicasting of several channels over a single station, program menu options, parental control of channels and various online activities like gaming, business transactions etc. through back-channel activities have made multimedia systems truly entertaining and educative. But then, there are several aspects of virtual reality that are missing from practical implementations even today names of the authors, should be checked before the paper is sent to the Volume Editors.

II. LITERATURE SURVEY

The existing implementations of Compressor and Decompressor follow the ISO Standard 13818. The standards evolved from MPEG - 1, MPEG - 2, MPEG - 4, MPEG – 7, and MPEG - 21. There are implementations of CODEC based on H.264 Standard, which uses Wavelets instead of DCT. MPEG2 implements the CODEC based on DCT. The shortcomings of existing CODECs are not adaptive to the patterns of the pixel residents in the video frames. MPEG2 uses a flat and uniform quantization while other implementation uses Vector Quantization techniques. It is important to observe that Vector Quantization, while being marginally superior in terms of compression ratio, has substantial computing overheads which counterbalance the gain resulting from better compression ratio for a given visual quality metric. There is a authentic need for better mechanisms of compression which will seek to achieve (1) decoding of pictures faster at the receiver end (2) compression ratio is better and (3) frames are constructed in better quality factor in terms of Peak Signal to Noise Ratio and Mean Square Error

III. IMMERSIVE VIRTUAL REALITY

Immersive Virtual reality it defines about ‘virtual’ and ‘reality’. The meaning of ‘virtual’ is near and meaning of ‘reality’ is as human beings what we feel or experience. Therefore, the ‘virtual reality’ term means ‘near-reality’. This is the classical definition of virtual reality. To make Virtual Reality nearer to reality, the video or images could be immersed in a 3D world with stereo/ 3D vision. Natural scenes are not flat but embedded in a 3D spherical world. Rendering these on a 2D flat screen removes the effect of depth of scene. Then again, the human visual system is stereo in nature. The scene is captured by both the left and right human eye giving a true sense of depth of objects within. Audio rendering has so far reached the level of DOLBY 5.1 with the use of 6 different bands. Although DOLBY 5.1 is considered the most sophisticated media of audio rendering, there is still a lot left in its implementation. DOLBY standard does not generate high frequency sounds around

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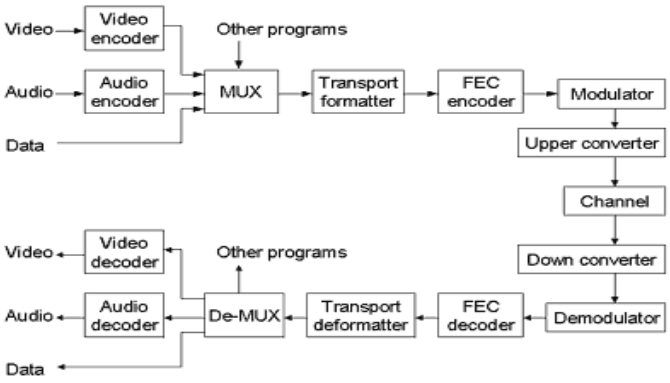
20Hz with much fidelity. Further, the depth of sound is not perceptible unless the speakers are arranged to synchronize with the acoustics of the room. This being the case, there is sufficient room for research in improving the quality with addition of adaptive noise cancellation, faithful reproduction of high frequency sounds (especially percussion instruments and piano), selective and mild echoing to generate pleasant aural effects. Virtual (Immersive) Reality seeks to combine the essential ingredients of audio, video and back-channel activities in unobtrusive ways to generate a real "virtual world". Adding of environment aspects will make Virtual Reality truly awesome. Although Virtual Reality has been around since a decade, we implementation targeting specific areas such as education, medicine, stock markets etc.do not see any true implementation that is worthy of being called realistic. Current implementations concentrate only on specialized

IV. Need for a more efficient Transport Protocol for Payload

To form MPEG-2 Transport Stream these streams are multiplexed with data source from the programs. Transport streams consists packets of 188 bytes length. To protect transport streams from interruption and noise in transmission channel the encoder FEC takes precautionary measurement. To transmit the suitable digital symbols the modulator converts FEC protected transport packet into digital symbol, which are preferred for transmission in the global channel. Upper converter is used to convert digital symbols into required appropriate RF Channel. The operation is in reverse order in the receiver section.



DTTB (Digital Terrestrial Television Broadcasting) system. The video, audio and data are compressed and multiplexed to get streams

V. ALGORITHMS

Our research work so far has been related to Stereo Video Rendering using 3D curvilinear coordinate system with Left and Right video frames, projecting the space-shifted frames on to the video display. Algorithms have been developed by us to give the effect of depth and perspective projection techniques have been used. Novel compression techniques based on multi-scale wavelets have been invented to generate a balance between video quality and compression levels.

The latest video quality assessment techniques based on CIDIED2000 color differences have been employed to ensure quality of reconstructed frames.

i. The inputs to the rendering codec are the Left and Right frames of the stereo vision camera. The frames are in RGB (Red/Green/Blue) pixel format. Since manipulation of color images is done in the Y,Cb,Cr, color space, the RGB pixels are converted to Y,Cb,Cr, using the following linear equations:

$$Y' = 16 + (65.481 \cdot R' + 128.553 \cdot G' + 24.966 \cdot B')$$
$$C_B = 128 + (-37.797 \cdot R' - 74.203 \cdot G' + 112.0 \cdot B')$$
$$C_R = 128 + (112.0 \cdot R' - 93.786 \cdot G' - 18.214 \cdot B')$$

The Y,Cb,Cr image is split into 3 planes Y, Cb, Cr, These three planes become input to the multi-scale wavelet algorithm.

ii. After application of the transform, we have 3 frequency planes corresponding to Y, Cb, Cr. The frequency planes of both Left and Right Images are digitally composited to get a single plane. For 3D to 2D rendering, we transform every X,Y,Z coordinate for rendering as follows:

Apply x-axis rotation to transform coordinates (x1, y1, z1)

a). x1 = x,
b). y1 = y*cos(Rx) + z*sin(Rx),
c). z1 = z*cos(Rx) - y*sin(Rx)

Apply y-axis rotation to (x1, y1, z1) to get (x2, y2, z2).

a). x2 = x1*cos(Ry) – z1*sin(Ry),
b). y2 = y1,
c). z2 = z1*cos(Ry)+x1*sin(Ry)

Finally, apply z-axis rotation to get the point (x3, y3,z3).

a). x3 = x2*cos(Rz) + y2*sin(Rz),
b). y3 = y2*cos(Rz) – x2*sin(Rz),
c). z3 = z2

iii. Apply mid-rise quantizer to the result of step 1. Each coefficient value is rounded as:

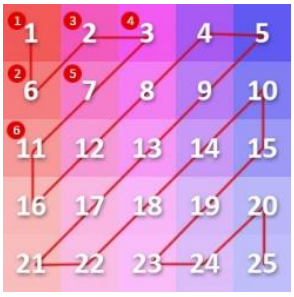
Pixel = floor (Pixel + 0.5)

iv. Quantization:

$$\begin{bmatrix} 16 & 11 & 10 & 16 & 24 & 40 & 51 & 61 \\ 12 & 12 & 14 & 19 & 26 & 58 & 60 & 55 \\ 14 & 13 & 16 & 24 & 40 & 57 & 69 & 56 \\ 14 & 17 & 22 & 29 & 51 & 87 & 80 & 62 \\ 18 & 22 & 37 & 56 & 68 & 109 & 103 & 77 \\ 24 & 35 & 55 & 64 & 81 & 104 & 113 & 92 \\ 49 & 64 & 78 & 87 & 103 & 121 & 120 & 101 \\ 72 & 92 & 95 & 98 & 112 & 100 & 103 & 99 \end{bmatrix}$$

The wavelet coefficients of step 3 are quantized using the above matrix to yield a coefficient array with smaller dynamic range.

v. Rearrange Coefficients in increasing frequency order:



We use the above scheme to rearrange the wavelet coefficients for subsequent compression.

vi. Temporal redundancy is achieved by adjacent frame differencing. Each pixel in the given frame is manipulated with the corresponding pixel in the next frame using:

Pixel(x,y) = Pixel-1(x,y) XOR Pixel-2(x,y)

The ANN and Fuzzy Engine is employed at this stage.

vii. Compression is done by Adaptive Huffman Coding – which is the industry standard method.

viii. The picture at the receiver end is clocked to the display by retracing steps 7 to 1 in the reverse order.

VI. RESULTS

File Name	(O) Size	(C) Size	% Comp	PSNR (dB)
frm2-00.bmp	522296	42801	91.8	1302
frm2-01.bmp	522296	51473	90.1	1290
frm2-02.bmp	522296	55790	89.3	1295
frm2-03.bmp	522296	56495	89.2	1301
frm2-04.bmp	522296	56269	89.2	1292
frm2-05.bmp	522296	58300	88.8	1291
frm2-06.bmp	522296	59766	88.6	1301
frm2-07.bmp	522296	59355	88.6	1289
frm2-08.bmp	522296	59148	88.7	1301

VII. CONCLUSION

On all the image files without exception, Neuro-Fuzzy Motion Compensation produced better compression ratios for a given quality factor. For evaluation of performance in compression time, we performed the compression of several images both by Neuro-Fuzzy Motion Compensation and MPEG2 Codec 500 times in a loop to determine the average time taken. While time for compression understandably varies across different images, the performance of Neuro-Fuzzy Motion Compensation was much better than that of MPEG2 video codec. The algorithm presented here lends itself very easily for implementation both in hardware and software. Future enhancements and extensions to this research work could include deployment of an additional layer clustering based on Markov's Chains. The structure of the implementation is such that any type of transform can be employed in the Neural Network, potential candidates being *wavelets* (in all its variations), *Hadamard* and *Walsh Transforms*.

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Smart Agricultural Development Modes and Technologies

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Abstract: ***More than 40% of the population in the world chooses agriculture as the primary occupation, in recent years the development of the autonomous vehicles in the agriculture has experienced increased interest. The project aims about the multiple agricultural tasks done by the single robot and design, develop and fabricate of the robot. To develop the efficiency of the agricultural tasks that have to find the new ways. This project deals with a novel approach for cultivating lands in very efficient way. The distinctiveness of this agriculture robot system is, multitasking abilities which can drilling, seeding, pumping water & fertilizers, to work in both agriculture, afforestation and gardening platform. This whole system of robot works with the help of battery and solar power.***

Keywords: Agriculture, Robot, Arduino UNO, Bluetooth

I. Introduction

Agriculture is the backbone of India. The history of agriculture in India dates back to Indus Valley Civilization Era and even before that in some parts of Southern India. Today, India ranks second worldwide in farm output. The special vehicles play a major role in various fields such as industrial, medical, military applications etc., [1] The special vehicle field are gradually increasing its productivity in agriculture field. Some of the major problems in the Indian agricultural are rising of input costs, non-availability of skilled labors, lack of water resources and crop monitoring. To overcome these problems, the automation technologies are used in agriculture. The agricultural census gives vital information on the distribution of land holdings in our country. According to the census majority of the farmers are having land less than 1 hectare [2]. This is one of the major drawbacks for the mechanization in agricultural sector in India. The vehicles are being developed for the process like ploughing, seed sowing, leveling, water spraying. All of these functions have not yet performed using a single vehicle. In this project, the robots are developed to concentrate in an efficient manner and also it is

expected to perform the operations automatically. The proposed idea implements the vehicle to perform the functions such as ploughing, seed sowing, mud leveling, water spraying.[3] These functions are integrated into a single vehicle.

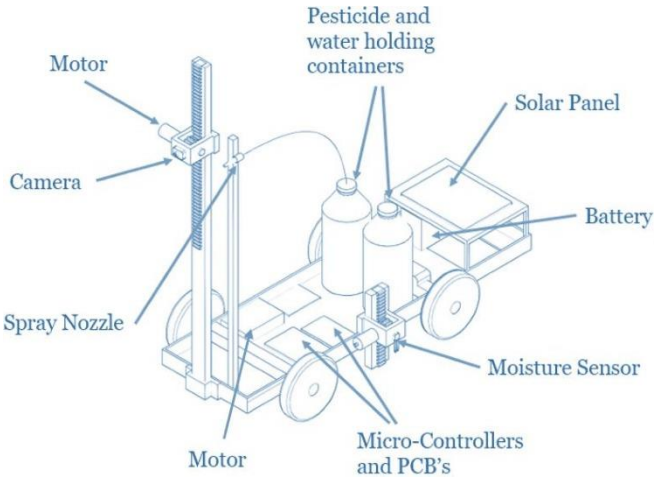


Fig 1: Layout of Multipurpose Robot for smart farming

II. Literature Survey

Fang Wu. Et.al.[01] Proposed a model that provides a technical reference for automatic agricultural picking and positioning in hilly farming. The diversification of China's farming environment has led to a low degree of agricultural mechanization. Three-dimensional path planning can enable agricultural machinery to play a role in mountainous and hilly areas. Zhao Bo, et.al.[02] Introduced a new method that is effective on the shadow environment, and could obtain the target navigation path rapidly, reliably and accurately. This paper investigated the influence of the shadow environment on the path recognition for the vision navigation system of the agricultural wheeled-mobile robot. G. Belfort, et.al.[03] Proposed manipulator is a structurally simple but reliable device that can operate in high level of automation greenhouses. Many agricultural operations, like precise fertilization, plant disease detection, spraying and selective harvesting, could be routinely performed by robots. K Durga Sowjanya1, et.al.[04] The Proposed system aims at designing multipurpose autonomous agricultural robotic vehicle which can be controlled through Bluetooth for ploughing, seeding and irrigation systems. More than 40 percent of the population in the world chooses agriculture as the primary occupation. Christoph Schuetz, et.al.[05] Proposed an application in addition to traditional industrial production for robot manipulators (e.g., agriculture, human areas) requires extensions to the sensor as well as to the planning capabilities. Motion planning solely based on visual information performs poorly in cluttered environments since contacts with obstacles might be inevitable and thus a distinction between hard and soft objects has to be made. Alberto Pretto, et.al.[06] Introduced a scientific and technical outcome obtained within the Flourish project, providing insights and practical details on the lessons learned in several areas ranging from robot navigation, mapping, and coordination up to robot vision, multispectral data analysis, and phenotyping. Joerg Baur, et.al.[07] Agricultural work still involves demanding and exhausting duties. The application of autonomous robots is a possible way to support human labor in the field. By adapting the robots to several tasks, like harvesting or cultivation of different types of crops, costs can be reduced while the flexibility of the system is increased. Sunita Meti, et.al.[08] The designed Robotics techniques are efficient for achieving the tasks such as automatic cultivating, seed providing, water sprinkling, insecticide spraying and Grassland wounding with the help of solar energy. Seeds are spread in 4 rackets at a

single instant. Agriculture is considered as one of the most important economic activities in India. Hector Fabio Cadavid Rengifo 1 and Javier Alberto Chaparro Preciado.[09] Introduced some obsolete - but common- practices in the application of fertilizers and pesticides are causing serious environmental problems in Colombia; a situation that could be addressed by combining robotics and modern farming management principles, for example, the Precision Agriculture. Akhila Gollakota and M.B. Srinivas.[10] Agribiont is a robot designed for agricultural purposes. It is designed to minimize the labor of farmers in addition to increasing the speed and accuracy of the work. It performs the elementary functions involved in farming i.e., ploughing the field, sowing of seeds and covering the seeds with soil. Ranjitha B, et.al.[11] The present methods of seed sowing, pesticide spraying and grass cutting are difficult. The equipment's used for above actions are expensive and inconvenient to handle. So, the agricultural system in India should be encouraged by developing a system which will reduce the man power and time. Bhao, et, al. [12] Camera calibration is the base of the machine vision based the autonomous navigation of the agricultural wheeled-mobile robots. There is the complex nonlinear relationship between the actual position points and the matched image points. Therefore, the camera parameters have to be calculated by a precise imaging model.

III. Methodology

Initially, based on the key activated on remote controller unit, microcontroller input lines take that data and produces corresponding signal through output lines. The information is carried to RF receiver through the transmitter and antennas. This information is carried in the form of either radio or electromagnetic waves. This frequency waves themselves cannot travel long distances. So here, frequency wave gets superimposed with the carrier frequency wave. This modulated signal can reach long distances and that is transmitted to RF receiver and gets demodulated.

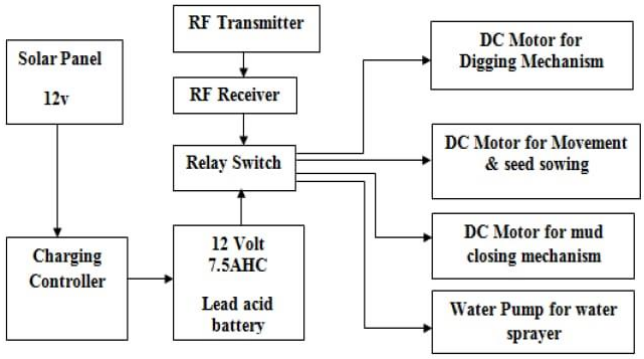


Figure 2: Block Diagram of Transmitter and Receiver section

Relays will be activated depending upon the desired motion. If an R1 relay is activated D.C motor 1 will rotate clockwise direction and when R2 relay is activated, the D.C motor 1 will rotate in anticlockwise direction. Similarly, if R3 relays is activated D.C motor 2 will rotate clockwise direction and when R4 relay is activated, the D.C motor 2 will rotate in anticlockwise direction.

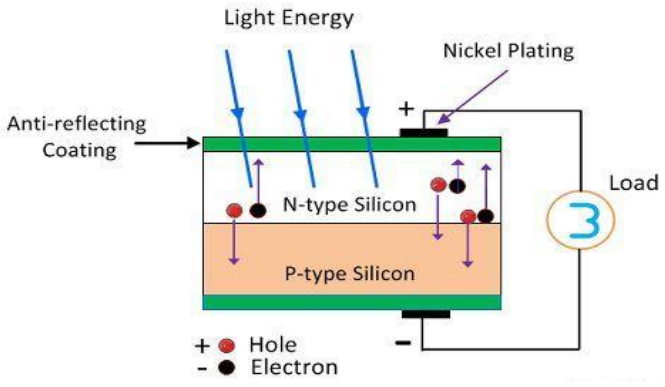


Figure 3: Photovoltaic Cell

A solar cell, or photovoltaic cell (Fig 3), is an electrical device that converts the energy of light directly into electricity by the effect, which is a physical and chemical phenomenon.

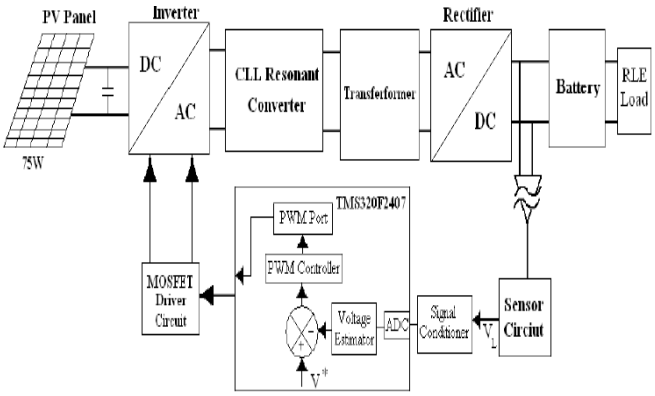


Figure 4: Block Diagram of Solar panel to Battery Storage System

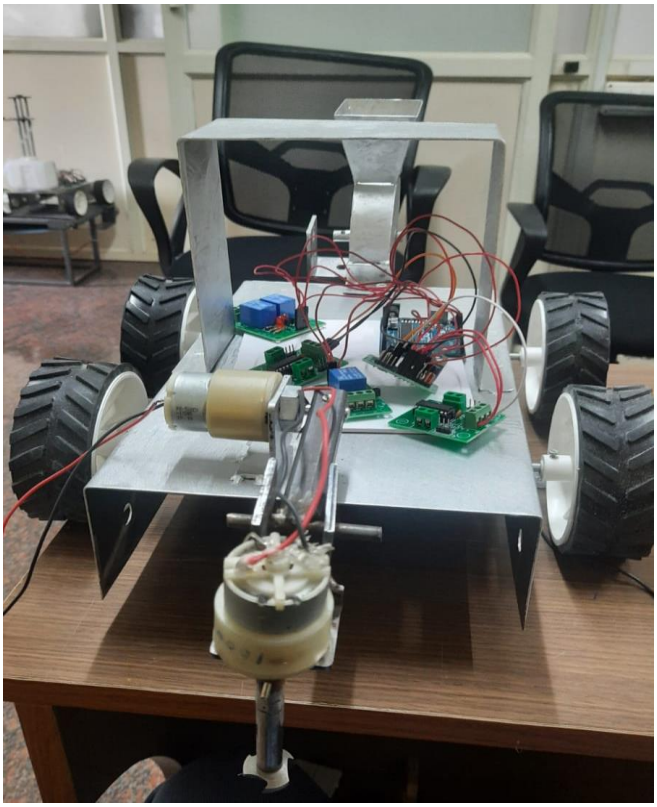
Batteries store and produce energy as needed. In PV systems, they capture surplus energy generated by your PV system to allow you to store energy for use later in the day. Like technologies such as fuel cells, a battery converts chemical energy to electrical energy. Solar panel to battery storage system is shown in Fig 4.

This proposed system will give the user to sit in the base and monitor each and every activity in the agriculture.

Conclusion:

An autonomous multipurpose agricultural robot is designed to perform the complex farming tasks like seed sowing, spraying, land leveller, digging and ploughing. The benefits of robot are reduced human intervention and efficient resources utilization. Instructions are passed to the system using Bluetooth which ensures no direct contact with human and thus safety of operator is ensured. The robot is solar power driven therefore it is renewable energy source. The operations are performed using android app. By using this advanced technology, farmer can save more time and also reduce lot of labour cost. The machine requires less man power and time compared to traditional methods, so manufacturing it on a large scale reduces the cost and would satisfy the partial thrust of Indian agriculture. In this way labour problem is overcome, that is the need of today's farming in India.

VII. Result



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Analysis of Network on Chip Router

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Abstract*— Network-on-chip is a new prototype model in complex system-on-chips that provide an effective on chip communication networks. The information is transmitted through the interconnected modules in terms of packets. The routing of data is mainly done by routers. So, the router architecture must be efficient with lower latency and higher throughput. In this project, we design and implement a 2D Network-on-Chip router mesh having four ports connected to other ports in four directions and fifth connected to the processing element through a network interface. This project is aimed to improve "Quality-of-Service" by employing algorithms like wormhole, routing, arbiter and crossbar switching.

Keywords*— Networks-on-chip, System-on-Chip, Chip-multiprocessors, QoS, Label switching, Flitting, Bandwidth reservation, Streaming applications

I. INTRODUCTION

Network-on-Chips help in managing high complexity of designing large chips by decoupling computation [1]. NoCs service chip multiprocessors (CMPs) or system-on-chips (SoCs) are expected to meet QoS demands of executing applications. The two basic ways in NoC design to enable QoS guarantees are: creation of stored connections between source to destination node via label switching and support routing based on priority. High throughputs and efficient interconnect utilization have been provided by packet switched networks . However, they need to be over-provisioned to support QoS for various traffic classes and also have high buffer requirements in routers. On the other hand, circuit switched NoCs guarantee high data transfer rates in an energy efficient manner [2]. This is done by reducing intra-route data storage. These are best suited for streaming applications in which the communication requirements are well known. By establishing provisioned, contention-free routes between nodes, adequate throughput, latency and bandwidth guarantees between process blocks can be provided. These methods use hardware or software managed resource reservation techniques, Or they implement priority-based schemes along with resource sharing between connections across time and space. When there is a traffic containing same priority, priority-based schemes come into play. A centralized, resource reservation scheme is practically infeasible because of the magnitude and complexity of such a system [3]. While on the other hand, on-chip networks are smaller and less dynamic SoCs are designed to meet specific application demands with well-known input, output and traffic scenarios. Circuit switching schemes have been shown to deliver QoS for specific applications.

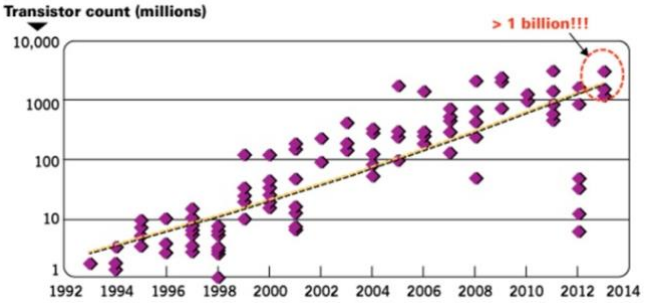

Fig 1: Evolution of transistor integration on a chip

Circuit switching schemes which aim at identifying shortest path circuits in a static manner block network resources for the lifetime of the connection. Such schemes will not utilize network resources effectively. We present a Label Switching based Network-onChip (LS-NoC) in this paper which is motivated by throughput guarantees offered by bandwidth reservation. Such NoC amidst resource competing processes can be used to service hard bandwidth and throughput guarantees to streaming applications in a multiprocessor environment.

II. LITERATURE SURVEY

The paper [6] examines the impact of failures on the on-chip reliability interconnects and develop corresponding counter measures either to prevent or recover from them. In this regard, several schemes to remedy various kinds of error

symptoms, while keeping area and power at a minimum. Over a normal transmission scheme, it requires a 3-flitting retransmission buffer per virtual, since a flit should be kept for 3 cycles after it leaves the current node. The simplest type of transmission buffer is a Queue working on the principle of First-In First-Out (FIFO) buffer[25]. Such implementation has one input port and one output port, and have a control logic. The concept of deadlock has been enormously stressed upon. Some of errors mainly encountered in the router are VC allocator error, crossbar error, handshaking error. The scheme was shown to be very effective in terms of both latency and power even under high error rates. All of these mechanisms described in the work keeps the critical path of the Network on Chip router intact.

The work proposed in [9] describes the design of Network-on-chip routers based on power consumed and its area occupied by chip. Proposed architecture of on-chip router in this gives the results in which power consumption is reduced and silicon area is also minimized. This router for NOC increases throughput, and introduce architecture which shows a improvement in Figure Of Merit at the expense of area and power due to extra crossbar and arbiter scheme, and got up to 94% of throughput but power consumption is increased by the factor of 1.28. [10] This approach gives the reduced power consumption. It also addresses the buffer utilization by making the channels bidirectional and shows drastic improvement in the performance of system. But in this case, each channel controller will have two additional tasks: dynamically configuring the channel direction and to allocate the channel to one of the routers, sharing the channel. A router architecture with Reliability Aware Virtual Router allocates more memory to the busy channels and less to the idle channels. This dynamic allocation of storage shows a latency decrease of 7.1% and 3.1% under uniform traffic and transpose traffic patterns respectively at the rate of complex memory control logic. This solution is delay efficient but not area and power efficient.

II. RELATED WORK

Providing QoS guarantees in on-chip communication networks has been identified as one of major research problems in NoCs. In packet switched networks, QoS solutions use priority-based services. While in circuit switched NoCs, some form of resource reservation is used. Packet switched NoCs use differentiated services for traffic classes to provide latency and bandwidth guarantees. Circuit switched NoCs use resource reservation mechanisms to guarantee QoS. Resource reservation mechanisms involve identifying a sufficiently resource rich path, reserving resources along the path, configuration, actual communication and path tear down.

QoS in packet switched networks

One of the major drawbacks of priority-based QoS schemes is that increase in traffic in one priority class affects the delay on traffic belonging to other classes. A priority based QoS network loses the differentiated services advantage if all traffic belongs to the same priority level. Deadlock-free routing algorithms using virtual circuits with a priority approach [16] may lead to degradation in NoC throughput.

QoS in circuit switched networks

Resource reservation methods use one of the following two methods: (a) a path probing, service network, (b) an intelligent, traffic-aware distributed or centralized manager. Circuit switched, bus-based QoS solutions such as Crossroad, dTDMA and Heterogeneous IP Block Interconnection (HIBI) rely on communication localization to satisfy timing demands.

Point-to-point connections in NoCs are costly in terms of network resources and result in inefficient network utilization and poor scalability. Crossbar based solutions use protocol handshakes to establish a communication path between nodes. These protocol handshakes force nodes to wait till the handshake is complete before establishing a path. Non-interference of communication channels is achieved by over-provisioning resources in the crossbar. This leads to complex and poorly scalable networks.

If the shortest X–Y path is not available, route discovery mechanisms in other paths are initiated by the probe packets [19]. The probe-based route discovery mechanism is dynamic and is dependent on the current traffic in the NoC. If the circuit establishment does not succeed in the first attempt, the probe packet might repeat route discovery steps or try after a random period of time which leads to large route setup times that may be unacceptable for real time application performance.

Label switched NoC

Use of a centralized NoC Manager to identify resource-rich paths between communicating nodes is the unique feature of LSNoC. In the proposed work, we describe a Label switched, QoS guaranteeing NoC [8] that retains advantages of both packet switched and circuit switched networks. The key features and contributions of the work follow.

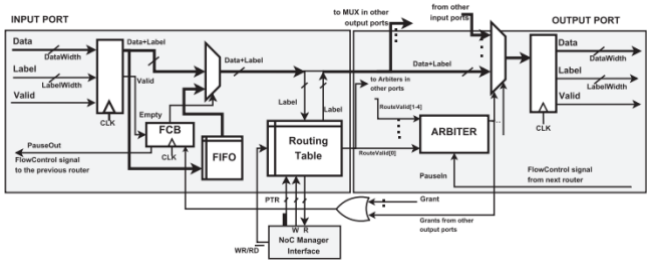

Fig 2: A single NoC Router

Figure 2 shows a Label switched router with single-cycle flit traversal. A valid signal identifies Data and Label as valid. Pause-In and Pause-Out are flow control signals for downstream and upstream routers. Arbiter receives input from all the input ports along with the flow control signal from the downstream router. The combinational circuitry between a single input port and an output port in the label

switched router is shown in Fig. 2. Incoming data flits are written into the FIFO if other flits are awaiting traversal or if arbiter does not grant access to the output port. The FIFO Control Block (FCB) handles FIFO pointer arithmetic and controls flow control signal of the corresponding input port [23].

Label switching inherently supports traffic engineering, as labels can be chosen based on desired next hop or required QoS services. Use of Multi-Protocol Label Switching (MPLS) for QoS in NoCs [12] and advantages of identifying communication channels using labels have been investigated. For hardware implementation, the router and NoC designs are not optimized. Implementation of label-based addressing in streaming applications has resulted in significant reduction in router area.

III. SIMULATED WAVEFORMS AND RESULTS

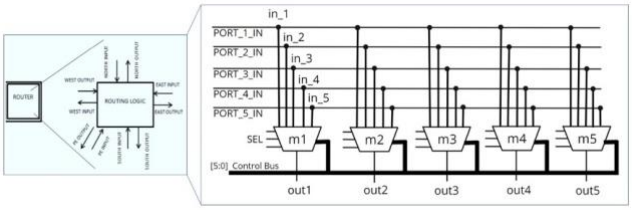

Fig 3: Implemented Crossbar Connection

Crossbar Algorithm

- Initialize input and output ports and all the wires for intermediate connections.
- Choose a MUX based on the conditions of select and enable lines from the instantiated 5 MUXs.
- Under cross bar module, case enable is used to re-direct port output to temporary registers.
- Default case is added to nullify inferring latch.

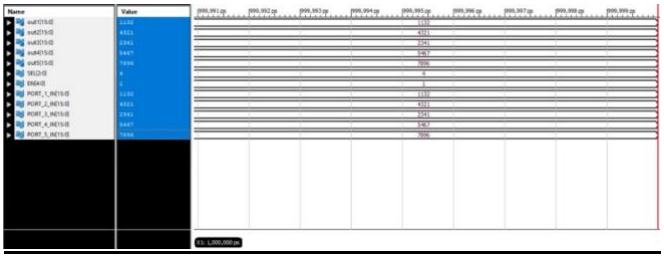

Fig 4: Simulation results of crossbar switch module

- Crossbar Switch with 5 MUX is verified in Xilinx Simulator.
- Each MUX has a select line and enable, based on the enable the corresponding mux is selected and all the possible combinations of that corresponding MUX is done using the select line.
- All possible connections of input and output ports are done.

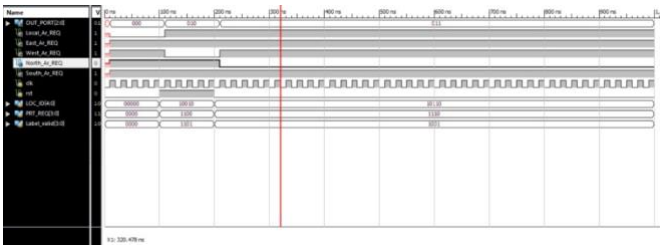

Fig 5: Simulation results of arbiter module

IV. CONCLUSION

Streaming applications have deterministic communication patterns due to pipelined nature of operation. Traffic engineering in LS-NoC guarantees QoS and delivers constant throughput in such applications.

The proposed LS-NoC services QoS demands of streaming applications using a traffic-engineering capable NoC Manager [18]. The centrally-managed, bandwidth-provisioned NoC Manager utilizes flow identification algorithms to identify contention-free, bandwidthprovisioned paths. Network visibility enables NoC Manager to configure bounded latency pipes in homogeneous and heterogeneous networks alike. Flow identification algorithm takes into account bandwidth available in individual links, to establish QoS guaranteed pipes. The algorithm allows sharing of physical links between pipes without compromising QoS guarantees.

The Label Switched (LS) router used in LS-NoC has a single-cycle traversal delay for contentionless traffic. The router is multicast and broadcast capable. Bi-synchronous or mesochronous input buffers in LS router enable multiple clock domain operation, without globally synchronous clocks. The LS-NoC router has a competitive FoM among compared designs. Further, the use of LS-NoC in general purpose CMPs where applications demand deterministic latencies and hard bandwidth requirements can be implemented. LS-NoC can be used as a separate layer, catering to applications requiring hard QoS guarantees.

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INDOOR PLANTS RECOMMENDATION SYSTEM TO IMPROVE THE AIR QUALITY

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***Abstract*— Indoor air quality has become increasingly important as our standard of living improves. In the twenty-first century, this is a major source of concern. The project's goal is to develop a smart solution in which the suggested system recommends appropriate plants to improve Indoor Air Quality (IAQ) dependent on a variety of parameters such as the amount of CO2 used by the plants, as well as their geographic location availability, as well as their compatibility with the surroundings. The project is divided into two parts, which are Back-end design and hardware design the sensor system is part of the hardware design. The sensors are connected to the ESP8266 micro controller via CD4051 multiplexer. The Measurements of air quality in parts per million (PPM) are taken and presented on the Arduino. IDE Serial Monitor (IDE Serial Monitor). Back-end the design entails the establishment of a Python dictionary that comprises.**

***Keywords*— parts per million IDE serial monitor Indoor air quality**

I. INTRODUCTION

Air is one of the fundamental components of man's environmental factors. The world's air is brimming with air which contains gases, for example, Nitrogen, Oxygen, Carbon Monoxide, Carbon Dioxide and hints of a few uncommon components. People need an air of air that is liberated from foreign substances. Air contamination is the presence of at least one impurity in the climate, for example, gases in an amount that can hurt people, creatures and plants. Air contamination kills an expected 7 million individuals overall each year. Metropolitan indoor air quality is a worldwide medical problem, since city occupant's burn through 90% of their time inside. Any abatement in indoor air quality straightforwardly influences human wellbeing and execution.

One of the best ways of further developing indoor air quality is keeping up with appropriate ventilations. Natural Protection Agency (EPA) concentrates on show that the degrees of contaminates in indoor conditions can be somewhere in the range of 5 and multiple times more noteworthy than outside air. The grouping of CO2 in outer conditions might shift as per many variables, including the presence or nonattendance of forests, development, traffic, the season, and so on, one way or the other, indoor air ought to be ventilated to decline the grouping of CO2. One of the elements that impact indoor CO2 fixations is the quantity of indoor plants. Indoor plants consume carbon dioxide and produce oxygen through photosynthesis. Photosynthesis, be that as it may, relies upon different ecological elements, like light and temperature. At the point when the essential conditions are not met, plants start breath, taking O2 from the climate and supplanting it with CO2. While plants are the main part to the oxygen and carbon cycle in nature, they are additionally significant inside. Plants truly affect individuals since they capability both to work on the style of a space and to further develop air quality. The other major indoor toxin, carbon dioxide (CO2), is delivered by human breath. Elevated degrees of CO2 (over 800 to 1000 sections for each million) make rooms feel "stodgy". Yet, wiped out building disorder like side effects can happen at much lower focuses than this. CO2 levels in the reach 400-750 ppm has no mischief to wellbeing. For 750-1000 ppm range the consideration needs to take. When CO2 levels are over 1000 ppm, building inhabitants can turn out to be very unwell.

II. LITERATURE SURVEY

A. **Jane Tarran et al**. introduced the utilization of residing pot-plants to scrub indoor air where Research facility studies with 9 indoor plant species and field concentrates on in 60 workplaces showing limits of indoor plants to further develop Indoor Air Quality (IAQ) by dependably lessening Total Volatile Organic Compound burdens and by eliminating indoor CO and CO2. Pruned Plant Microcosm (PPM) can significantly further develop IAQ. In this way, the PPM addresses a versatile, automatic, convenient, adaptable, minimal expense manageable and lovely bio filtration and bio remediation framework for IAQ.

B. **Andrew Smith and Michael Pitt** introduced plant scaping for indoor natural quality. Involving two workplaces in similar structure, one with plants and one as a control, day to day tests were embraced for relative moistness, carbon dioxide, carbon monoxide and (Volatile Organic Compounds) VOCs. Results were breaking down to recognize any distinctions between the workplace with plants and the one without. There was by and large decrease in CO2. Carbon monoxide levels diminished with

the presentation of plants and again with the extra plants. VOC levels were reliably lower in the non-established office.

C. **Mehmet Cetin and Hakan Sevik** Explained the Impact of Selected Plants on Indoor CO2 Concentrations. The estimations of CO2 inside the glass walled compartment were conveyed out by means of Extech Desktop Indoor Air Quality CO2 Datalogger, and the CO2 estimating gadget put in the compartment was set to quantify CO2 once like clockwork. This investigation discovered that all of the chose plants diminished the CO2 fixation somewhat during the day. The discoveries of the current review offer significant hints for picking plants in light of the qualities of the climate and the time spent in the climate.

D. **Kennedy Okokpujie et al** proposed a savvy air contamination observing framework. It examines how the degree of contaminations in the air can be observed utilizing MQ135 gas sensor, Arduino UNO microcontroller and an ESP8266 Wi-Fi module. The proposed framework continually monitors air quality in a space and shows the air quality estimated on a LCD screen. It additionally sends information estimated to the "Thing talk" stage. This checking gadget can convey ongoing estimations of air quality.

E. **Elisabetta Salvatori et al.** introduced a Nature-Based Solution (NBS) for Reducing CO2 Levels in Museum Environments: A Phytoremediation Study for the Leonardo da Vinci's "Last Dinner". The phytoremediation capability of tree plants was assessed at CO2 1000 ppm under controlled ecological circumstances. Besides, light-immersed net absorption (Pnmax) was estimated at two CO2 fixations (380 and 1000 ppm) during the developing season. The present work assesses the chance of decreasing the CO2 levels delivered by guests' breath in an air tight gallery climate, through the execution of a NBS, in view of the photosynthetic process worked by pruned evergreen plants developed inside.

III. BLOCK DIAGRAM

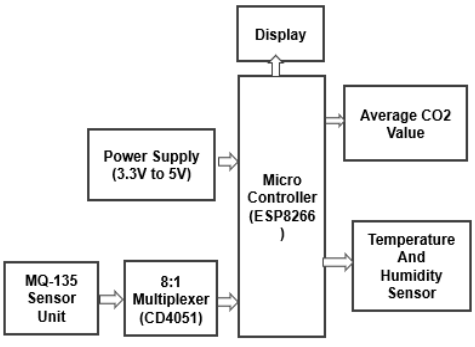

Fig 1: Block diagram of the sensing system

In Hardware Design the Sensing System is executed to quantify the air nature of the indoor space. Figure 1 shows the block schematic of the detecting framework.

Various parts utilized in the detecting framework are associated as displayed in the above block outline. It comprises of MQ-135 Sensor unit where up to eight such MQ-135 sensors (Analog Sensors) can be connected to the ESP8266 Micro-regulator utilizing 8:1 Multiplexer. The sensors are sent according to the prerequisites on the volume of indoor space. These sensors go about as contribution to the framework

A power supply of around 3.3 to 5V is expected for uses of sensors and other parts. The miniature regulator is modified to show the normal of the CO2 values read by every sensor. Every part is made sense of exhaustively. Digital input to the Select Lines of the multiplexer is used to read the sensors serially. Read the enabled sensor for around 5 seconds and display the value. When the input to select lines is changed the next sensor is enabled and readings of it are taken. Compute and display average of the CO2 values sensed by each sensor.

IV. FLOW CHART

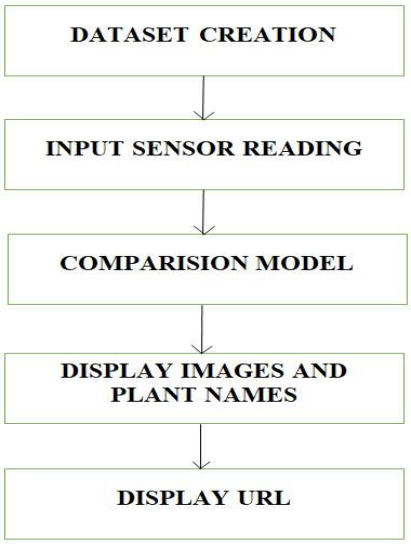

Fig 2: Flow chart

1. Import the Pillow Image library.
2. Upload every one of the essential pictures of plants in a similar document where the PyCharm project is found.
3. Take the client input with respect to the typical CO2

level in PPM estimated by the Sensing Framework and the present climatic condition.

4. Create a python word reference having plants name, its local accessibility, climatic similarity and its CO2 utilization level.
5. Using Image. Open () capability all the transferred picture records are opened and afterward doled out to a solitary variable "picture".
6. Check for the plants that matches the client inputs in the wake of going through different CO2 consumption ranges and other key-values determined in word reference utilizing if-else-if stepping stool.
7. Display the arrangement of sifted plants in the above step utilizing img.show( ) capability.
8. Provide the connection of the site made

V. OBJECTIVES

1. A sensing system to estimate IAQ in a room is implemented.
2. A python dictionary is created, having a set of plants to be suggested based on the quality of Air read by the sensors, regional availability of the plants and its environmental compatibility.
3. A Combination of suitable plants that matches measured IAQ level and other user input Parameters are recommended.
4. A website is created in which URLs from where the users can purchase those plants are provided.

VI. METHODOLOGY

"Indoor Plants Recommendation System to Improve the Air Quality", is the work completed in this task. The confirmation is finished by working out the normal of the CO2 values detected by every one of the sensors regarding Parts Per Million (PPM) and in light of this worth a bunch of reasonable indoor plants to further develop the air quality are proposed. The elements of this framework are made sense of in ensuing areas. From the writing overview, it is seen that the chose indoor plants are significantly more nominal, climate amicable and less complex choice fit for diminishing CO2 and CO focuses there by further developing the air quality. Air contamination influences our everyday exercises and personal satisfaction. It represents a danger to the environment and the personal satisfaction on the plane Nearly 90% of individuals' day to day routines are experienced inside, and their wellbeing is impacted by the groupings of CO2 in these spaces thus, necessity to have a decent oxygen level.

CONCLUSION

Check of indoor plants suggestion framework to further Develop the air quality is effectively completed and results were shown on the product devices. Arduino IDE was utilized as stage to check the sensor readings and PyCharm was utilized to show the Recommendation of the Indoor plants. Finish of the outcomes is given in segment the confirmation of MQ-135 sensor readings and the indoor plants Recommendation; it is seen to follow focuses.

1) Indoor Air Quality estimation utilizing MQ-135 sensor unit is effectively done which Shows the typical CO2 level detected at the indoor space.

2) The site made for buying the suggested plants is distributed through 000webhost what's more, is made accessible for the simple access

SCOPE OF FUTURE WORK

Aside from CO2, other principal classification of indoor air contaminations is Volatile Organic Compounds (VOCs) like CH3)2CO, benzene and formaldehyde. Notwithstanding carbon dioxide, plants can take up gases like benzene, toluene and other VOCs Thus, biofiltration/phytoremediation of these VOCs should be a future extent of this project.

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Redundant Binary Signed Digit Frame Work for ALU Implementation

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Abstract— A redundant binary representation is a numeral system that uses more bits than needed to represent a single binary digit because of which most numbers have several representations. The unique feature of redundant binary signed digit number system allows addition without using typical carry. The paper proposed the design of an Arithmetic Logic Unit based on redundant binary signed digit number system. One digit redundant binary signed digit ALU is designed by VHDL and its FPGA implementation using synthesis process. Finally, it is compared with other ALU architectures such as conventional binary, carry look ahead adder. The frame work is designed using VHDL and its RTL view is generated by its FPGA implementation in Xilinx ISE environment.

Keywords- ALU, RBSD, FPGA, RTL, Xilinx, VHDL

I. INTRODUCTION

Today's world requires faster processor for the computation purposes to meet the application demand of the digital systems. Speed of these processors is usually limited by the latency of arithmetic units like adders and multipliers. With the constant growth of computer applications in every field of engineering such as signal processing, communications and neural networks, fast arithmetic logic units (ALU) are increasingly required. The ALU of any processor perform many functions such as Addition, Subtraction, Multiplication, Division and Logical Comparison etc. The arithmetic operations like addition is performed using conventional binary number system produces longer chain of carry. This increases the complexity of the circuit and also reduces the operating speed. ALU designed using such arithmetic operating circuits generating long carry chain will have low operating speed.

ALU can be designed using different adders like ripple carry or carry look ahead adder. ALU designed using ripple carry adder the delay will be more since the carry getting propagated from LSB to MSB. So speed will be reduced. Compared to ripple carry adders Carry look ahead adders are faster, but in case of Carry look ahead adders the complexity of the circuit increases as the number of bits increases. Because of these drawbacks non-conventional number systems cherishing in designing ALU in recent years because of their attractive property of carry free addition. Processors designed using ALU with carry free adders will have high operating speed. Redundant binary number system in one of the nonconventional system which provides carry free addition. For making the processing faster a carry free addition technique is adopted by using Redundant Binary Number System [1][2][6]. Redundant The property of carry propagation chain elimination tends to make the processing faster.

In this paper, the RBSD based arithmetic and logical unit is designed using VHDL and its RTL view is generated by its FPGA implementation. The FPGA Implementation is done in Xilinx ISE environment. The simulation is done in Model Sim environment.

II. CARRY FREE ADDITION USING REDUNDANT BINARY SIGNED DIGIT

The redundant binary representation (RBR) is a non conventional number system that uses more bits than needed to represent a single binary digit. Each number will have more than one representation in case of Redundant Binary Representation. RBR is a place-value notation system. In RBR system digit set will have more digits than the radix and digits are pairs of bits, that is, for every place RBR uses a pair of bits. Conventional binary number systems, including two's complement, which use single bit for each digit.

The value represented by an RBR digit can be found using a translation table as shown in Table 1. This table indicates the mathematical value of each possible pair of bits. As in conventional binary representation, the integer value of a given representation is a weighted sum of the values of the digits. The weight starts at 1 for the rightmost position and goes up by a factor of 2 for each next position. Usually, RBR allows negative values. There is no single sign bit that tells if a RBR represented number is positive or negative. Most integers have several possible representations in an RBR. An integer value can be converted back from RBR using the following formula, where 'n' is the number of digit and d_k is the interpreted value of the k^{th} digit, where 'k' starts at 0 at the right most position [5]:

$$\sum_{k=0}^{n-1} d_k 2^k$$

The redundant binary signed digit number (RBSD) representation makes it possible to perform addition with carry propagation chains limited to a single digit position and has been used to speed up the arithmetic operations. In order to cope with the problem of carry propagation the most appropriate approach is elimination of carry propagation. If the numbers can be represented in such a manner that addition does not require carry propagation then the addition is said to be carry-free or carry eliminated addition, In case of RBSD all digit additions can be done simultaneously. The application of interval arithmetic in which carry propagates only one position and no additional carry is generated; makes possible carry free addition [3][4].

The RBSD carry propagation free addition is performed in two steps [5]:

Step 1: In order to eliminate carry, at each position the transfer digit t_i and interim sum digit w_i are determined according to Table 2. If X_i and Y_i are the two operands then the relationship between X_i, Y_i, t_i and w_i is mathematically represented as

$X_i + Y_i = 2t_i + w_i$

Step 2: The incoming transfer digit is added with the interim sum to obtain the final sum digit with no new transfer digit. This step is mathematically represented as

$S_i = w_i + t_i$

Where w_i is interim sum, t_i is transfer digit and S_i is sum digit.

Table 2 Transfer Digit and Interim Sum for Redundant Binary Radix 2

X_i	Y_i	X_i+Y_i	t_i	w_i
-1	-1	-2	-1	0
-1	0	-1	0	-1
0	-1		-1	1
-1	1	0	0	0
1	-1	0	0	0
0	0	0	0	0
0	1	1	0	-1
1	0	1	1	-1
1	1	2	1	0

A. *Example: Carry –Free addition using redundant signed radix 2*

In conventional binary number system radix 2 number digit set contains 0, 1. The number of digits equal to radix.

Example : Number 6 can be represented in binary as below
0 1 1 0

Number 4 can be represented as below
0 1 0 0

In case of redundant Signed radix 2 number digit set contains {-1,0,1}. The number of digits present in the digit set will be more than the radix. So each number can be represented in many ways.

Example: Number 6 in decimal can be represented in redundant binery as follows.

0 1 1 0 ------- 6

1 0 -1 0 ------- 6

Number 4 can be represented in redundant binary as follows

0 1 0 0 ---------- 4
1 -1 0 0 ---------- 4

Table 1: Translation Table for Redundant Binary Signed Digit

Digit	Interpreted value
00	-1
01	0
10	0
11	1

In case of conventional binary addition there will be carry propagation. Carry will be propagated till the end.

Addition in case of RBSD is carry free.

In case of RBSD addition the two operands will be added to get the position sum(p_i). Then the position sum will be divided into interim sum(w_i) and transfer digit(t_i). Then interim sum and transfer digit is added to get the final sum.

In case of conventional binary there is no such steps .

Let the two operanads be X_i = 0 1 1 0 and Y_i = 0 1 0 1
X_i = 0 1 1 0 ------- $(6)_{10}$
Y_i = 0 1 0 1 ------- $(5)_{10}$
The final sum should be $(11)_{10}$

Adding these two numbers using binary.

0 1 1 0 ---- X_i
0 1 0 1 ---- Y_i
---
1 0 1 1 ---- s_i

The steps involved in adding the two operands using RBSD are as below.

Step 1. Both the operands are added to get the position sum, p_i.

Step 2. Interim sum w_i and transfer digit t_i are determined from Table 2. The interim sum and transfer digit are selected in such a way that they should be within the digit set
i.e -1 0,1and after adding interim sum and transfer digit the final sum also should be in the selected digit set.

Step 3 Transfer digit is added with the interim sum to get final sum s_i. ---- 0 1 0 1 1 --- $(11)_{10}$

```
      0   1   1   0          xi
+     0   1   0   1          yi
-------------------------
      0   2   1   1          pi
    0   0   1   1            wi
   /   /   /   /
0   1   0   0                ti
-----------------------------
0   1   0   1   1            si
```

III. Design and FPGA Implementation of RBSD based one Digit ALU

The one digit ALU is designed using VHDL and logic diagram is as shown in Figure 1.

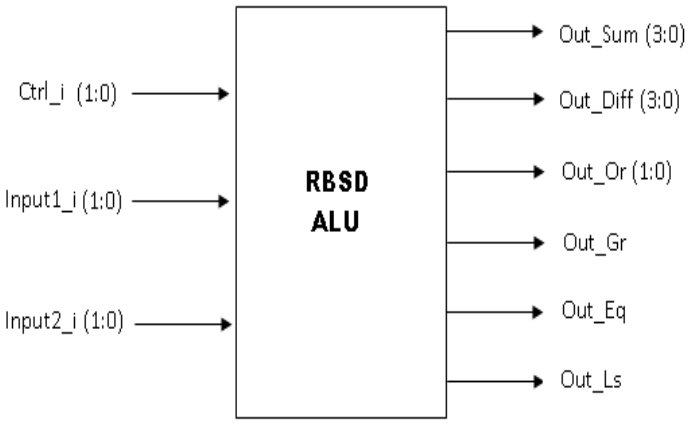

Figure 1 One digit RBSD ALU pin out

One digit (two bits) ALU has two input bit vectors Input1_i and Input2_i having width of two. It has one control input Ctrl_i also having width of two. Control input is used to select the required arithmetic operation. The designed ALU has adder, subtractor, OR gate and comparator. If the control is '00' adder unit will be activated. If it is '01' subtractor unit will be activated. If it is '10' OR gate will be activated. If it is '11' comparator will be activated

One digit ALU contains six outputs. Out_Sum is the output of the adder having the width of four. Out_Diff is the output of the subtractor having the width of four. Out_Or is the output of the OR gate having the width of two. Out_Gr, Out_Eq, Out_Ls, are the three outputs of comparator.

The block diagram of one digit RBSD ALU is as shown in Figure 2.

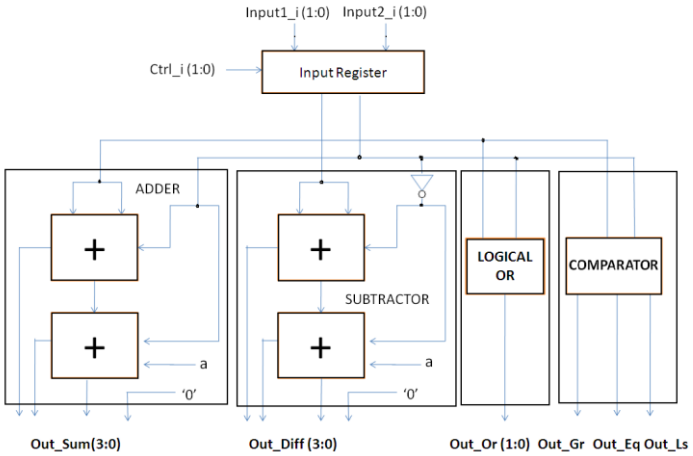

Figure 2 Block Diagram of One Digit RBSD ALU

The one digit RBSD ALU contains adder [7], subtractor, logical OR and comparator block. The adder unit contains two full adders. One digit RBSD means two bits . For the first full adder the inputs are two bits from the Input1_ I (1,0) and one bit from Input2_i (1,0), totally three inputs. The output of the first full adder ,one bit from Input2_i (1,0) are the inputs to another full adder. Output of 1 digit RBSD adder will be four bits.

The subtractor unit contains two full adders and one NOT gate. Here NOT gate is used to find the additive inverse of one of the operands. After finding the additive inverse the unit will work same as adder unit. Difference between two operands is found by adding the additive inverse of one of the operands to another.

The comparator unit will have two inputs each input of two bits. It has three outputs. It will compare two inputs and depending on the status of the inputs one of the output will be at logic high state.

Simulation is done using ModelSim XE III 6.2g Simulator. The simulation results for one digit ALU are verified with its corresponding logic diagram and are shown below [5].

Figure 3 shows the simulation result for adder unit of one digit RBSD ALU. Input1_i = -1, Input2_i = -1,0,1
Input1 will be -1. As shown in table 1 redundant digit -1 is represented as 00
Input2 is (i) -1 (00) , (ii) 0 – (01 or 10) (iii) 1 – (11)

Figure 3 Simulated Result for adder
Input1_i=-1 Input2_i =-1, 0, 1

Figure 4 shows the simulation result for subtractor unit of one digit RBSD ALU. Input1_i = -1, Input2_i = -1, 0, 1

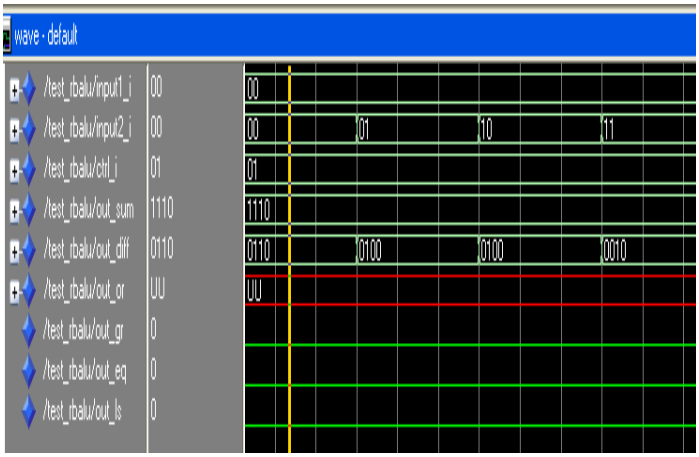

Figure 4 Simulated Result for subtractor
Input1_i=-1 Input2_i =-1, 0, 1

Figure 5 shows the simulation result for OR gate of one digit RBSD ALU. Input1_i = -1, Input2_i = -1, 0, 1

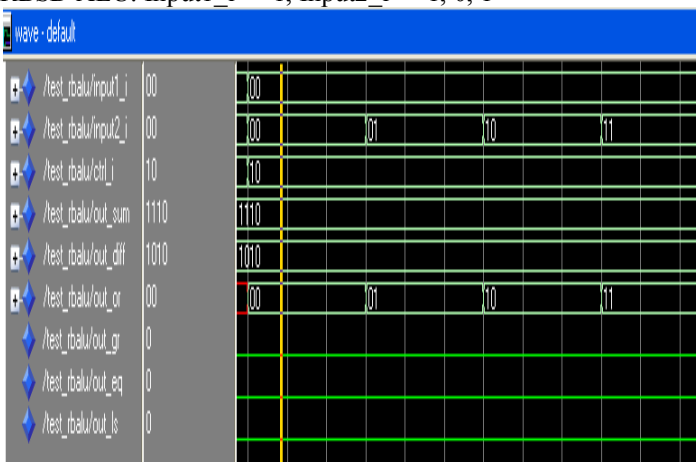

Figure 5 Simulated Result for OR gate
Input1_i=-1 Input2_i =-1,0,1

Figure 6 shows the simulation result for comparator of one digit RBSD ALU. Input1_i = -1, Input2_i = -1,0,1

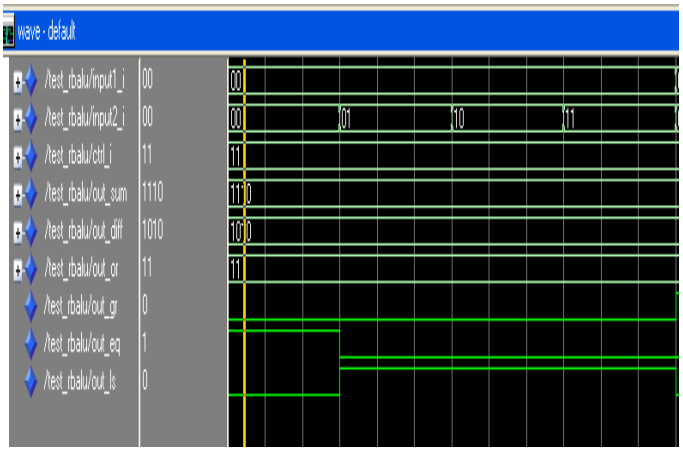

Figure 6 Simulated Result for Comparator
Input1_i=-1 Input2_i =-1, 0, 1

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Network Intrusion and Cyber Attack Rates Detection Using Machine Learning

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***Abstract*— Network intrusion detection system is a system that monitors malicious activities by analyzing network traffic. Cyber security is a growing threat in the networking field, in recent years dueto pandemic online transactions have been increasing gradually. Various machine learning techniques are employed to avoid these intrusions. Cyber Crime is one of the biggest and dominating problem in our society and its prevention is an important task. Daily there are hugenumbers of cybercrimes committed frequently. The objective of this project is to analyze dataset which consist of numerous cybercrimes and predicting the type of cybercrimes whichmay happen in future depending upon various conditions. In the current work the technique of machine learning and data science for cybercrimes prediction of cybercrimes is used. Before training of the model data preprocessing will be done following this feature selection and scaling will be done so that accuracy obtain will be high. Various algorithms are tested for crime prediction and Random classifier provided the best classification accuracy.**

***Keywords*— ML-Machine Learning, LR-Logistic Regression, DT-Decision Tree, RF-Random Forest, KNN-K Nearest Neighbour, UNSW-University of New South Wales, ANN-Artificial Neural Network, IDS-Intrusion Detection System,**

I. INTRODUCTION

Cybercrime is not an old sort of crime to the world. It is defined as any criminal activity whichtakes place on or over the medium of computers or internet or other technology. It is the most prevalent crime playing a devasting role in Modern World and as well as India. The effects of a single, successful cyber-attack can have far reaching implications including financial losses, theft of intellectual property, loss of consumer confidence, trust factor and a big threat to the national economy. A primary effect of cybercrime is financial. Cybercrime can includemany different types of Profit-driven criminal activity, including ransomware attacks, email and internet fraud and Identity fraud, as well as attempts to steal financial account, credit cardor other payment Card information. Cybercriminals may target an individual's private information or corporate data for theft and resale. As many workers settle into remote work routines due to the pandemic, cybercrimes are expected to grow in high frequency, making itespecially important to protect backup data.

fig 1: Categories of cyber crime

With machine learning, cybersecurity systems can analyse patterns and learn from them to help prevent similar attacks and respond to changing behaviour. It can help cybersecurity teams be more proactive in preventing threats and responding to active attacks in real time. Detection tools include intrusion detection systems, tripwires, configuration checking tools, honey pots(lures), anomaly detectors, and simple operating system commands. Cybercrime many be fast-growing, but detection, simple operating system commands.

Cybercrime may be fast-growing, but detection of cybercrime is catching up just as fast. Through the use of algorithms and computer-based training, Artificial Intelligence and Machine Learning can effectively be used to create expert systems that will exhibit intelligent behavior, provide solutions to complicated problems, and further help to develop stimulations equivalent to human intelligence.

II. RELATED WORK

Numerous researches were conducted on cyber security, including intrusion detection and prevention. Web phishing is used to steal valuable information on personal or organizational data. Researchers found some solutions for the detection of web phishing attacks. The standard way to find whether the website is legitimate or fake is to use a blacklist or white list. To trace out this, we may search the URL and decide about the website. One way to detect phishing is a feature selection of known phishing sites to discover unknown phishing sites Another way to find out the fake websites is the features' analysis of the website. It can be content, URL, and DNS features. A clever tactic is to block malicious emails and bogus URLs. One proactive strategy is to keep safe and secure the web site and email from a phishing attack. A phishing attack occurs to scam with the web users through websites and emails. Web criminals hack the website and make it harmful for the user. They develop a fake website as look the same as an official website. It usually happens in the organization, and individuals are also attacked by the scammer.

Data visualization and data pre-processing

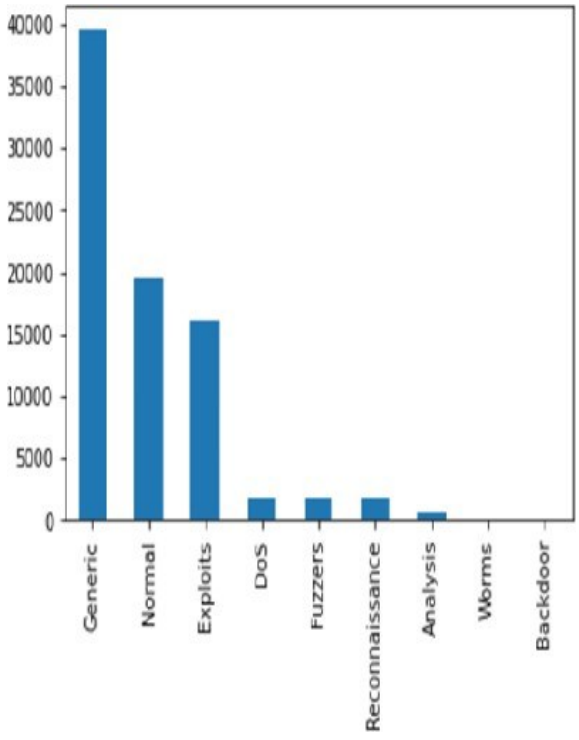

fig 3: Cyber-attack categories

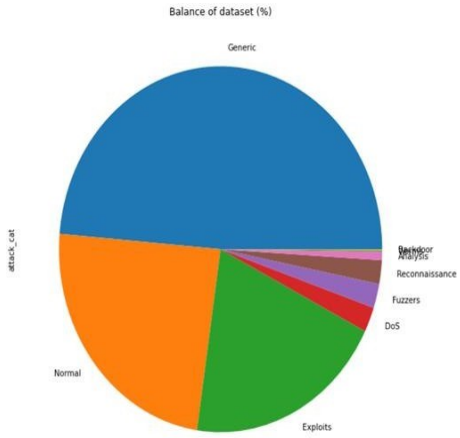

fig 2: shows an attack category of cybercrimes.

DoS: A Daniel-of-Service (DoS) attacks is an attack meant to shut down a machine, making it inaccessible to its intended users

Fuzzers: It as an automated software testing method that injects invalid or unexpected inputs into a system to reveal software defects and vulnerabilities.

Backdoor: It refers to any method by which authorized and un-authorized users are able to get around normal security measures and gain high level user access on a computer system, network.

Reconnaissance: It is usually a preliminary step toward a further attack seeking to exploit the target system.

III. The proposed Method

The features were processed using data processing techniques. The 45 processed features were applied to various classifiers: Logistic regression, Random Forest, XG Boost, Light GBM, Extra tree to select the best classification model.

IV. Results and Discussion

To compare accuracy parameters of implemented techniques.

Import the requires classification algorithm.

Obtain performance parameters such as:

- *Precision*
- *Recall*
- *F-1 score*
- *Accuracy*

Table 1 provides the performance of different classifiers in terms of parameter like Precision, Recall, F1-Score, Accuracy and Receiver operating Curve. The Random Forest algorithm has the better performance and accuracy than others.

Precision: It refers to the quality of a positive prediction made by the model. It also refers to number of true positives divided by the total number of positive predictions.

Table-1 The performance of different classifiers

	Classification Models used				
Performance parameters	Logistic regression	Random forest	XG Boost	Light GBM	Extra Tree
Precision in (%)	83.00	94.00	94.00	93.00	93.00
Recall in (%)	75.00	94.00	95.00	94.00	94.00
F1-Score in (%)	76.00	94.00	94.00	94.00	95.00
Accuracy in (%)	80.53	95.27	94.40	94.40	94.96
Receiver operating Curve (ROC in %)	75.00	95.00	94.00	94.00	95.00

Recall: It is calculated as the ratio between the number of positive samples correctly classified as positive to the total number of positive samples.

F1-score: Is one of the most important evaluations metrices in the machine learning. It is the combination of precision and recall.

Accuracy: Is perhaps the best-known machine learning model validation method used in classification problem.

Receiver operating Curve: It is a metric used to measure the performance of a classifier model.

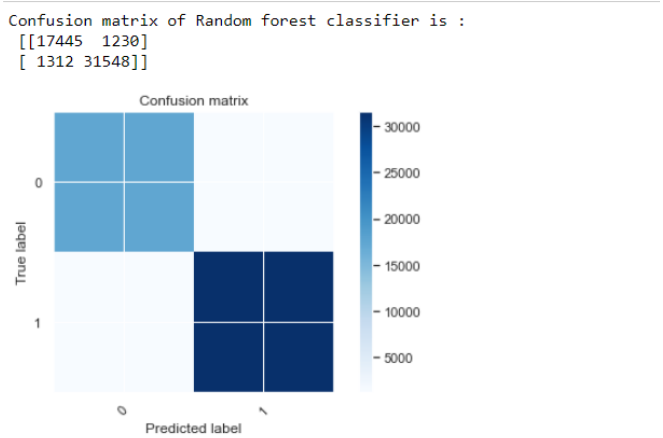

fig 4: Confusion matrix of random forest classifier

Confusion matrix is used to determine the performance of the classification models for a given set of test data. It can only be determined if the true values for test data are known. The matrix itself can be easily understood, but the related terminologies may be confusing.

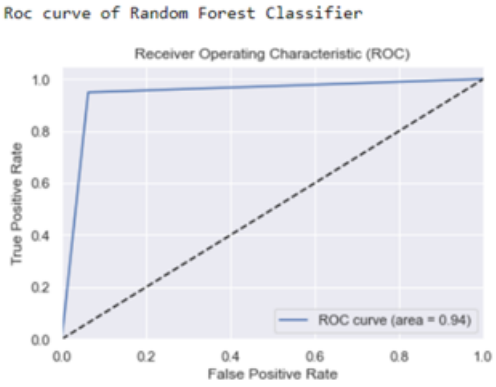

fig 5: Roc curve

fig 5: An ROC curve showing the performances of random forest classification model

V. CONCLUSION

The proposed system extracts relevant features of UNSW-NB15 Dataset from the 45 available features using data preprocessing techniques. The processed data is applied to various classifiers for detection of online cyber-attack and network intrusion. To evaluate the performance of the classifier accuracy, recall, precision and f1-score parameters are measured. The classification accuracy of 80% is achieved using logistic regression classifier. The Random Forest classifier achieved the best accuracy and other performance parameters compared to other Classification algorithms whose accuracy is around 96%. As future scope deep learning classification algorithms can be applied to the existing models to improve the classification accuracy.

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A LITERATURE SURVEY ON ULTRA WIDEBAND HIGH DIRECTIVITY LOW PROFILE ANTENNA

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Abstract—**Antenna converts electronic waves into electromagnetic waves. In the present days of communication the antenna has to be versatile which can have wider applications. This is possible if the antenna is having wide range of operating frequency. At the same time to achieve high range of communication the antenna has to be very high directive. Thus a compact antenna with very high directivity and wide operating range of frequency is the need for many wireless communication systems & defence (RADAR, Unmanned Aerial Vehicle etc).This paper presents a survey on ultra-wideband high directivity low profile antenna. In this crowded world, wireless communication plays a prominent role in keeping us to stay connected, antenna is an important part of wireless communication system, after the extensive use of wireless communication, new growing ultra-wideband technology with advantages of less power consumption, less complexity, low cost, high data transmission, thin profile, conformability is used. Further ultra wide band micro strip patch antenna with improved characteristics of thin profile, high directivity becomes prominent feature of wireless communication. This paper confers the existing survey works followed by discussion of all the significant literatures related to the topic.**

I. INTRODUCTION

An antenna is a basic device that is made up of a series of conductors .It is a device that can act as a part of both the transmission and reception system of a communication system .Antenna converts the given input electronic signals into electromagnetic waves propagating in free space .For the higher applications like satellite communication specified antennas are used based on the characteristics like high gain ,high directivity ,wide-band ,high efficiency ,small size ,low profile ,easy to massive production ,light weight ,cost friendly ,etc.

Ultra-wideband antennas are specifically designed to transmit and receive very short time durations of electromagnetic energy. As we all know that radio spectrum is finite but, wireless communication is increasing drastically. To cope with the demands faced for the wireless communication in the fields like radio station, satellite communication, GPS system, GRS system, radar system.

Directivity can be defined as the radio of the radiation intensity in a given direction from the antenna to the radiation intensity averaged over all directions. It will measures the degree to which the radiation emitted is concentrated in a single direction .An antenna that radiated equally well in all directions would be omni-directional and have directivity of 1(0dB).

Low profile antenna is also called as microstrip(patch) antenna.It is an antenna fabricated using photolithographic techniques on a printed circuit board(PCB).It is a kind of internal antenna ,and are mostly used at microwave frequencies .Patch antennas are special type of antenna that yields high frequency signals ranging from 3GHz to 9GHz ,high directivity ,large band width .

In this paper we are making survey on how to attain ultra-wideband ,high directivity using patch or low profile antenna and comparing between the different techniques used .By designing an antenna with above specifications ,the frequency range would be 3GHz to 9GHz and 1dB to 13dB directivity .This antenna can be designed and stimulated using the CST Microwave Studio tool .And output is verified by practically calculated values and obtained radiation pattern. Like this there are many more methods using both software tools and hardware components.

One of the biggest advantages of designing the proposed antenna is, it will reduce the loss of signals and results in the high propagation of the signal. It is more difficult to detect ultra-wideband without prior knowledge of the system specifications in some applications especially military and defence department this feature is very helpful. This feature also helps in privacy and maintaining the confidential data while transferring from one user to another user.

To attain the proposed high directivity we can use the array antenna. Array antennas are preferably suitable for space-based systems, microwave ground, and mm-wave applications.

II. DESIGN CONSIDERATIONS

While designing the UWB antenna the range of the bandwidth should follow the rules applied by US FCC. Design specifications may get varied based on the application and characteristics of antenna. Since we are considering the satellite communication and ground penetrating radar system as the application, the following features are taken into consideration.

- Radiation characteristics and Bandwidth range
- Gain and directivity
- Impedance matching
- Physical size

We can observe huge classification of antenna based on their different parameters. Initially antenna can be classified on the following parameters:

A. Based on directions

- omni-directional
- directional

- semi-directional

B. *Based on design*

- resonant
- non resonant

In the GPR radar system Omni directional antennas are preferred due to its narrow direction feature which helps to reach the target depth in short time period. Since resonant antennas are bi-directional, it exists both forward and reflected waves. If the antenna works in a resonant frequency, the entire radio signal fed to antenna is radiated. But if the antenna is fed with a frequency other than a resonant one, a large portion of the fed signal will not be radiated .If resonant antenna is used for large frequency range then, a separate antenna must be used for each frequency.

But these issues can be resolved in non- resonant antenna. Since it is unidirectional it can cover wide range of frequency with single antenna itself.

Common to all UWB, high directivity patch antennas in frequency domain and time domain the requirements are:

- Low Q elements to avoid resonances.
- Direct coupling between transmitting and receiving antenna.
- A non-dispersive phase center.
- Constant radiation over the frequency range.
- Constant impedance.
- Reduction of side lobes to increase directivity.

III. SIGNIFICANCE OF UWB, HIGH DIRECTIVITY, PATCH ANTENNA:

At the present ongoing technology like wireless communication, radio communication we can observe the various technologies that aims for the accurate and expected output. The proposed antenna has a good radiation pattern ,gain ,directivity ,impedance bandwidth ,propagation pattern .The characteristics can be compared both by the time domain and frequency domain ,both the domain uses complete information of the radiation pattern .As the proposed antenna has a special characteristics of less physical area with large effective area ,the size of the antenna get reduced and can be used as portable device .From the analysis we found that optimum dimension of given parameters is approximately found to be 3mm ,14mm to meet requirement. We can find n number of alternative methods for the reduction in size off antenna .Each method has its own importance with more complication .In antennas like horn and dish antenna the physical area is closely linked with the effective area .But in the travelling antennas and wire antennas like dipoles, monopoles, Yagi-Uda the effective area is much larger than the physical area.

Characteristics of the UWB, low profile antenna

- Enhancement of bandwidth: In order to increase the bandwidth by satisfying all our requirements special type antennas called array antennas is used.
- High directivity: Initially patch antennas are used to increase the directivity of the antenna. With increase in directivity gain also increases simultaneously, as both gain and directivity is directly proportional to each other.
- Reduction in loss of penetration: UWB antenna has special ability to work in harsh environment condition.
- High security: Since antenna has low power spectral density. It is very difficult to encode or encrypt the data sent by the source.
- By the high security characteristics UWB antennas are used in the defence department to exchange the data or the information.
- Budget friendly devices: we can design a cost free antenna for multiple use and less budget.
- Portable antenna: in the devices of wireless communication portable antenna plays an very important role.

IV. DIFFERENT TYPES OF ANTENNAS

Antennas can be classified into various types; some of the important types are given below.

- Wire Antennas
  - Short dipole antenna
  - Dipole antenna
  - Loop antenna
  - Monopole antenna
- Aperture antennas
  - Slot antenna
  - Horn antenna
- Microstrip antennas
  - Rectangular microstrip patch antenna
  - Quarter wave patch antenna
- Reflector antennas
  - Flat-plate design reflector antenna
  - Corners reflector antenna
  - Parabolic design reflector antenna
- Travelling-wave antennas
  - Long wire antenna
  - Yagi-Uda antenna
  - Helical wire antenna
  - Spiral antenna
- Array antennas
  - Two-element array antenna
  - Linear array antenna
  - Phased array antenna

V. APPLICATIONS:

- Used in data communication, localization and identification.

- Radar devices: GPR system to find the objects buried in the ground.
- Microwave imaging techniques: used in two different fields namely medical and security purpose.
- Microwave imaging is used to breast tumor detection.
- When comes to security purpose this technology is used to detect the concealed weapons.
- Used in portable wireless devices due to the ease of fabricating it on the printed circuit boards.
- Widely used in satellite communication.
- Wireless communication: Wi Fi, mobile phones, data transfer, defence.
- Radio frequency identification (RFID) system.
- Antenna plays vital role in global positioning system applications.
- Telemedicine application.

VI. LITERATURE REVIEW:

A. An Ultra-Wideband Low-Profile High-Efficiency Indoor Antenna

In 2020 researchers Yanzhu Qi, Bo Yuan, Yazi Cao investigated towards the ultra-wideband low profile antenna and presents a high-efficiency indoor antenna. The proposed antenna has a low-profile compact size of 310 * 270 * 0.8 mm^3, also it covers a 3GHz ultra-wideband width and has high efficiency in the whole frequency band.

B. High Directivity Microstrip Patch Antenna Based on TModd-0 modes

In 2020 researchers JaumeAnguera, Aurora Andujar, Jeevani Jayasinghe presented a paper on High Directivity Microstrip Patch Antenna. In order to attain a high directive radiation pattern,the geometry of a patch antennas operating at a TModd-0. The advantage the of the proposed technique is that it is not required to have feeding network,hence the design is simple and reduce the loss of signal caused due to feeding network.

C. Bandwidth Improvement in Microstrip Patch Antenna

In 20017 researchers UlasKeskin, Bora Doken, Mesut Kartal investigated towards improvement of bandwidth in microstrip patch antenna. The main aim of this study is to design a simple ultra-wideband microstrip antenna for the wireless intra-satellite communication systems. Proposed antenna provides frequency agility, feedline flexibility, beam scanning bi-directional pattern. In this paper antenna the bandwidth is achieved around 2GHz to 9.7GHz.

D. Bandwidth Enhancement Of Microstrip Antenna

In 2006 the author A.A.Abdelaziz presented a paper on bandwidth enhancement of microstrip patch antenna.By controlling the resonance frequencies of two elements a wide frequency around 9% is achieved. The 12% bandwidth enhancement has been achieved with the two parasitic elements. From this paper we can observe that by adding parasitic elements in different methods bandwidth can be enhanced to the better range for the required application.

E. Microstrip Patch Antenna For Ultra- Wideband Applications

The authors Qaddi Mohamed Hamza, Srifi Mohamed Nabil, Mharzi Hassan, presented a paperon microstrip patch antenna for UWB applications. The proposed antenna has dimensions 20 * 30 * 1.6 mm^3 with the relative permittivity of 4.3. here the simulation is done using the CST Microwave Studio. We can find the applications of proposed antenna in the field of UWB applications and radio communication services systems. In this paper the bandwidth attained numerically is 4.4GHz because of the multiple slots used in the antenna.

F. Designing of Simple Array Antennas for High Directivity

In 2016 the authors Abhijit Bhattacharya, Rodney Vaughan presented a paper on array antenna for high directivity. Microstrip patch antenna configured in an array format with different number of patch elements has been analyzed. Larger number of patch antenna elements, better gain of antenna is achieved.As a result we obtained a low cost,high broadside gain with fixed direction and beam flat top aperture array antenna is obtained.

G. Low-Profile, Low-Frequency, UWB Antenna for Imaging of Deeply Buried Targets

In 2020 researchers Behzad Yektakhah, Jeffrey Chiu, Faisal Alsallum, Kamal Sarabandi presented a paper on low profile and low frequency antenna for imaging of deeply buried targets. Here the antenna is designed for below 500MHz frequencies to allow for high resolution imaging of the deeply buried items like pipes or underground structures like tunnels. The above antenna is low profile with a total height of 153 mm and lateral dimension of 600mm * 600mm. the low frequency of the antenna enables imaging the deeply buried targets in soil with high losses.

H. Design and Analysis of Ultra-Wideband Micro Strip Patch Antenna with Notch Band Characteristics

In 2016 the researchers Omprakash Kumar, Surender Kumar Soni presented a paper on UWB microstrip patch antenna with notch band properties. This is a special kind of antenna designed for wireless local area network(WALN). In this paper authors did analysis between the UWB and WALN system. The antenna can operate over the frequency range between 3.1 and 10.45GHz for voltage standing wave ratio(VWSR) with the band notch 5.06 to 5.825GHz. the simulations were done by using the tool called CST Microwave Studio in time domain, antenna has good

radiation pattern in both H and E plane and also good time domain characteristics.

VII. CONCLUSION:

The goal of the survey paper is to clarify the low profile micro strip patch antenna and analyzing the methods of improving its efficiency to enhance its bandwidth and high directivity. In this paper how to achieve UWB antenna with frequency range of 3GHz to 9GHz, and directivity of range 1dB to 13dB using different techniques like using special kind of array antenna to enhance the wideband width and preferring low profile antenna to get high directivity were discussed. By achieving the above specification the designed antenna can yield high efficiency, low profile, low weight, low cost, portable antenna, which has a more applications in wireless communication. But in the applications like GPS system, GPR system only use antenna with very less physical aperture and narrow bandwidth can be used.

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A Survey on "Design and Implementation of Reconfigurable Neural Network"

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***ABSTRACT*—Neural Networks are usually implemented in software on sequential machine but when implemented in hardware, they are extremely fast due to the massive parallelism inherent in the hardware devices. The aim of the survey is to determine different techniques used to model neural network on FPGA. MAC unit and Activation Functions are required to design a neuron. In this paper, different MAC units and Activation functions are compared. Also, comparison on number of epochs versus learning accuracy was noted. Implementation of Neural Networks in Programmable Logic Devices such as Field Programmable Gate Array (FPGA) gives more flexibility since these devices are reconfigurable and their design can be altered.**

Keywords—Artificial Neural Network (ANN), Multiplier and Accumulator (MAC), Hardware Description Language (HDL), Activation Function.

1. INTRODUCTION

Neural networks are popular and provide solutions to many real-world problems. There is a growing demand for large and fast processing neural networks. Therefore, hardware implementation becomes in-dispensable [1]. ANNs are systems, based on the behavior of human brain and its ability to adapt, learn and generalize. These characteristics make them suitable for an extended range of applications, whether implemented in software or in hardware [4]. ANN has gained wider acceptance in a greater variety of applications such as pattern recognition, classification, control, artificial vision etc. [2]. The neural network can be implemented on FPGA devices to work as parallel computing structure. The speed of artificial neurons depends on the speed of activation function. Its implementation on FPGA requires significant hardware resources such as multipliers, adders and registers [14],[5]. Neural networks can be trained for specific applications. This paper presents a survey on different techniques used to model reconfigurable neural network.

2. LITERATURE SURVEY

2.1 NEURON DESIGN

Neurons are the basic building block of neural network. MAC unit and activation function play a vital role in deciding the output of neuron.

Mohamad K et.al [6] designed a digital neuron architecture on FPGA. MAC consists of an adder and multiplier that can handle inputs. The MAC operation was performed in binary system. Fig 2.1 below shows the neuron architecture that has MAC blocks and activation function.

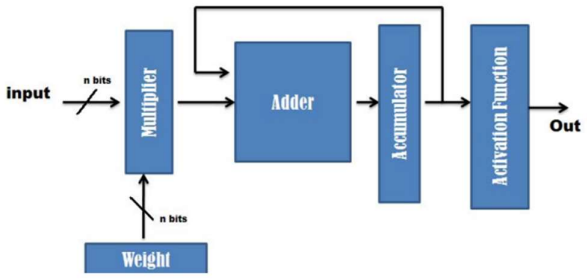

Fig 1: Neuron Architecture [6]

The author concluded that performance of neuron depends on methodology, type of multiplier and adder used and also coding styles.

2.2 MAC DESIGN

In artificial neural network multiplier and accumulator is the key processing unit. The accuracy of output function of neuron is decided by MAC. L.Ranganath et.al. [7] implemented a MAC unit where the operation was performed using Vedic Multiplier with Square Root Carry Select Adder (SQRT-CSLA) that overcomes the drawbacks of some processing unit that has more delay, consumes more area and power. Vedic multiplier multiplies inputs and weights, sum the products and sent to the activation function block. Vedic multiplier consumes less power than booth multiplier [4]. The proposed MAC unit found to have better performance. In the proposed work, the entire processing unit has been implemented and verified using Verilog HDL and compared to the existing booth multiplier with carry look ahead adder. This MAC design increased the speed of the neural network, but consumed more power as ordinary gates were used [7].

Kiruki Cosmas et al. [8] performed a MAC operation using DSP48E1 slice. It had a 48bit accumulator and 2's compliment multiplier that can perform 28x18bit multiplication. The number of blocks required for MAC operation cannot be reduced by reducing the size of input data width. With the increase of neurons, additional control logic was not required. DSP48E1 was sufficient to perform MAC operation in such cases, only one block increased with increase in one neuron in MAC unit. The output in the neural network obtains data from the multiplier block and concurrently carries out the MAC operation. The design was suitable only for the particular dataset. Table 1 shows the delay observed in Vedic and Booth multiplier.

Table 1: Delay comparison between Vedic and Booth multiplier [7]

Multiplier	Delay
Both Multiplier	19.114
Vedic Multiplier	19.11

Booth multiplier adds a bit extra delay and consumes more resources compared to Vedic multiplier [7]. By using efficient MAC unit high performance Neural Network can be designed.

2.3 ACTIVATION FUNCTION

Activation function are critical in neural network design. It decides how the weighted sum of the inputs transforms into output. Sahil Abrol et al. [9] proposed hardware implementation of neuron using various activation functions. Neuron is synthesized and implemented using different activation functions namely Hardlims, Satlins, Sigmoid and Hyperbolic tangent. Hyperbolic tangent function requires more hardware elements compared to Hardlims. The author concluded that the Sigmoid function can be used in neural networks where Backpropagation algorithm is used, as the function is differentiable. Hardlims function can be used to classify two distinct entities. Sarah L. Harris et.al [10] implemented neural network using dynamic Relu (Rectified Linear Unit). The Relu function used 18-23% less area and had a loss of 0.7-2.9%. Due to the simplified calculations, the D-ReLU function results in decreased software execution time by 57% than Sigmoid function and consumes 23% less FPGA area. Activation function decides the speed of artificial neuron. To implement nonlinear activation function, different approximation methods were used [5]. Without a nonlinear activation function in the network, a neural network would behave just like a single-layer perceptron, because summing these layers will just result in another linear function. Tanh lacks

probabilistic interpretation. Hence Relu and Tanh is not preferred for binary classification.

Sigmoid function limits the output function value between 0 and 1 and has good probabilistic interpretation. Therefore, it is preferred in binary classification. Table 2 shows nature and operating range of Sigmoid, Tangent Hyperbolic (TanH) and ReLU functions.

Table 2: Nature and Operating Range [9],[10]

Function	Range	Nature
Sigmoid	0 to 1	Non-linear
Tan(h)	-1 to 1	Non-linear
Relu	0 to ∞	Linear

2.4 RECONFIGURABLE NEURAL NETWORK DESIGN

Neural networks are parallel and distributed mathematical models that encompasses a family of computational methods used in business and product analysis, financial operations, trading, enterprise planning, fraud detection, risk assessment, robotics, space missions, communications, medical systems, prediction and recognition techniques. Various features of an ANN may vary in a reconfigurable approach, such as the number of layers and neurons, the activation function, among others [3].

Artificial neurons are the basic building blocks of ANN. There are three main layers in the neural network namely input layer, processing hidden layer and output layer [12]. Fig 2.3.1 shows structure of typical Artificial Neural Network.

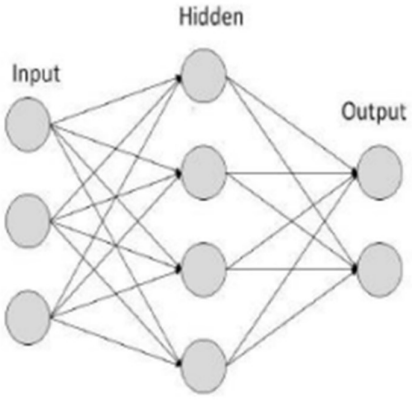

Fig 2: Typical Artificial Neural Network [12]

Amit Mishra et.al. [2] has discussed that neural network architecture can be implemented in two methods, namely analog and digital. By analog implementation of neural netwo+ a Sigmoid function can be easily emulated using amplifier trans-conductance function but suffers from noise sensitivity and drift. Digital implementation of neural network architecture overcomes the drawbacks of analog implementation. But digital implementation requires large weight memory and nonlinear activation function. In this paper author used piece wise linear approximation technique to overcome these limitations.

Artificial neural networks offer intrinsic parallelism to obtain faster and efficient results. Janaina G. M. Oliveira et.al [4] used 20 neurons to implement the neural network. According to the paper, the network can be reconfigured with several modifications and hardware implementation of ANN increased flexibility as it was reconfigurable and could be implemented in Application Specific Integrated Circuit (ASIC) circuits due to this feature. With the help of fixed-point implementation few problems were eliminated.

Drishti Beohar et al. [13] implemented ANN and Convolutional Neural Network (CNN) for handwritten digit recognition of MNIST dataset. ReLU was used as an activation function along with backpropagation algorithm that extracts the feature automatically. 80% of the dataset was used for training and 20% for testing. They found that ANN and CNN had an error of 1.31% and 0.91% respectively. ANN had an advantage over CNN as CNN consumed more power and time, but CNN was more preferred over ANN for cutting edge techniques.

Stefan Ivanov et.al [14] presents hardware implementation of ANN for character recognition. Implementing neural networks on programmable logic resulted in faster character recognition but was difficult to achieve with standard processors or DSP. Thus, FPGA was used, ANN was trained to classify input datasets of 8x5 pixels. MATLAB was used to generate and train ANN. VHDL code of the trained ANN was obtained using MATLAB

HDL coder. The generated code was the main component of the digital design for character recognition. They concluded that computing speed can be increased by using more complex FPGA.

Mrs. Abhjeet Sekhon et.al [15] presents an ANN modelled using backpropagation algorithm. BP algorithm is the most effective approach when the data has images. By using this algorithm accuracy of the system was controlled only up to certain level. It was also observed that more time was required to train the ANN using backpropagation.

Sumek Wisayataksin et.al [16] proposed a hardware programmable ANN coprocessor for handwritten digit recognition. MAC with processing unit and Sigmoid calculation engine were connected in pipeline stages to increase the processing speed. Here the computation speed of cortex A4 Central Processing Unit (CPU) and designed coprocessor was compared. The results showed that the speed of backpropagation learning and validation process was 47 times faster than cortex A4 CPU.

Neural networks are trained for particular application. The accuracy of the network depends on the number of training epochs. Table 3 shows the variation of accuracy of network for MNIST data recognition by varying number of epochs.

Table 3: Number of Epochs versus Accuracy [13]

epoch	Learn correct
1	0.96403
2	0.96710
3	0.97073
4	0.97388
5	0.97395
6	0.97526
7	0.97413
8	0.97853
9	0.97616

From table 3, it can be concluded that the learning accuracy increases with increase in epochs and becomes constant at certain point.

CONCLUSION

After surveying some of the different techniques used to design ANN, it was found that efficiency of neuron depends on type of multiplier, adder and activation function used in neuron design. From the survey, it was found that in MAC unit, Vedic multiplier gave better performance. Sigmoid function has a good probabilistic interpretation compared to tanh and Relu. With the increase in number of epochs, the learning accuracy of the network also increases. From all the factors involved in hardware implementation of reconfigurable neural network, it can be concluded that complex processing units are required to design and train the network for various applications.

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Integration Of Renewable Energy Sources

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Abstract— Renewable energy sources are proven to be reliable and accepted as the best alternative for fulfilling our increasing energy needs. Solar photovoltaic energy and wind energy is the emerging and enticing clean technologies with zero carbon emission in today's world. To harness solar power generation and wind power generation, it is indeed necessary to pay serious attention to its maintenance as well as application. The IoT-based solar energy and wind energy monitoring system is proposed to collect and analyzes the solar photovoltaic energy and wind energy parameters to predict the performance for ensuring stable power generation. The main advantage of the system is to determine optimal performance for better maintenance of solar PV (photovoltaic) and wind power. The prime objective of the PV monitoring system is to offer a cost-effective solution, which incessantly displays energy yields and its performance either on the computer or through smartphones. The proposed system is tested with a solar module to monitor string voltage, string current, temperature, and irradiance. This monitoring system is developed by a smart Wi-Fi-enabled microcontroller with the latest embedded processor that communicates and uploads the data to the cloud platform with the Blynk application. Also, the Wireless monitoring system maximizes the operational reliability of a system with minimum system cost.

Keywords— Solar energy system, Wind energy system, Wi-Fi, Microcontroller.

I. INTRODUCTION

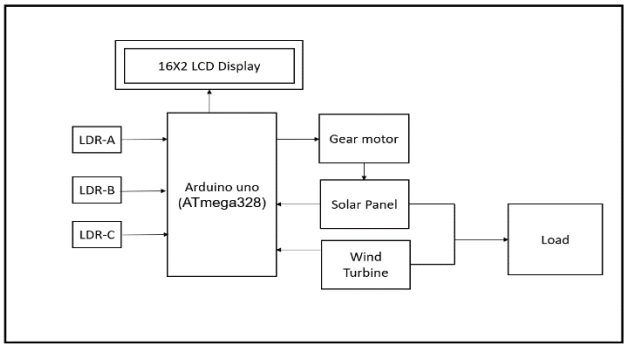
Power generation plays a major factor in many developing countries. Due to the improvement of the industrial and commercial sectors, energy demand reaches its peak. Hence all are working towards renewable energy sources to produce green energy for meeting our energy consumption. This can help society to decrease greenhouse gas emissions and ozone layer depletion for the future generation. This solar photovoltaic and wind power technique is gaining popularity due to huge availability, reduced cost, easy installation, and maintenance. Currently, the Internet of Things (IoT) is an evolving technology that makes things smarter and user-friendly when connected through the communication protocol and cloud platform. The efficiency of the solar panel and wind turbines is influenced by basic parameters such as current, voltage, Irradiance, and temperature. Hence real-time solar monitoring system is essential for increasing the performance of the PV panel and wind turbines by comparing with the experimental result to initiate preventive action. In recent years there had been a lot of research attempts made in solar energy and wind energy. A simple forecasting database is modeled to collect the raw data, filter un-relevant values, and produce forecasts without the assistance of any modern automation tools. This is a powerful tool for exploring the operation of different PV modules concerning real-time data. A microcontroller-based displaying system is proposed to monitor the different factors that affect the performance of PV panels and wind power generations. The measured parameters are evaluated with the standard operating condition to provide necessary action for better performance of PV and wind power.

A low-cost solar panel monitoring is developed based on IoT for online visualization and improving performance. This helps to take preventive maintenance and track the fault location. An IoT-based cloud monitoring system is proposed and developed using the microcontroller for remote PV plants and Wind plants. The basic characteristics of a PV system and Wind system are analyzed for real-time measurement to study the fault diagnosis. A smart monitoring system is developed with a microcontroller to gain maximum efficiency with the use of sun trackers. A remote Solar and wind monitoring and control system is proposed for implementation at the plant level and promotes the decisional process for the central control station which has a crucial role in processing, storage, warning, and displaying. PV and wind power monitoring system is developed based on wired and wireless networks to transmit the parameters to a remote coordinator that offers a web-based application for remote access. A practical graphical user interface is developed for online monitoring of solar PV and wind power. Arduino controller is used for analyzing the measured parameters and sends the data to the server for making a useful decision which improves the performance of PV panels and wind power. A cost-effective smart architecture is proposed to optimize the efficiency of the PV panel and wind turbines by detecting the performance degradation through the continuous monitoring system. Therefore, the proposed work illustrates the real-time Solar PV monitoring system and wind power monitoring using a cost-efficient Smart Controller to communicate with the cloud platform to provide large storage space and fast data access.

II. Solar-Wind Power and System Methodology

This solar-wind hybrid system consists 3 stages:

A. Power Generation
B. Processing the data
C. Distribution



The Block diagram of the developed model of Solar and Wind is shown in Fig.1.

A. Power generation

In power generation, the solar energy and wind energy generated are combined and fed to the load. Solar and wind energy are renewable energy resources that are abundant in nature. Hence this system is an eco-friendly power generation system.

A.1 Solar Energy

It is energy emitted by the sun. This energy is in the form of heat, which is used in many technologies such as PV panels, solar heating, etc.

Solar energy is a renewable energy resource that is very important in the modern world. There are mainly two types of technologies: active solar and passive solar. These classifications depend on how the energy is captured and distributed. Active solar techniques are solar heating, PV systems, and concentrated solar power. . And passive solar technologies include selecting materials with favorable spaces that naturally circulate air. Solar energy is affordable and clean and will have longer-term benefits as they are highly abundant.

In solar power plants, lenses and mirrors are used and large light is focused into a small beam. PV converts the light into electric energy using the photoelectric effect. A solar cell is used in the solar panel which converts the light energy as they capture light. As the sun illuminates on the solar cells, the current is produced due to the separation of excited electrons and holes. The light falling solar cell is directly proportional to the output current. In absence of the sunlight, the solar cell behaves like a diode.

A.2 Wind Energy

In a wind energy system, the kinetic energy in wind is converted to mechanical energy and then into electrical energy. Wind energy has a huge demand and scope as the wind present in our nature is unlimited. Hence large energy can be generated at a low cost. This is an eco-friendly source of energy as it does not produce any chemicals or depletes any resources. The output of the wind turbine varies as the wind velocity changes.

A.3 Solar-Wind Power system

This system combines wind energy and solar energy. This provides an advantage over a single system. During summer, the wind speed is low and the sunshine is bright. Hence solar panel is more efficient than wind turbines. During winter, sunshine is low and wind speeds are high. This makes wind turbines more efficient than solar panels. The efficiency of these also varies in day and night. During the day, the solar panel is more efficient. During the night, wind turbines are more efficient as there is no sunlight, and energy is generated even during the night.

B. Processing the data

In this system, the basic idea of MPPT is used. There are three LDR (Light-dependent resistor) sensors used in this system. LDR sensor is a variable resistor whose resistance varies based on the light intensity that falls on it. These three LDR sensors are placed in three different positions. The solar panel tilts to three positions based on the values of the LDRs. The solar panel moves to the position according to the highest value of the LDR sensor. All three LDR sensors are monitored instantaneously and the highest value of the LDR sensor is determined.

During the operation, voltages of solar panels and wind turbines are measured and displayed on the LCD display. The combined voltage is displayed giving detailed information about the generation to the user. The values are also accessed wirelessly through the phone via Wi-Fi. This adds convenience to the user.

C. Distribution

Once the power is generated, the distribution of this power becomes very important. There are many ways this power can be distributed or stored. In this system, a load is used to demonstrate the hybrid power generation. This power can also be stored in a battery or with the help of an inverter it can supply to a grid.

III. Flowchart to determine the efficient position of the solar panel

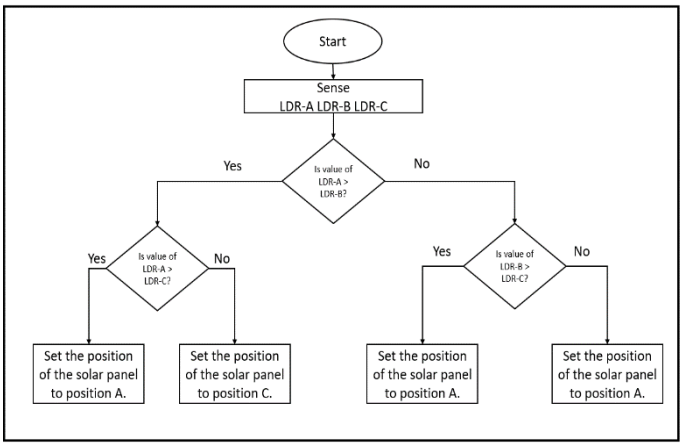


Fig. 2. Flow chart for LDR sensing and solar panel positioning

IV. Experimental Results

No. of Reading	***Parameters***	***Value***
1	*Solar panel*	*6.133 V*
2	*Wind Turbine*	*3V*
3	*Total Voc*	*9.133V*

TABLE I. VALUES OF ELECTRICAL PARAMETERS FOR SOLAR panel and Wind turbine.

V. Conclusion

The generation of electric power from a solar-wind hybrid system is efficient, cost-effective, and future secured. This system is scalable i.e. the power generation can be increased by upgrading the solar panels and wind turbines with higher output voltages. This system eliminates the problem faced by the single system that produces power with a single source in a certain area.

Acknowledgment

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"IOT BASED POWER MONITORING AND POWER THEFT DETECTING SYSTEM"

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ABSTRACT

Power theft, at low voltage distribution end is a concerning issue as the distribution companies lose billions of revenue annually. With the advent of smart grid technologies, smart meters with Information Communication Technology (ICT) can provide a solution for detecting and alerting the power theft. This paper presents the application of Internet of Things (IoT) in power theft detection and real-time smart meter monitoring. Linear Regression method is used for detecting power theft by continuously monitoring the consumer and distribution end smart meters data. Android applications are developed for monitoring consumption & billing information of consumers and alerting the authorities in the event of theft. The presented system is capable of detecting power theft due to meter bypass, meter tampering and direct line hooking. A prototype circuit is developed using ATmega328P micro-controller with NodeMCU as a WiFi module, for validating the presented system.

INTRODUCTION

Power loss is one of the important issues that have to be taken care in the distribution network. It can be addressed as the difference in power, between the generation and metered consumption. This power loss is classified into technical losses and non-technical losses. Majority of the power loss are nontechnical losses and are due to power theft. Power theft can be defined as the illegal or un-metered utilization of electricity from distribution utilities. The distribution utilities incur huge financial losses due to this power theft. It has been estimated that around 6-10 billion INR of revenue will be lost in India because of the theft every year. Consumers commit power theft in various ways which include meter bypassing, direct line hooking, meter tampering etc. A very common way of bypassing the meter include, connecting the supply wire directly to the distribution network in parallel to the meter. The other way to access electricity is by tampering the meter. This type of theft is generally practiced in the village and suburban areas where, insertion of foreign objects, etc. Apart from these, consumers also commit direct line hooking on low voltage overhead lines to access the electricity. Hence power theft is a critical issue for the distribution utilities as it directly reflects on the revenue of the utility. Substantial research has been carried out on power theft detection algorithms. The Presents the power theft detection methods using consumer load profile analysis. But these methods have a limitation that they cannot identify complete bypass and line hooking type of thefts. In work applied state estimation for power theft detection where, a privacy preserving theft detection algorithm has been developed by applying Kalman filtering

approach. The presents the linear regression method for theft detection. However, it mainly concentrates on mathematical design of theft detection algorithm and less on real-time implementation. Apart from these, presented a power line communication-based approach for theft detection. In this paper designed an inspection device to detect power theft based on the magnetic oscillations of the distribution line. Various approaches have been presented in the literature for theft detection. However, these methods are more complex, computationally difficult and the utility has to invest in building dedicated infrastructure at consumer premises which is not feasible. Moreover, majority of methods concentrate only on detecting the theft and there is less research explored in building communication technologies to alert the authorities about the theft.

With the advent of upgrading with communication technologies so that they can interact with central hub/server for real time monitoring. Internet of Things (IoT) provides the advanced communication technologies through which the consumer utilization information can be sent to the central server. By utilizing each consumers information along with distribution transformer information, any type of power theft can be detected and alert the concerned authorities distribution transformer level. Few research works related to application of loT in theft detection and monitoring system have been recorded. But the presented system does not possess theft identification. This device uses two controllers one for communication and other for computation. Hence, it is identified that, there is a need for developing a system which would detect power thefts as well as monitor individual consumer utilization. In this regard this work presents an lot based power theft detection and power monitoring system which uses linear regression-based approach for detecting the power theft. The proposed system is made to be low computational and cost effective so that its practical implementation is feasible.

OBJECTIVE

1. To provide automated load energy reading over an immediate basis.

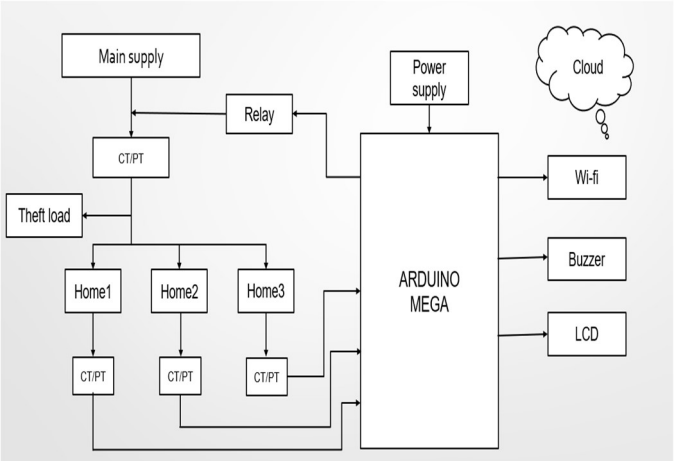
2. To use the electricity in an optimized manner.

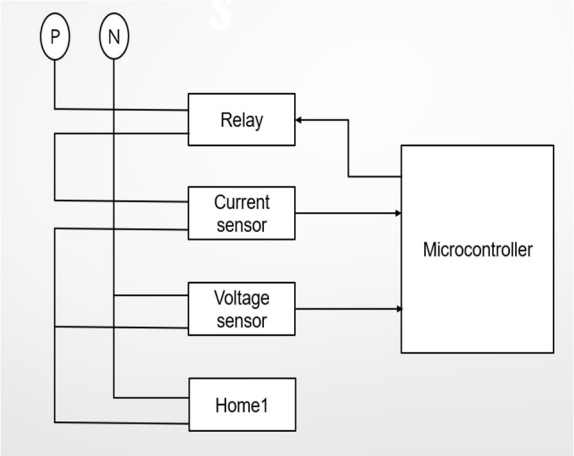
3. Reduce the power wastage.

METHODOLOGY

- We are using Arduino ATMEGA 2560 as main controller and adding Wi-Fi feature.
- Voltage and current sensors are used to read the sssscorresponding voltage and current information and generate equivalent analog signals.
- These analog signals are passed to the Arduino microcontroller and values are updated to server through ESP8266.
- A Passive sensor is used to detect the tampering. If there was any tampering, the output of sensor will be HIGH.
- Based on the output of sensor an alert message is passed.
- Relay used to control the access of power to the consumer.

BLOCK DIAGRAM





RESULT & DISCUSSION

Electricity thefts are increasing every year across domestic as well as industrial domains which affect the economic status of the country. Various wireless communication systems are available to detect the power theft, but lacks the required infrastructure needed to employ them. The project's aim is to design a system to monitor the power consumed by load and to detect and eliminate the power theft in transmission lines and energy meters. This work is also focused on communicating the theft information to Electricity Board (EB) through IoT. As a network of devices is connected like sensors it has the ability to exchange real time information through internet. In this project Raspberry Pi is utilized to detect power theft and send command to GSM module which sends the theft information message to EB. The implementation of this system will help save large amount of electricity

CONCLUSION

This paper presents a framework for IoT based real time power theft detection and smart meter monitoring system. A linear regression-based approach is presented to detect the power theft. A new IoT based architecture is used for imple menting communication infrastructure for the theft identifica tion and alerting system. Android applications are developed for easy monitoring of energy utilization/billing information and alerting the theft for authorities. A prototype system is implemented and various test scenarios are considered to val idate the proposed system. The future work for the presented system lies in improving the theft detection algorithm to use past history of each consumers to detect the theft at each smart meter level.

ACKNOWLEDGEMENT

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"ELECTRIC BICYCLE"

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ABSTRACT: This project is about designing and building a low-cost portable electric bicycle that can be mounted on an existing bicycle. It has two modes of operation; pedalling and electric motor. A 240W brushless DC motor is included in the electric bicycle kit which is powered by a lithium phosphate battery with a voltage of 36V. E-bikes use rechargeable batteries and lithium phosphate ones can travel up to 30 km/hr, and some electric bicycles can exceed 55 km/hr. There are two types of Electric Bicycles; one has a smaller motor to assist the rider's pedal power. The other is a more powerful E-bike with moped-style functionality, but all retain the ability to be pedalled by the rider.

I. INTRODUCTION

An electric bicycle, also known as an e-bike or booster bike, is a bicycle with a built-in electric motor that aids in propulsion. It is an ecofriendly electric & power assisted bike. It is one of the fastest-growing technology of the bicycle industries. There is a wide range of e-bikes available worldwide, ranging from e-bikes with only a small motor to assist the rider's pedal power to slightly more powerful e-bikes with moped-style functionality. E-bikes use rechargeable batteries and can travel at speeds ranging from 25 to 32 km/h (16 to 20 mph), depending on the laws of the country where they are sold. While the more powerful varieties can frequently exceed 45 km/h (28 mph). It is an environmentally friendly bike that emits no harmful gases during operation.

II. OBJECTIVE

The main purpose of this project is to save the environment. In order to attain this, the following objectives are specified:

i. To design and develop an E-bike which reduces physical effort of the rider compared to traditional bicycles.
ii. To propel the vehicle by the combination of pedaling and a battery powered electric motor.

III.METHODOLOGY

A) DESIGN OF E-BIKE:

After developing the concept of an E-bike kit, we discussed and designed a method to install the motor using journal paper. We decided to install it on the rear axle and mount the battery on the carrier for a simple design.

C) CALCULATIONS ON E-BIKE:

After research and designing we started to focus on calculations which included torque required to pull a certain load, speed of the motor, horse power of the motor and gear reduction.

C) SELECTION OF COMPONENTS:

Based on the results obtained by the calculations, the components for the E-bike are selected like DC Motor, Motor controller and Battery is selected based on the requirement of capacity and range.

D) FABRICATION:

We designed a mounting plate that allowed the electric motor to be mounted on the rear axle by installing it on the rear wheel. Then, to protect the battery from vibration, we designed and built a battery container out of shock-absorbing material.

E) TESTING:

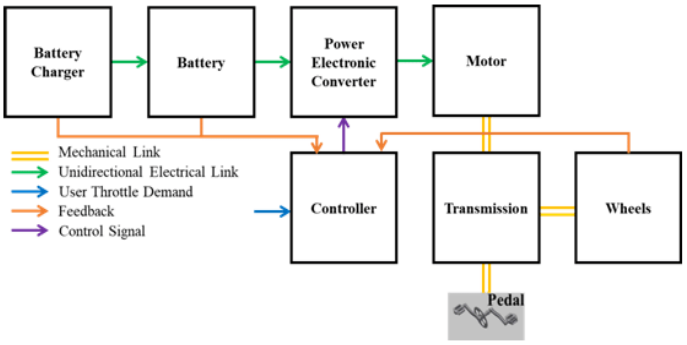
Following the completion of the E-bike, various tests were performed on the E-bike, such as the speed of the E-bike in kmph, range of the E-bike (distance travelled by E-bike on full charge), and load carrying capacity.

F) RESULTS:

After the various tests, the data obtained in each test are as follows.

- Speed of E-bike
- Range of E-bike
- Maximum torque on wheels

IV. BLOCK DIAGRAM



The basic configuration of pedelled electric bicycle has been presented in the above figure. The controller receives the throttle demand of the rider. Controller senses the torque generated at the pedal and computes the required torque. Controller generates the required control signal for the power electronic converter in accordance to the received throttle demand and the torque available at the pedal. The converter acts as a link between the power source "Battery" and the electromechanical conversion necessary which is used to

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transfer / control the power supplied to the motor which in turn controls the speed of the bike.

Transmission system is used to couple the power obtained from the motor as well as the rider when pedaling. Wheel speed is monitored in order to maintain the speed in accordance to the government regulations (Maximum Speed < 25 km/hr for India). Controller also monitors the state of charge of the battery to protect the battery from over charging / discharging.

V. COMPONENTS DESCRIPTION

A) DC MOTOR

A direct current (DC) motor is an electrical machine that converts direct current (DC) electrical energy into mechanical energy. The most common types are based on magnetic field forces. Almost all types of DC motors have an internal mechanism, either electromechanical or electronic, to provide power.Change the direction of current flow in a section of the motor on a regular basis. DC motors were the first widely used motors because they could be powered by existing direct-current lighting power distribution systems. The speed of a direct current motor can be varied over a wide range by using either an adjustable supply voltage or by varying the current strength in its field windings. Small alternating current Motors are found in a variety of tools, toys, and appliances. The universal motor is a lightweight brushed motor that can operate on direct current and is used for portable power tools and appliances. Larger DC motors are now used in electric vehicle propulsion, elevator and hoist drives, and steel drives,mills for rolling with the advent of power electronics, it has become possible to replace DC motors with AC motors.Many applications are possible with motors.

B) BRUSHLESS DC HUB MOTOR

A brushless DC electric motor also known as EC motor, are motors powered by DC electricity via an inverter or switching power supply which produces an AC electric current to drive each phase of the motor via a loop controller. The controller provides pulses of current to the motor windings that control the speed and torque of the motor.

The construction of a brushless motor system is a typical permanent magnet motor, but can also be a switched reluctance motor, the advantages of a brushless motor over brushed motor are high speed, high power to weight ratio and electronic control.

In brushless DC motors, an electronic servo system replaces the mechanical commutator contacts. An electronic sensor detects the angle of the rotor, and controls semiconductor switches such as transistors which control current through the windings, either reversing the direction of the current, or in some motors turning it off, at the correct time each 180° shaft rotation so the electromagnets create a torque in one direction. The elimination of the sliding contact allows brushless motors to have less friction and longer life; their working life is only limited by the lifetime of their bearings.

C) LITHIUM IRON PHOSPHATE BATTERY

The lithium-iron-phosphate battery (LiFePO battery) or LFP battery (*lithium ferrophosphate*) is a type of lithium-ion-battery using lithium-iron phosphate ($LiFePO_4$) as the cathode material, and a graphitic carbon electrode with a metallic backing as the anode.The energy density of an LFP battery is lower than that of other common lithium ion battery types such as Nickel Manganese Cobalt (NMC) and Nickel Cobalt Aluminum (NCA), and also has a lower operating voltage: CATL's LFP batteries are currently at 125 watthours (Wh) per kg, up to possibly 160 Wh/kg with improved packing technology, while BYD's LFP batteries are at 150 Wh/kg, compared to over 300 Wh/kg for the highest NMC batteries.

Because of its lower cost, high safety, low toxicity, long cycle life and other factors, LFP batteries are finding a number of roles in vehicle use, utility scale stationary applications, and backup power. LFP batteries are cobalt-free. As of Q1 2021, LFP type battery market share reached 24.1%, with Chinese manufacturers holding a near monopoly, and is expected to rise further to surpass NMC type batteries in 2028.

D) CONTROLLER

The electric bike controller is one of the main parts of an electric bike, it is the brain of the ebike, controlling the motor’s speed, start, stop. It is connected to all the other electronic parts such as the battery, motor, and the throttle (accelerator), display (speedometer), PAS or other speed sensors if exist.

A controller is composed of main chips (microcontrollers) and peripheral components (resistors, sensors, MOSFET, etc). Generally, there are PWM generator circuit, AD circuit, power circuit, power device driver circuit, signal acquisition and processing circuit, over-current and under-voltage protection circuit inside the controller.

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E) THROTTLE

The throttle mode is similar to how a motorcycle or scooter operates. When the throttle is engaged the motor provides power and propels you and the bike forward. A throttle allows you to pedal or just throttle it and move forward. There are three main types of throttles: thumb throttles, half twist throttles and full twist throttles. Of course, each type of E-bike throttle has its own advantages and disadvantages, and each have their own effect on your riding experience.

F) BRAKES

Mostly used on motor vehicles, a caliper brake (sometimes called a side-pull) consists of a pair of curved arms or calipers pivoting somewhere beneath the headset bearings, with 'blocks' of friction material at their lower extremities.
By the action of a pull rod, push bar, or more usually a flexible cable these days, the friction blocks are moved towards each other, squeezing the two outer faces of the wheel rim in the process. The caliper is light and cheap, because the rotating element is already in place, but being completely exposed to the elements, it is badly affected by rain, grease, oil and grit. Different calipers and brake blocks are affected in different ways, but the most important element is the frictional coefficient of the wheel rim material. The quality of the brake 'feel' depends largely on the friction material and the construction of the caliper. Poor calipers bend and distort when the brake is applied, giving a rubbery feel at the lever and/or judder or squeal.

VI. CALCULATIONS

To find the torque of dc motor

Given data:

Power = 240 W

Voltage = 36 V

To find current

Power = I * V

I = (240 / 36)

I = 6.6666 A

To determine the output power of the battery:

V = 40
I = 6 Amps
P = V*I
P = 40*6
P = 240 W
P = 0.24 kW

To find the torque

T = (P*60) / (2*3.142*328)
= 6.986 N-m~7N-m

VII. CONCLUSION

The range of the bicycle ride was successfully increased with the help of the E-bike kit by using a brushed DC motor to drive the bicycle when needed and powered by a lithium iron phosphate battery. The whole unit was controlled by a control unit. The estimated range of an E-bikeis 25Km, with the speed of 25-30 kmph and the torque obtained on the wheels is 7 N-m. As it is having two modes of drive electric and manual pedaling it will significantly improve rider's health than motorbikes and reduces rider fatigue than traditional bicycle. E-bikes are claimed to have a significantly lower environmental impact than conventional automobiles and generally seen as eco-friendly.

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"SMART WAGON"

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ABSTRACT

In any unexpected and serious condition, each second is very important to save a life. Many lives are lost before reaching the hospital or life is lost due to lack of basic information about the condition of the patient and the delay caused due to this. Ambulance becomes a very critical case in tier1 cities due to rising traffic. Though the ambulance tries to find their way through the city, the movement of traffic is very slow because of its heavy density. In order to overcome these problems, mainly two solutions are taken into consideration. For sending the patient health status to the doctor in advance, sensors have been used by the help of IoT. Linear actuator mechanism (pneumatics) helps our SMART (Standard Medical Advance Reliable Technology) Wagon to reach the hospital faster, by enabling it to raise the chassis/frame while trying to make its way out of the traffic.

1.INTRODUCTION

For an urban area, a fast and accurate emergency medical response is mandatory service for citizens. The rapid development of Internet of Things technology makes it easy to connect various objects such as sensors, connecting through internet and providing important data for any application.

The IoT is the interconnection of uniquely identifiable embedded computing devices within the existing internet infrastructure. IoT means that the components can also be controlled remotely through internet. Emergency service must be provided on time. In India, a large number of patients lose their lives because of heart attacks and reason being the inability to receive proper help on time. They must be taken to the hospital as early as possible so as to receive proper treatment, which may save their life.

This project is predominantly based on communication between SMART Wagon and other devices such as mobile phones, traffic signals so that the possibility of saving a life increase. Also, as we know that most of the cities are facing problems due to traffic rush and hence, even though vehicles do try to clear path for the ambulance but are not always successful in doing so.

Hence, we have come up with the idea of lifting our SMART Wagon's frame using linear actuator mechanism, so that it can easily cross over other vehicles while stuck in the traffic and reach the hospital on time.

2. BLOCK DIAGRAM

The figure 1 represents the block diagram of proposed work. The power supply to the motor shield (driver circuit + microcontroller) is provided using a Lithium-ion battery. The microcontroller is the controlling unit here, due to which the movement from fixed position of the SMART wagon takes place.

Simultaneously, the updates are provided about the patient's health condition to the Hospital in advance, that

includes temperature and heart rate using respective sensors through cloud. After the obstacle is crossed over, the SMART wagon stops and chamber are brought back to the position through command of microcontroller.

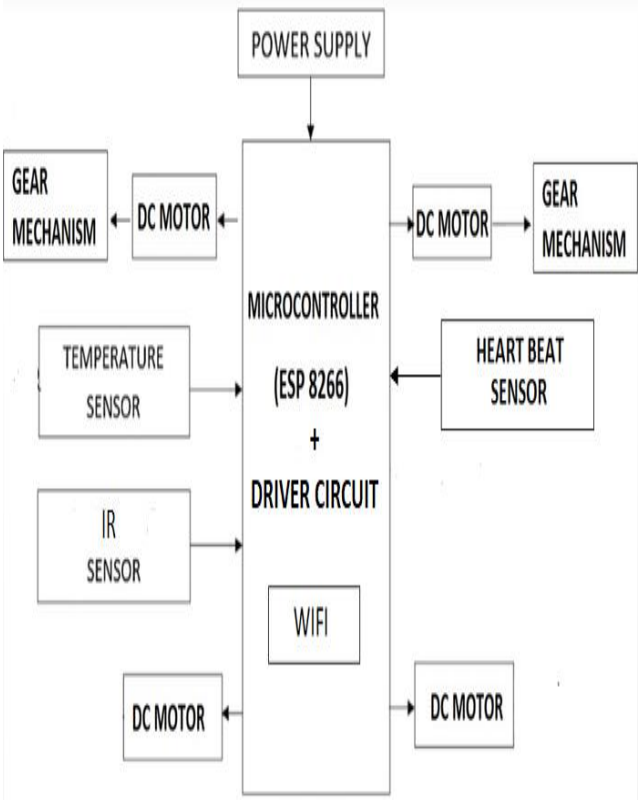

Fig -1: Block diagram

3.METHODOLOGY

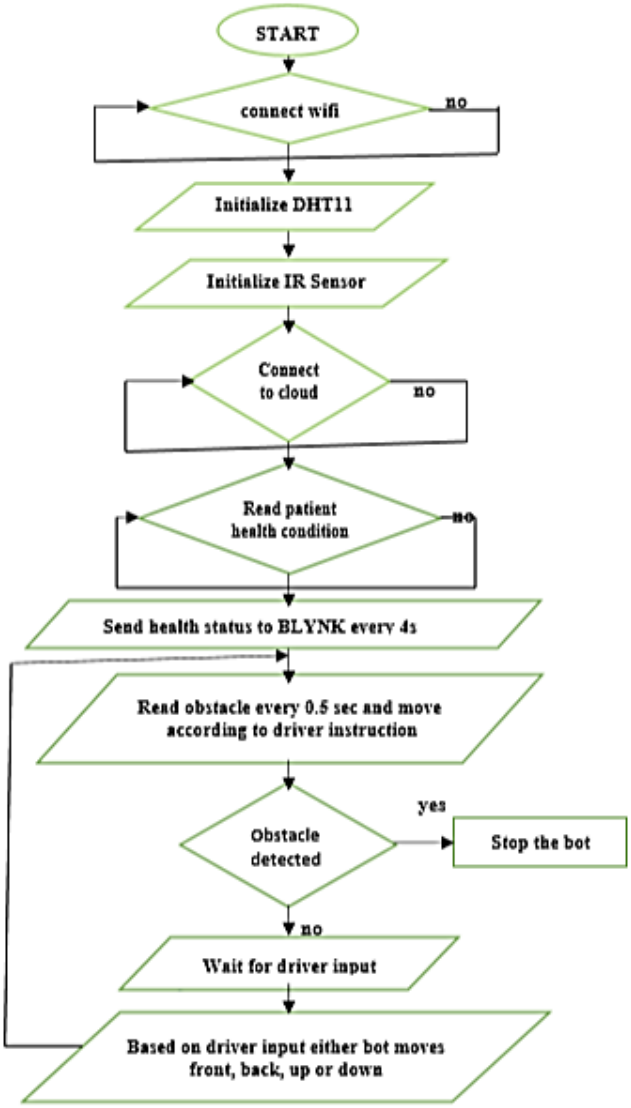

Fig -2: Flow of operation

3.1. Connection of Modules to Cloud

SMART Wagon provides continuous update to hospital regarding patient's health status, CLOUD technology is used which helps to transfer the data from Wagon to the destination within less time and accurately.

Wi-Fi is provided for this purpose in the SMART Wagon in addition with other advance equipment's which can record the data and send data using Blynk app like patient's heart rate, temperature other health associated information etc. Below steps shows connection of modules to cloud:

1) Start
2) Connect to WIFI (Access point)
3) If WIFI is connected, Read temp and Heart rate
4) Send temperature and Heartrate
5) Else if WIFI is not connected, Go to step 2

6) User (driver) input to control ambulance forward, backward and lift up and down
7) Stop

Fig -3: Steps to Connect Modules to Cloud

3.2. Providing a traffic free path in emergency

To clear the path for ambulance, surrounding vehicles should clear the lane which consumes time.

When an ambulance is stuck in heavy traffic and is unable to reach in time where it is required, in such cases the driver can lift the frame of SMART Wagon With the help of pneumatics and cross the vehicles Infront and continue to travel, this will reduce the travelling time and lives which are lost due to delay in reaching the hospital can be saved.

3.3. Manual control for frame movement

Considering a situation in which a patient is critical and stuck in heavy traffic, our SMART Wagon has advantage over other ambulance.

SMART wagon driver can visualize properly if the remaining time is sufficient for ambulance to lift and cross over the other vehicle in front if so then driver may struck accordingly and frame can be lifted up and that time in traffic can be saved.

If the time is not sufficient like less than 5-6 seconds then the driver can wait until the traffic turns green.

4. WORKING PRINCIPLE

4.1. Software

- C++ and Blynk app: It's a digital platform with Android apps which can be used to build a graphic interface for projects by simply dragging and dropping widgets.
- It allows to control and monitor hardware projects.

4.2. Hardware Requirement

4.2.1 Microcontroller ESP8266:

The **ESP8266** is a very user friendly and low-cost device to provide internet connectivity to the projects.

It has built-in wi-fi module. The module can work both as an Access point and as a station.

4.2.2. DC Motors

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy.

Two set of motors are used, one for controlling wheels movement and other is used in lifting mechanism.

4.2.3. Heart Beat sensor & Temperature and Humidity Sensor (DHT11)

Heart attack detection using Heart Beat Sensor (Pulse Sensor) works on Photoplethysmography (PPG) technique. Humidity Temperature Sensor - DHT11 is a low-cost digital sensor for sensing temperature and humidity. These sensors can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc, to measure humidity and temperature instantaneously.

4.2.4. Battery (Lead acid Battery, 12v, 1.3 amp)

The battery which uses sponge lead and lead peroxide for the conversion of the chemical energy into electrical power, such type of battery is called a lead acid battery.

4.2.5. IR Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. This is used for safety of SMART Wagon as well as surrounding vehicles.

4.2.6. Pneumatics

The compressor is the machine that turns ordinary air into compressed air putting pressurized air to practical use. Here this mechanism is used for lifting the chassis of our vehicle. This is safer as it can use the atmospheric air with higher pressure, hence economical and reliable.

Microcontroller-ESP is main controlling unit. Inputs are given to the microcontroller via a Blynk- App using cloud technology i.e., Patients health status etc.

A patient with critical condition stuck in heavy traffic as seen in Fig.1, has very less chance to reach hospital in time and in many cases, we have seen that patient lose their life just by few second/minute delay in reaching hospital.

By sensing density of traffic jam, the ambulance driver can lift the chassis and move forward to avoid the traffic and save the travelling time.

- Wi-Fi + Blynk app + cloud is used to record and send the required data to hospital, which will help to gather the treatment requirements intern avoiding the treatment delay.
- To deal with situation like heavy traffic, SMART WAGON is equipped with the facility to lift the chassis and cross the traffic. Hence it overcome the major drawback of our traffic problems.
- Driver has the main control, depending on his inputs the ambulance can either travel normally or if required it can be lifted up to cross the traffic jam for any critical condition. Pneumatics plays the important role and is the basic mechanism for lifting the chassis. It need only 4 components i.e., air compressor, motor, air cylinders, actuator.

5. RESULT

Fig -4: SMART Wagon

As it was very difficult for the ambulances to reach the hospitals on time, we've come with the solution in which we've manipulated the structure of the ambulance by inducing some additional technologies to:

- Ease the work of hospital management.
- Ambulance's travelling time is reduced.
- Providing updates to doctors in advance

6. FUTURE SCOPE

In future we will be working with better mechanism for lifting the chassis.

With better and new upcoming technologies for more accurate operation.

7. CONCLUSIONS

In the last few decades, the medical facilities have seen a lot of improvements, but even today one of the major challenges before us is to make these facilities available on-time. For this to happen we have to ensure a short and swift path for the ambulances, by avoiding the hour-long traffic jams.

To overcome heavy traffic, the SMART WAGON can lift and pass-over other vehicles, and hence avoid the time lost during unwanted halts. Usage of other advance equipment's in the wagon, will help in real time monitoring of patients' health status in case of an emergency, hence playing a vital role during the treatment.

Over all it contributes to the development of smart medical facilities thus improving country's medical condition and protects civilians' life during critical cases stuck in heavy traffic.

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CHILD RESCUE SYSTEM FROM OPEN BORE WELLS

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Abstract **–The aim of this paper is to rescue children falling in to bore-wells, this implies a new design which has a sensor kept at top of borewell hole which helps to sense the child if he falls inside. If the system senses the child the automatic horizontal closure kept at around 3ft dept closes and prevents the children from falling beneath, it has the facility to monitor the trapped child, and provide a supporting platform to lift up the child driven by motors. The motor placed below the plate turns the bottom shaft by 360 degrees, thereby helping to locate the gap through which the lifting rod passes. The motor placed at the top turns a gear mechanism which in turn, rotates 360 degrees and lift the child along with the metal plate to ground level. The whole system is firmly to the bore-well wall.**

Index Terms— Bore well, Child rescue system, IR sensor, child safety, DC Motor, Wifi module;

I INTRODUCTION

Our paper titled as "Child recue system from open bore well " has been undertaken with the aim to save a life[4].

Bore well accidents are common due to uncovered openings
of bore well. It is very difficult and risky to rescue the trapped children. A small delay in the rescue can cost the child his or her life[1][2]. Lifting the child out of the narrow hole of the bore well is not easy. The child who has suffered the trauma of the fall is confined to a smaller area where with the passage of time, the supply of oxygen reduces. The main objective of this paper is to design and construct a portable system which is cost effective, quick in action and accurate.

Fig.1: Existing method of child rescue available

This child rescue presents a proactive approach to prevent child fatalities at open uncapped bore-wells in India, which is based on communications using Infra-

Red signals[3]. When the signal generated by IR sensors, placed two inches below the entrance of bore-well, breaks due to any obstructing object, an alert message is dispatched through Wifi module and at the same time, a metal plate that is kept a few feet lower in the bore-well closes the bore in order to prevent the object from falling deeper into the well. The solution presented in this paper is a simple and yet easily scalable and highly reliable, utilizing the proven technology of Infra-red signaling

II OBJECTIVE

- Communicating with the system by sending appropriate commands to it and activate suitable motors
- Once the system has reached proximity of child, it is stopped immediately and is given commands by the controlling device to perform the closing of systemic arms.
- Controlling a system to take off the child inside the bore well, which is controlled by the person from outside.

III METHODOLOGY

Child rescue system used if a child falls in a bore well. In this method a metal plate or lid is placed at a distance below the entrance of the bore well. IR technology is efficiently used to identified if a child has fallen into a bore well[5][6][7][8]. Here, pair of IR sensors is placed in four directions. The IR transmitter and receiver are placed opposite to each other in a line of sight propagation technique. The output of IR sensors receiver is connected to a comparator. The output of comparator is given to input pins of microcontroller. When both the pair of IR sensors line of sight is blocked only then the microcontroller sends an SMS via WiFi to the child rescue centre or to the police station.

If one pair of IR sensors line of sight communication is obstructed then no SMS is sent by microcontroller via WiFi. As soon as both the pair of IR sensors is blocked, then depending on the program embedded within the microcontroller the DC motor connected to a metal lid/plate begins to block passage of the bore well, this preventing the child from further falling into the depths of the bore well.

After sometime, the microcontroller activates another DC motor to pull the child out of the hole.

In the paper demonstration LCD is used to display the working of every unit in this paper.

IV BLOCK DIAGRAM

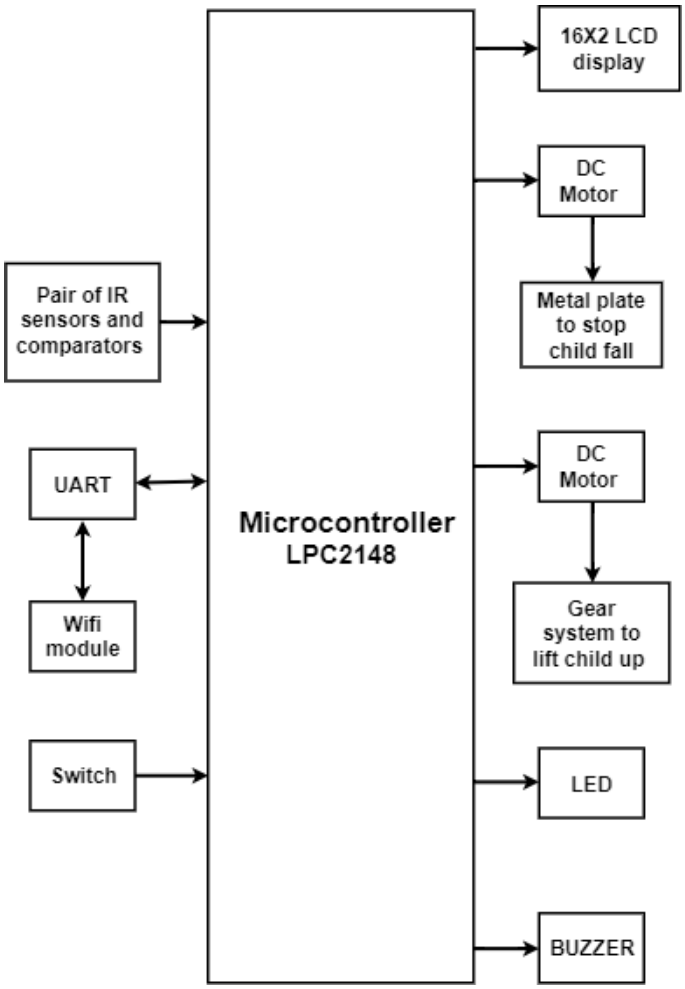

Fig.2: Block diagram

V RESULT AND DISCUSSION

A laptop PC is dumped with embedded C coding for the data transmission and is placed near the hardware set-up. A prototype module will be developed for the paper. It includes individual PCB boards for all interfaces according to the block diagram. Every PCB will be inter-connected with jumper wires. Firstly, the paper title i.e. “CHILD RESCUE SYSTEM” will be displayed on LCD. And the GPRS module tries to

access the network. Now, all the components are initialized to their respective initial conditions. Suppose a person comes near the vicinity of uncapped bore well then the IR Sensors placed on surface detects the obstacle and sends a signal to microcontroller. As soon as someone enters the dry bore well area, the alarm system is activated. This consists of an LED and buzzer. When the communication between IR transmitter and IR receiver is interrupted, microcontroller turns on LED to indicate danger and Buzzer signifying to not move further. And also it displays on LCD. Simultaneously the GSM module is initiated and a message is sent to the field owner and also to the nearby police station as fed in program. The second pair of IR sensors line of sight of communication is interrupted when a child falls into the bore well indicating obstacle.

The IR sensors status is high signaling the controller to open the metal plate. The plate rotates 90 degree anti-clockwise direction driven by motor the plate opens up preventing the victim to fall into the further depths. The metal plate raises up enabling the victim to flee from bore hole. Either they can be saved from someone or if they are conscious they can get out of there. When the victim is saved, switch is pressed. The metal plate moves back to its default position. Manual operation has been reduced to major extent. Less man power is required and hence saves time. Technology is being used and hence expenditure. This system is used at agriculture field to prevent child fall. Also used in small town and industries related to manufacturing. This system can be used in industrial construction sites. In oil mining area, this system can be used same as in open bore wells.

VI FUTURE SCOPE

For paper demo concern, we have developed a prototype module. In future, this paper can be taken to the product level. To make this paper as user friendly and durable, we need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system. Solar panel is used in order to charge the battery, Maximum solar energy is used for charging the lead acid battery inside the mobile battery charger to keep it charged fully all the time, Solar panel will track the direction of the sun To keep charging all the time, LDR sensors are used to find the position of the sun using light intensity.

VII CONCLUSION

By implementing this paper we prevent loss of an innocent life. Previously, manual rescue method was used which consumes more time to free the victim from danger. In many cases this method has been a failure in saving the life but in our method there will be no harm caused and a life is saved. Besides, manual rescuing method requires lot of machineries and manpower where there is no guarantee for safe return. The need for manual operation to rescue the child is completely eliminated thereby saving time and lives. This work was successfully designed and implemented.

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SIGN LANGUAGE TO TEXT CONVERSION USING ARDUINO

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Abstract – The easiest way for communication in the world is speech. Whereas it becomes difficult for speech impaired and hearing-impaired people to communicate as they use sign language for the communication. It becomes difficult for normal people to understand. Smart Glove for Sign Language Translation is a work that aims to present an easy way of communication for speech impaired and hearing-impaired people. ***So, the system is working on a glove-based device which will be used for conversion of sign language (ASL) to speech .The basic system consists of two parts; sign language recognition and conversion to text.*** ***This work consists of a glove equipped with sensors which senses different sign language gesture, these senses data are fed to Arduino and transfer data to android phone via Bluetooth module, a common android phone is used in this work for sign to voice translation and voice to sign language translation. In real life, the sign language users mostly use both hands. Thus, this is a prototype*** ***that will convert the basic Alphabets and numeric which will be further extended for recognition of words,*** ***presenting an ease in communication for the speech impaired and hearing-impaired people.***

I INTRODUCTION

The number of speech impaired and hearing-impaired people are increasing day by day. About 70 million people in the world are speech impaired and hearing impaired . We often come across these people communicating with the normal world. These people communicate with the help of sign language. When a speech impaired person tries to communicate with normal person and vice-versa, they feel difficult to understand. To bridge the gap between speech impaired, hearing impaired and normal masses, gesture recognition system is being used. Gesture recognition is a widely explored field. A lot of work has been done in the past few years. An electronic device has been used as a language interpreter and provides convenient way for communication between speech impaired, hearing impaired and normal people. Gesture for American standard language . Gesture recognition is classified into two main categories i.e., image processing based and sensor based. The main disadvantage of image processing-based techniques includes complex algorithms for data processing. Another challenge in image and video processing includes variant lighting conditions, backgrounds and field of view constraints. The sensor-based technique offers greater mobility.

This work uses sensor-based technique instead of image processing-based technique. First of all, sign language is converted to analog voltage signal using flex sensor and accelerometer. Using ADC from the microcontroller board analog signal is converted to digital signal. Now, the microcontroller processes this digital signal, detects respective characters and transmits through Bluetooth module to Android phone. An application on android is used to display the characters received from Bluetooth module .

II OBJECTIVE

- The main objective is to create an interface that translates sign language to text/speech.
- The framework provides a helping-hand for speech-impaired to communicate with the rest of the world using sign language.

III METHODOLOGY

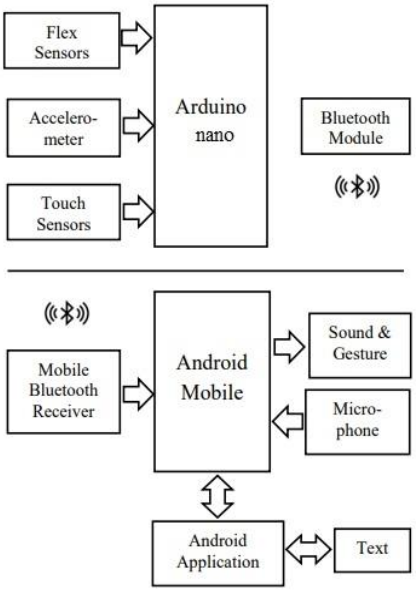
The project was inspired with the idea of controlling robotic arm with the help of hand movements, with help of using a hand glove we can mount Arduino Nano, accelerometer on the palm and flex sensors on each finger.

The Accelerometer is used to measure the tilt in the palm. Five bend sensors are placed on a glove, four for the fingers and one for the thumb.

These flex or bend sensors measure the bend in the fingers and thumb and palm, this is the sensors that change the resistance depending on the amount of bend on the sensor and Data from the sensors is send to the Control unit which is the Arduino Nano the analog

signals from the sensors are digitally converted and compared with the stored value for the recognition of sign and then displayed as a text.

IV BLOCK DIAGRAM



V RESULT AND DISCUSSION

The flex sensor measures the bending of fingers according to gesture and outputs change in resistances corresponding to the amount of bending. Accelerometer sensor measures the linear movements of hand in X-axis and outputs different values of X corresponding to the movement in X-axis. Touch sensor measures if there is any contact between two fingers. All the data from sensors are then processed on Arduino NANO involves combination of all the sensor outputs in order to match the resultant output with pre-stored values of different signs regarding the alphabets. For this, appropriate ranges are set for each alphabet and the words that can be recognized with single hand based on the measured data obtained from repeated measurements. A Bluetooth module is connected to Arduino NANO. The processed data are then transferred to the Bluetooth module (transmitter) obtained in string format. The Android mobile also have an inbuilt Bluetooth capability. These two Bluetooth devices are then paired, and string is transmitted to Android mobile. Android mobile receives data via Bluetooth in bytes format, convert them into string. Finally, the string is displayed as text using the text to speech application of Android mobile. This overall system is mounted over a normal glove for easy handling and recognizes the hand gestures accurately.

The outcome of this work was estimated where all the American standard sign language with their respective 26 alphabets and some words were successfully displayed in to text and voice which can help speech impaired and hearing impaired people to communicate with normal people easily. There is another feature also of this system which makes normal people to communicate with them also through an android application which can convert people voice in to text and sign language. So, this project is quite feasible to develop two way communication between speech impaired hearing impaired and normal people. All of the works mentioned, deals only with one way communication from impaired people to normal mass. This work allows two way communications between these groups

VI FUTURE SCOPE

There are many more works that can be carried out as an extension of this project. This system predicts the need of the mute person but future systems may be developed that could communicate to the mute person's mobile device, allowing the system to learn the needs of the user, thereby provisioning the development of recommendatory systems as they have the relevant data related to the mute person that can easily be learned thought he neural network model.

VII CONCLUSION

The project proposes a system for speech impaired and hearing impaired people using glove technology and enable normal people to communicate with them too. The use of five flex sensor, touch sensors and an accelerometer on to a glove demonstrate that it is helpful to beak the gap between speech impaired hearing impaired and normal people. This device will be an apt tool not only for the people got such disability naturally rather it also helps disability due to oral diseases and accidental cause make them to learn gesture through application easily. The project can be enhanced further by including more words and different standard sign language.

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Cost Effective Smart Ventilator System

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***Abstract*—This paper under sight proposes the design of a low-cost smart mechanical ventilator system which can be easily manufactured and integrated in the hospital environment to support COVID-19 patients. The main stimulation for developing this kind of ventilator comes from the worldwide shortage of mechanical ventilators for treating COVID-19 patients—the COVID-19 pandemic being a rampage in some regions, especially the deprived and underdeveloped ones. With this as the vision the ventilator is designed with increased robustness and under the basic idea of being incorporated to mitigate the effects of shortage in those regions. The proposed ventilator operates without a human operator as it delivers breaths through the compression of an orthodox bag valve mask (also called ambu bag) based on the heartbeat rate measurement from the heartbeat sensor. The unit is designed to support the standard Synchronized Intermittent Mandatory Ventilation (SIMV) mode of operation. The proposed ventilator design is done at a very low cost of $154, however on a massive production the cost is much likely to decrease. The design is under prototyping stage.**

***Keywords* — mechanical ventilator; cost effective; low-cost ventilator; COVID-19; heartbeat sensor; artificial ventilation**

I. INTRODUCTION

The last couple of years have seen an increased demand for ventilators in the treatment of patients with COVID-19, a fact that led to a ventilator shortage worldwide. The consequence of this shortage has been dreadful, especially in the deprived areas [1]. Failure of respiratory system caused by different kind of diseases is an extreme source of complication in both the technologically advanced improvised countries as well as backward and developing countries. The non-fulfilment of functions by the respiratory system due to diseases such as asthma, sleep apnea, pneumonia, chronic obstructive pulmonary disease, acute respiratory distress syndrome (ARDS) and recently COVID-19 requires artificial ventilation in case of failure of lungs [2].

The low-cost ventilator prototype developed will assist the patient in inhaling and exhaling so the exchange of carbon dioxide and oxygen will be possible and the patient relies on artificial respiration to survive. Ventilators that are already in use in most of the hospitals are expensive. Poor countries are unable to render such services and reason is very much clear; the high costs of acquiring and utilizing them. Thus, their maintenance is also costly. Another issue is that in developing countries the basic medical resources is mostly confined to urban areas only. Therefore, such kind of facilities are still missing in the distant and deprived areas and as a result there is a substantial shortage of such ventilators in the outlying areas. Owing to these circumstances it is essential to have a cost effective and efficient ventilator.

With reference to prior discussion, it is clear that the major reason for shortage of ventilators is the high cost of currently available ventilators in the market. In summary, this paper presents two things: (i) construction of a low-cost smart mechanical ventilator for patients with COVID-19, and (ii) deployment of a method that monitors the heartbeat of the patient and operates the machine accordingly.

A. Prior Art

Market is essentially occupied by a large number of ventilators which are efficient and portable in nature. But the ventilators that are very effective are also very costly, making them not affordable at all times. On the other side, the BVM ventilator is very affordable, its price being the lowest. One of the major drawbacks of BVM ventilator is that it requires a human operator to continuously provide compressions to the reservoir bag which makes it extremely tiresome for the person handling it. Moreover, portable electronic ventilators are too available in market with good performance but they are costly. High cost of the ventilator is a major hurdle in the abundant unavailability of ventilators in the market. Demand of these ventilators is high. So there exist a large difference between the availability and demand of ventilators in under developed and developing countries. So, there is a necessity to develop a low cost but equally effective ventilation machine [3].

So, our aim was to design and develop a cost-effective ventilator whose performance is at par or even better than the conventional BVM.

B. Fundamental Requirements of the Device

Given the circumstances, requirements that is essential for the desirable functioning of the ventilator are proposed as following points [4].

1) *Essential Medical Requirements:*
Requirements of the ventilator on medical basis is listed as follows:
- It should have real time monitoring of rate of heartbeat and the number of breaths per minute accordingly.
- Proximity of infection to the patient must be controlled.
- It should be capable of adequate exchange of humidity.
- Dead-space must be limited.
- It should give the option of maximum pressure limitation option.
- It should be capable of Positive End Expiratory Pressure (PEEP).

2) *Mechanical aspects:*
The mechanical aspects of the ventilator are as follows:
- It should be a portable device.
- It must operate on nominal power to function.
- It must contain operational capabilities of functioning as a standalone device.
- It should have an effective predefined mechanical, electrical and software systems.
- Spare parts should be easily available and have the capability of easily repairable.

3) *Economic aspects*: One economic aspect of this device is that it should be low cost. It must be highly economical (i.e., cost should be <$170).

4) *User interface aspects*: Its user interface should be user friendly and its parts must be of standard connection.

II. DESIGN OF THE DEVICE

A. *Technique of Air Delivery*

Air delivery system of a ventilator works mainly on two strategies. One strategy function is based upon the constant pressure source for continuous delivery of air, whereas the second strategy supplies uninterrupted air by compressing an air reservoir. For the prototype developed second strategy of delivering of air is being adopted and the reason is that there was no need for continuous operation of a positively charged pressure source for the process of respiration. It results in lower requirements of energy and power.

The proposed ventilator prototype is identical to a conventional one and is made up of an inexpensive Bag Valve Mask (BVM). Most of the other ventilators that are available in the market are designed with customary components whereas the prototype here is the most affordable and simplest form of portable ventilator technology. It is the basic focus of this prototype to be much simple and cost efficient than those that are being used in most of the hospitals and ambulances. BVM's are very much affordable as compared to other technologies which serves as a mark of merit for this technology and helps in making ventilators available in those countries which lack resources or ridden by poverty. Presence of an air tank and a system of stopcock makes the ventilator a complete package to meet the needs of basic ventilation machine.

BVM has already been incorporated in different medical facilities. But they conform a negative aspect of having the continuous engagement of an operator. It normally results in fatigue of the operator when it comes to operations for long durations. Thus, it reduces the performing abilities of the operator to occasional and transitory relieving tasks only. In addition to that an untrained operator could not be enlisted for the efficient operation of the machine. This can hurt the lungs of the patient by either over or under compression of the reservoir bag. Considering this aspect of BVMs, this prototype is designed to actuate the BVM. It not only facilitates the function desired but it also reduces the cost of required systematic ventilators being produced.

B. *Compression Mechanism-Linear Actuator*

Basic method of operating a BVM is by pumping of air with the use of hands on a bag made for the exact purpose specified above. This activity requires some additional space in order to use linear actuator mechanism. For the purpose of utilizing maximum benefits from compression, a cylindrical BVM is appropriate. This is adopted by taking into consideration the comer stone of manual operating techniques. The BVMs are produced with such rough and hard materials which provide friction to some extent as well as safety and grip in order to avoid slippages. In order to minimize or eradicate the anomalies associated with surface with high tension and low slippage, the BVM is actuated by a linear actuator mechanism.

In this concept a block of fiber glass is used to support the BVM. The linear actuator is connected to the axle of the DC motor via a shaft. When the motor rotates it moves the actuator arm with it which results in better compression of the BVM as one side of it is fixed to a support. The actuator presses the BVM only from one side as its other side is fixed. This mechanism was found to be more space efficient, weight efficient and have a lower power requirement than any other mechanism.

III. DESIGN OF THE PROTOTYPE

A. *Scope of the Prototype*

The prototype under sight is aimed at enhancing the robustness and functionalities of ventilator which is not only easily transferrable as well as it is very low cost and economic friendly. It functions without human operator as it delivers breaths through the compression of an orthodox bag valve mask (BVM).

B. *Methodology - Principle design of the prototype*

The figure 1 shows the block diagram of the working prototype of the ventilator.

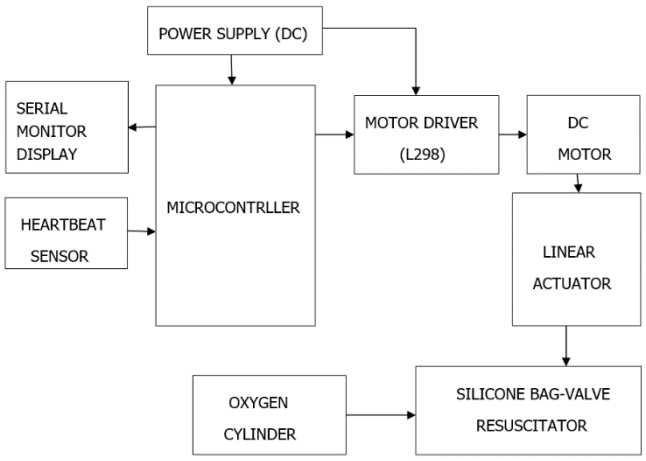

Figure 1. Block Diagram of the Prototype

- The main component used here is the Atmega328P Microcontroller that supervises the entire system.
- The heartbeat sensor measures the rate of heartbeat of the patient and sends the data to the microcontroller.
- The microcontroller is programmed to give specific DTL or TTL logic levels to the motor driver (L298) based on the data received from the heartbeat sensor.
- The motor driver (L298) controls the forward/backward motions of the DC motor according to the standard logic levels it receives from the microcontroller.
- The DC motor via a shaft drives the linear actuator and systematically compress and decompress the Bag-valve mask (BVM) resuscitator to which the oxygen cylinder can be connected.
- The Serial Monitor displays the BPM of the patient.

C. *Basic experiment of the Prototype*

In order to test the performing standards of the prototype, an experiment was conducted. Insights were extracted from the prototype's linear actuator mechanism. An analog air pressure sensor was used to measure the output air pressure from the BVM. Motion of the motor was changed according the values of data by the heartbeat sensor. On the basis of this experiment, it was concluded that the amount of power required for functioning of the machine did not exceed 24 watts, and torque not more than 0.80 Nm. So, this is adequate to call the prototype portable and cost effective.

D. *Expected outcome of the prototype*

The functional model of the proposed prototype can be constructed and tested on an artificial lung. An initial outcome of the experiment indicates that the ventilator developed works as per the standards. This machine requires lesser amount of power; it is portable and is low-cost. The prototype is open to improvements in its functionalities. Investigations can also be proposed in order to examine the outcomes resulted by using different motor.

IV. IMPLEMENTATION

A. *Control design*

Initially, during the early stages of the development of the prototype three modes of operation were chosen to run the ventilator. The three modes were infant, child and adult modes. Speed and pressure of each of them were different because respiratory requirements for different age groups are different. These requirements are described in the form of table below.

TABLE I. RESPIRATION RATES of DIFFERENT AGE GROUPS [5]

Age Group	**Breaths per Minute (BPM)**
6 months	30-40
10 years	17-23
Adult	12-18

Nonetheless, it was later decided to make the prototype more of a real-time machine and hence a heartbeat sensor was included to monitor the heartbeat rate of the patient and then operate the ventilator accordingly. If in case an infant is the one need of the ventilator, we will have to additionally change the Ambu Bag also because these bags are different for adults and infants.

B. *Microcontroller*

We have used Arduino UNO as a controller. Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

C. *Motor*

To provide the required torque (0.80 Nm) to operate the linear actuator of the ventilator we chose to have a DC gear motor that operates on 12 Volts DC voltage. This motor at full load takes only 1.8 Amperes current.

D. *Motor Driver*

The motor driver used is L298. It consists of two H-Bridge circuits which forms the basis of a motor driver required for bidirectional control of the DC motor. The function of this motor circuits is to direct the current in both directions alternatively through the motor. This process depends on the different sets of switches which are energized solely for the stated purpose. A pin termed as PWM is used to address the speed of the motor. Supply of current is done from an AC-to-DC adapter or a battery, so the main concern is to limit the extent to which the current is needed. We have chosen the L298 motor driver for the purpose of operating the motor at desired rate because this module allows us easily and independently control two motors (although we need only one motor) of up to 2A each in both directions.

E. Heartbeat Sensor

Heartbeat Sensor is an electronic device that is used to measure the heart rate i.e., speed of the heartbeat. The principle behind the working of the Heartbeat Sensor is Photoplethysmography. According to this principle, the changes in the volume of blood in an organ is measured by the changes in the intensity of the light passing through that organ. Usually, the source of light in a heartbeat sensor would be an IR LED and the detector would be any Photo Detector like a Photo Diode, an LDR (Light Dependent Resistor) or a Photo Transistor.

F. Power Delivery

For initial testing a constant 12 volts were applied from the power supply. An AC-to-DC adapter was provided so that the ventilator can be directly operated from the main power supply (220 volts).

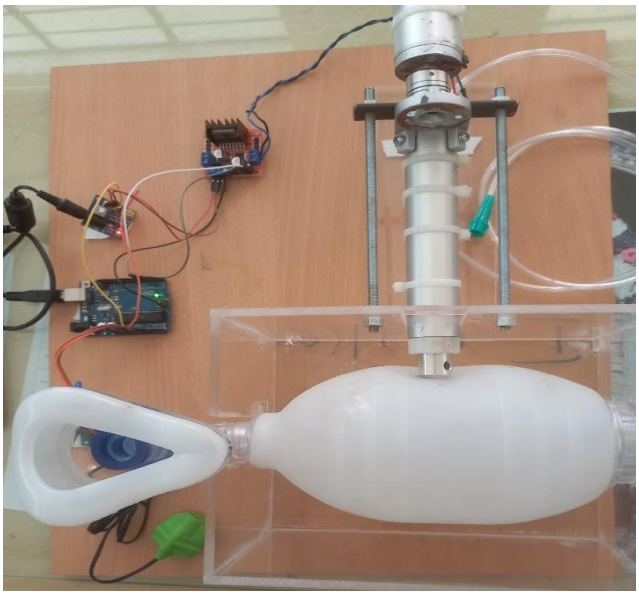

Figure 2. Prototype design and implementation.

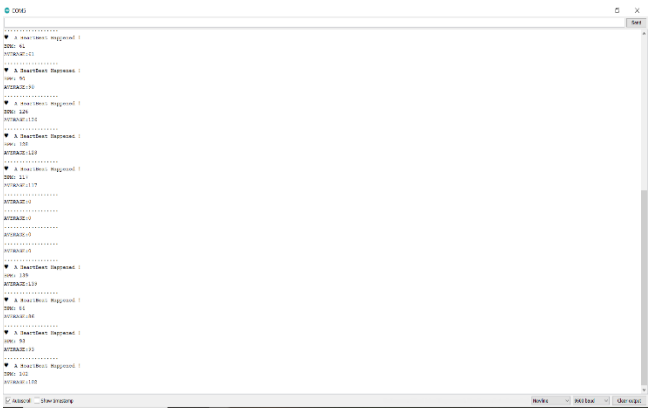

Figure 3. BPM display on Serial Monitor.

V. CONCLUSION

Since the start of the COVID-19 pandemic, researchers have been striving to help society face many problems caused by this pandemic. Among the important initiatives, producing low-cost, open-source mechanical ventilators stand atop. The motivation comes from the worldwide shortage of mechanical ventilators in the treatment of COVID-19 patients—mechanical ventilators keep severely ill patients alive. This paper contributes to this initiative. This paper has detailed the construction of a functional, low-cost, and open-source mechanical ventilator. This topic aims to mitigate the effects of this worldwide ventilators' shortage—a shocking, unfortunate event that hit hard deprived areas.

Functional model of the proposed ventilator was constructed. It was tested on an artificial lung. Model mechanism was operated and the desired breath rate and tidal volume was achieved. This machine requires less amount of power and is portable, weighing not more than 6 kg. It shows the BPM status on the serial monitor. Improvements in its functionalities are welcomed. Investigations are also proposed in order to examine the outcomes resulted by using different motor. Further induction of features is also proposed including a PEEP valve, a humidity exchanger and a blow-off valve. BVMs are easily accessible in the market, therefore inclusion of them poses a positive endeavor for further proceedings. On the final stage, tests will be enforced for the sake of testing of ventilator on a lung model to come up the standards set for ventilator to make the product able to compete with the market.

ACKNOWLEDGMENT

Intuition for construction and infrastructure of core idea for this device was a project during pre-final semester. Special gratitude is due towards Dr. Rekha S N and Mrs. Ramya M of the Department of Electrical and Electronics Engineering for their valuable time, uninterrupted help, encouragement and facilitation during this endeavor. Special thanks to Dr. K N Narayanappa, HOD, Department of EEE for his constant guidance related to medical perspective of ventilator and manual ventilation being provided currently in the hospitals. We would also like to thank Mahesh Deginal of Karunadu Technologies for his assistance in designing the compact models for this project.

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"IOT BASED BUCK BOOST CONVERTER USING PV FOR RESIDENTIAL APPLICATION"

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I. ABSTRACT

Technology is a never-ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This work presents the design and implementation of a low cost but yet flexible and secure cell phone-based home automation system and solar energy conversion. The design is based on a standalone Microcontroller board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Microcontroller board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow authorized users from accessing the appliances at home.

II. INTRODUCTION

Since in modern days the power usage is more than power generation there is a power crisis concentrating on this factor power obtained for solar is one of the advised technics to generate the power. Home automation system is use of information technologies and control system to reduce the human labor. The rapid growth of technologies influences us to use smartphones to remotely control the home appliances. An automated devices has ability to work with versatility, diligence and with lowest error rate. The idea of home automation system is a significant issue for Researchers and home appliances companies. Automation system not only helps to decrease the human labor but it also saves time and energy. Early home automation systems were used in labor saving machines but nowadays its main objective is provided facilities to elderly and handicapped people to perform their daily routine tasks and control the home appliances remotely. A IOT based home automation system can be implemented with a low cost and it is easy to install in an existing home

III. OBJECTIVE

1. To implement IOT based home automation .

IV. COMPONENTS USED

1.Solar panel

2.Charge controller

3.Battery

4. DC-DC Converter

5.Inverter

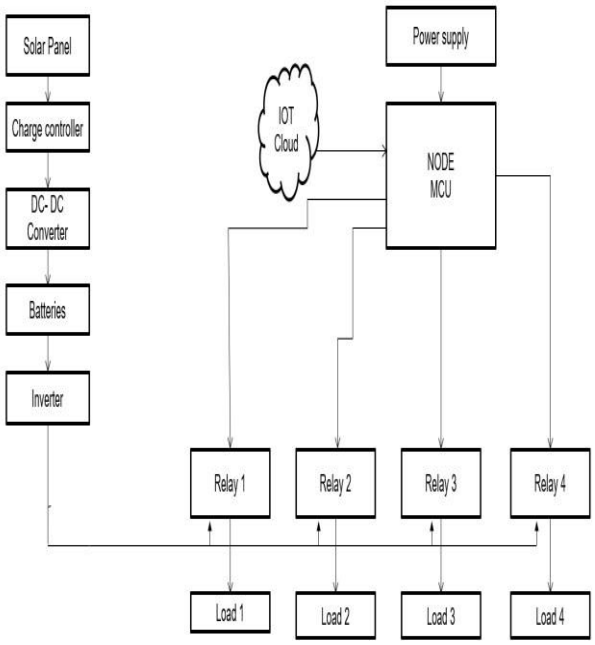
6.Relay

7.Node MC

V. METHODALOGY

Solar panels used to generate electricity and connected to charge controller to limit the current value. Charge controller is connected to Battery and Battery is charged using Electricity. Battery is connected to DC-DC converter which varies voltage from one level to another level and converted into AC by inverter. Inverter connected to step up transformer and transformer is connected to load through relay. IOT cloud is connected to Node MCU (Microcontroller) and in IOT cloud is interfaced to google assistant of our cell phones. IFTTT act as connector between IOT cloud and google assistant.

VI. BLOCK DIAGRAM



VII. RESULT AND DISSCUSIONS

project deals with the generation of power using solar which is renewable source of energy and that reduces the power crisis. IOT based home automation is the ability to control domestic appliances by electronically controlled, internet connected system .

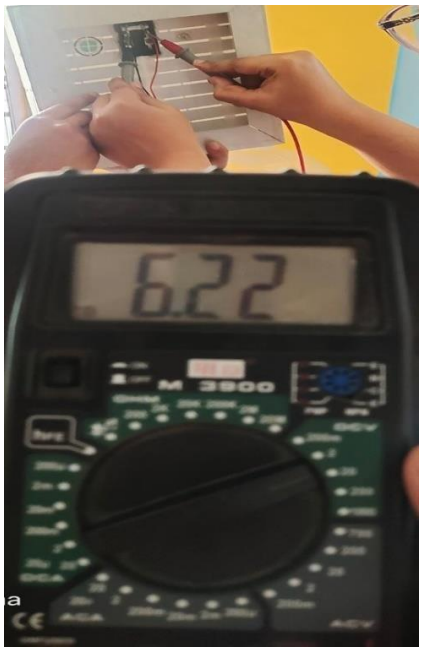


Figure 1. Solar panel connection

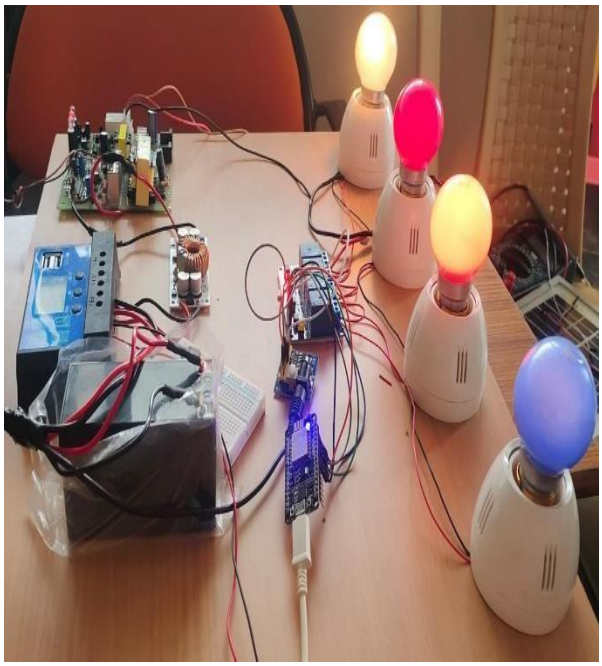


Figure 2.project working model

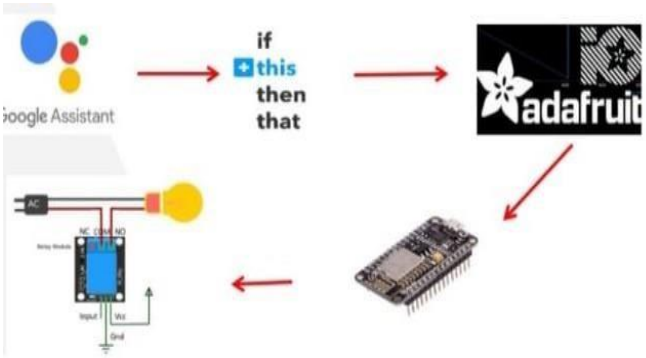


Figure 3. software connections

VIII. CONCLUSION

Different researches have been made in the past with respect to home automation. Home automation is a modern technique to control and monitor the home appliances via wireless technology. The considerable methods for home automation are via Bluetooth, Wi-Fi, ZigBee etc. All these are not cost effective. The proposed model of smart home automation is solar assisted and also password oriented. Solar power supply makes the system cost effective and password protection gives it full security

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Fault Analysis of Induction Motor Using Machine Learning

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***Abstract* -- Today's IoT plays an essential role in our day to day life. This paper thesis deals with the hardware part for monitoring the continuous parameters and speed control part of Induction Motor. In that, parameters are monitored with the help of sensors such as voltage sensor, current sensor, speed sensor, and temperature sensor and controlling the speed part of the induction motor with the help of PWM techniques. By monitoring the parameters of the induction motor, it should help in maintaining the motor before any fault occurs and to prevent any delay in production, which is the reliability of the induction motor. If there is any fault takes place in the induction motor should be automatically disconnected from the supply by using IoT applications. Also, it analyzes the results in graphical form.**

I. INTRODUCTION

Presently, Induction Motor is the most common type of motor in all over fields. The invention of the induction motor by the great scientists Nikola Tesla. About 50% of global electric power consumption is due to the induction motor. In industry 90% of uses the induction motor because of necessary characteristics such as it is inherently 'self-started' motor, it does not require permanent magnet, No brushes, No commutator rings, No position sensor. Induction motor also has a simple and robust operation, maintains a good power factor, less maintenance, highly efficient, small in size, reliable, and cheaper than another type of motor. The essential advantage part of an Induction motor is that its speed can be control easily as it has good speed regulation, sustainable overload capacity, and high starting torque. Due to all of these advantages, Induction Motor is frequently used in an all-over application like industry, electric train, electric Vehicles, crane, elevators, domestic motors, agriculture motors submersible motors etc. [1][6].

In Induction Motor number of types of fault that occur widely is subdivided into three most important parts such as:

1. Electrical faults: In electrical fault, there normally occurs a single phasing fault, Reverse phase sequencing fault, oversupply voltage, overload fault, Earth fault, etc. [1][14].

2.Mechanical Faults: In mechanical fault, there normally occurs a rotor broken bar fault, stator and rotor winding defect, Bearing fault, etc.[1][14].

3.Environment Faults: In environment fault, there normally occurs the vibration of the motor. The surrounding environment affects the performance of an Induction Motor such as moisture, temperature, etc.

This paper represents IoT-based Induction Motor monitoring parameters such as voltage, current, speed, and temperature based on sensor and cloud. By continuous monitoring the parameters, we maintain the continuity of production in industries, making the motor reliable increasing the production of an industry. Also, prevent any abnormality that takes place in the induction motor and detect the early fault in the induction motor. If there is any fault that takes place in this motor it should be determined by a sensor sense parameter value of voltage, current, and this sense value of the sensor gives a signal to Arduino Uno then from the cloud gives a command to the motor should automatically be disconnected from the system. And it gives an alert message in mobile after the fault has cleared for further future work that should not repeat once again.

II. OBJECTIVE

1. For safe and economic data communication in industry or any other fields, Monitoring and controlling the operation of an induction motor depend on the internet of Things (IoT).

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2. By Early fault detection, process interruption of the motor can be reduced, also reduces damages of the motor in an industrial process to a larger extent which makes motor should be more reliable.
3. To protect Motor from overloading, over-current and high temperature.
4. To avoid system failures by starting and stopping the operation of an Induction Motor by Automatic or manual controlmethods.

III. Block Diagram of the System

Below block diagram shows overall monitoring parameters and it's proposed speed controlling system of an induction motor.

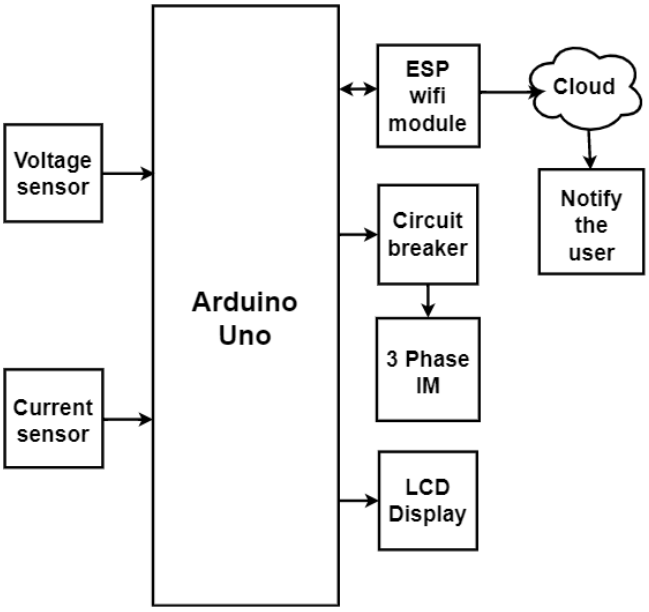

Fig. 1 Block diagram of an IM monitoring system

The block diagram shows sensors for sensing the respective parameters that are voltage & current. With the help of that sensor monitoring the condition parameters of motor and gives the current status of induction motor to the Arduino Uno and from Arduino Uno through the wifi, the module gives information to the cloud where the information is stored and from the cloud, it will receive information on mobile application whenever necessary with the help of things speak. In case any fault takes place in Induction Motor, it should be automatically disconnected from the supply. Whatever parameter is monitored that should be displayed on LCD one by one.

IV. Proposed System

The below block diagram represents the detailed view of the proposed system. It gives complete information about this proposed system. This diagram clarifies how the existing working system takes place and how the actual signal flows from one system to another and which are the main components used in this proposed system. Here in actual working firstly 3 phase AC supply comes into the system, from that AC supply, it will give to 3 phase Induction Motor The power is then fed to the microcontroller circuit via a combination of transformer, rectifier, and regulator. since the motor need to be protected with all the types of faults created from the incoming feeder line we will be having a fault detection algorithm by use of the inputs from CTs and pts along with the thermocouple sensor incorporated inside the motor The values of CTs and PTs were measured in real time and compared to reference values using a machine learning algorithm. In the event of a fault, the system will display the type of fault on an LCD display and use a relay to trip the circuit breaker. The user will be notified of the occurrence of the fault with the help of ESP communication module.

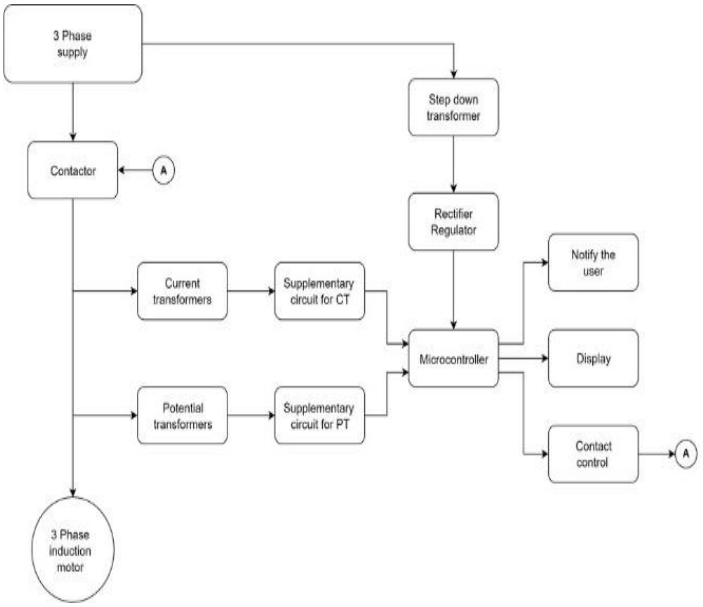

Fig. 2 Block diagram of Proposed system

V. Future Scope

In the future, lot of scope is there for IoT applications. Worldwide there is overuse of IoT application for making human life sophisticated. In 2025 millions of things will connect to the cloud. A lot of research also done on IoT and it's more uses for human life's easiest purpose. Some research works on defense services for security and surveillance, some on automatic vehicle control and traffic

signal control, some on the medical field for body control and health care, some on electronic devices, smart home, etc.

VI. Conclusion

This paper represents that the IoT is well known and rapidly growing technology nowadays. Now IoT becomes a vital part of human life. In the future millions of things will be interconnected with the cloud. Recently IoT comes all over the field such as industry, home automation, electric vehicle, traction, agriculture, medical field, etc. with the help of sensors. This paper represents IoT-based condition monitoring parameters. Analysis and visualization of voltage, current, parameters on an LCD display. By analyzing the motor parameters, it makes the motor to be operated in safe and protective in nature, It also helps in calculating new data to interact with social media and other devices. From thing speak visualization the of voltage, current, faults on the mobile application by connecting to hotspot module. Through thing speak continuously monitored the motor parameter and if any fault takes place it will get an alert message on the mobile application. In industries, its required continuous monitoring data value for power consumption and maintenance application. In case the motor gets over current, over speed and excessive temperature than its rated value it will get automatically disconnected from the supply. By Simulink model getting ideas regarding hardware setup how actual connection takes place and reading that show on an LCD display.

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AGROSMART

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***Abstract* – Agriculture is the foremost traditional movement over time. Since the starting of it, agriculture has endured numerous changes to improve efficiency and quality of crops. So for feeding the whole population the agriculture segment ought to be implant with IOT and agriculturists too should receive this technology's. Over time, farming has been influenced by climate disasters (such as storms or extraordinary temperatures) and by normal disasters (such as pests and plant illnesses). Hence, the another step within the improvement of the agriculture domain was to propose the Internet of Things (IoT) arrangements for observing of numerous parameters for way better smart agriculture. IoT can make cultivating less demanding by reducing the cost by diminishing the intervention of agriculturists in this field through robotization. This paper point is to create a self- independent agriculture system works by interfacing physical gadgets and frameworks to the internet growth. Moreover, the monitoring system aims to manage agricultural issues related to irrigations and analyses the effect of the measured parameters on agriculture, helping the farmers to have healthy crops.**

I INTRODUCTION

Agriculture is the backbone of Indian economy. In India, around 70% of the population earns its livelihood from agriculture. The recent betterment in information and communication technologies has allowed farmers to acquire a vast amount of site-specific data for the fields. Smart Agriculture could be a concept in which data and communication technology is executed to oversee all the activities and forms related to the agriculture domain. IOT could have an even more significant impact on the agriculture area. This process includes a GPS based controlling robot which can work both manually and automatically. It also uses different kinds of sensors to detect the temperature, moisture and humidity of soil . The system uses both wired and remote associations for the communication between the sensors, microcontroller and the internet. Smart Agriculture System is proposed in this paper which can utilize concept of IOT, WSN and cloud computing.

The few factors which influence the amount of water required by crops in various climatic conditions are:

- Temperature
- Humidity
- Sunshine
- Wind speed
- Passive infrared sensor
- Seed monitoring
- pesticide

The image processing techniques can be utilized in the plant disease detection. In most of the cases disease symptoms are seen on the leaves and stem . This paper gives the presentation to image processing technique.

II LITERATURE SURVEY

Our system focuses on the estimation of physical parameters such as soil moisture content and pH of the soil that plays a crucial part in cultivating activities. Also in this segment, different strategy of image processing for plant disease detection is discussed.

In [8], sensor data collection and irrigation control was put forward on crop using remote sensor systems for smart farming. The primary reason of the system is to construct a platform based on IoT for the smart irrigation focusing on distinctive challenges such as complexity using cameras, for real-time management of irrigation system. The elemental idea is to optimize the water distribution and utilization based on collected information from all the viewpoints of the system. In this way, it ensures the accessibility of water in a few circumstances where the water supply is constrained, anticipating within the same time over-irrigation and under-irrigation.

The threshold values of temperature and soil moisture is programmed into a microcontroller [9].

In[10],Monica Jhuria et al uses image processing for detection of disease . They have made two separate databases, one for the preparing of already stored disease pictures and other for the usage of the query pictures. They consider three vectors namely, color, surfaces and morphology .

III OBJECTIVE

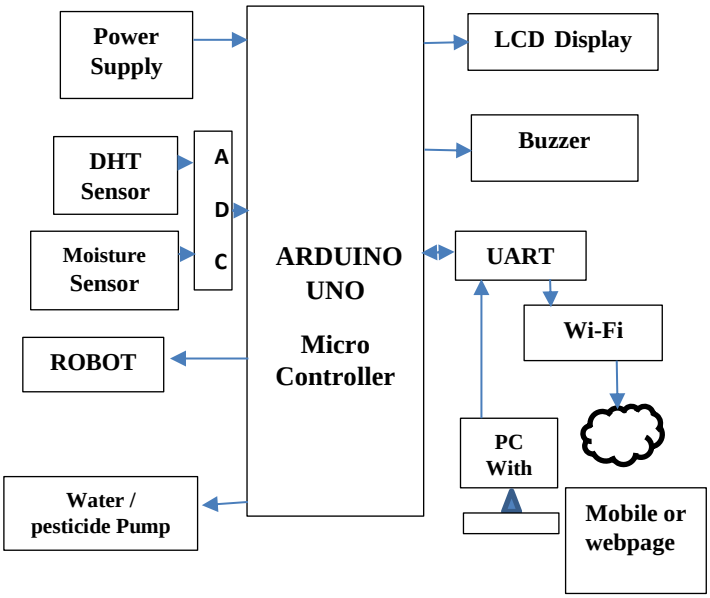
- To read the Temperature and humidity of the agriculture land using DHT sensor
- To measure the moisture content of the soil
- To detect the Crop diseases.
- Sprinkling of water and pesticides decided automatically based on the sensor status.
- To detect the weeds.

IV METHODOLOGY

In this process two sensors are used temperature sensor and humidity sensor.

- Depending on the moisture content, motors will switch ON automatically using Relay with help of solar panel/battery.
- If moisture content is very low in soil, then automatically motor will switch ON and drips water slowly to the roots of plants.
- If water content is very high in plants, then of excess water is removed either from the ground surface or from the root zone.
- The water level is detected by the level sensors, if the water level is low or empty, the tank is filled using pump.
- The updated information will be sent to farmer using wireless sensor network (WSN).
- Image processing is done to detect the crop disease, if disease is detected then the information will be provided to farmer using GSM.
- Image processing is also done for the weed detection. It will store the images in the database(one normal and the other is the weed), it differentiates whether the plant is weed or not by comparing between input and stored image.

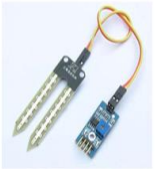
V BLOCK DIAGRAM



- ATMEGA 328 MICROCONTROLLER

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

- MOISTURE SENSOR



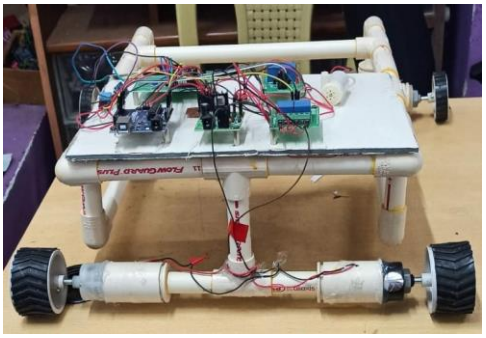
Moisture sensor detects the moisture by the conductivity between two ends of it, as much as the conductivity more the moisture. It can give both digital and analog data

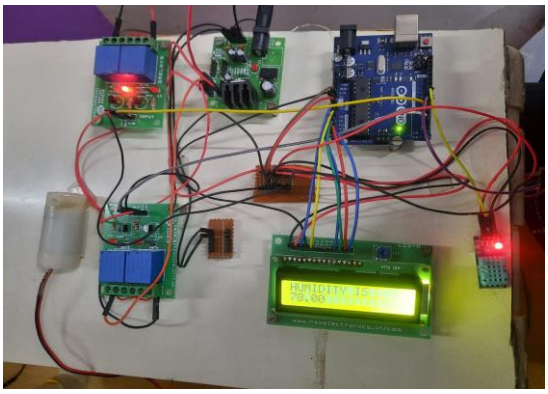
- DHT11 SENSOR

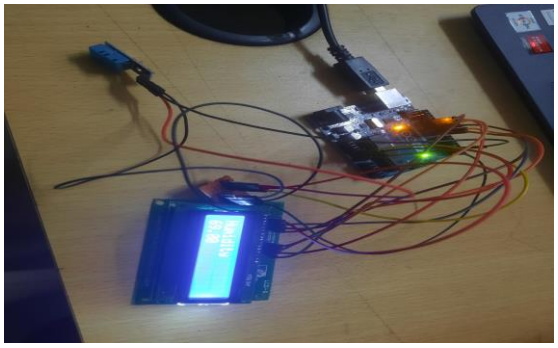
DHT stands for Temperature sensor. It is used to measure the temperature and humidity of the area. This sensor measures the temperature up to 50 degrees Celsius.

VI RESULT AND DISCUSSION

There are two sensors present in the circuit which are used for measuring the ambient temperature, humidity and the soil moisture level. Based on the monitoring of these sensor values the smart agriculture monitoring system provides water to the crop. The data from the sensors is sent to an Arduino controller which stores and processes this data and then sends it to the IOT platform as well as GSM module. A WiFi module is interfaced with the Arduino which sends the sensor values to the remote IOT platform using WiFi connection. The GSM modem receives the sensor values from the Arduino board and sends these values to the user. Some output devices are also connected to the Arduino outputs. These devices include DC motor, relays, and buzzer. If any of the sensor values crosses a certain predefined threshold then the buzzer is turned on to notify the user. One relay is connected to the motors while the other is connected to the water pump. If the soil moisture level is low then the water pump is turned on by the Arduino controller to provide water to the crops. The crop status can be monitored remotely by means of a remote IOT platform.







VII FUTURE SCOPE

In future, this paper can be taken to the product level. To make this paper durable, it has to be compact and cost effective. Additional agricultural, chemical and weather-related sensors can be added to the system in order to achieve more effective and accurate monitoring from the smart system. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system.

VIII CONCLUSION

Fortunately, by making use of the latest agricultural techniques as well as smart electronics technology efficiency can be increased and productivity too far higher levels which can ensure our food security. This model is built from easily available and reasonably priced components. Therefore, the cost is reasonable and maintenance is easy.Using this model, the status of crops can be viewed remotely on a smartphone or laptops using the internet. This helps to keep the farmer up to date even when he is away. This keeps the farmer updated regarding the status of the crop via SMS notifications. This keeps the farmer updated and conscious about the status of his crop.

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E-health Acquisition, Transmission &Monitoring System

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***Abstract*— The main focus of the paper is to address an e-health acquisition, transmission and monitoring system. Patient health parameters are monitored by wireless sensor network and communicated to the far end through Zigbee interface. Data received at far end is monitored by MATLAB. If the parameters are abnormal, it configures the GSM module to send SMS on doctor mobile phone. System implemented in this paper is made for such patients who are not in the critical state but they need to be monitored continuously. When the critical condition occurs, system will originate an alarming message and send it to the doctor. It is fast, less costly and monitors patient remotely from their homes.**

Keywords— PC (personal computer); ICU (intensive care unit); ALG (application layer gateway); GSM (global system for mobile communication)

I. INTRODUCTION

World is progressing very fast today. Every field of life is enhanced with respect to its past and transformed into more comfortable and sophisticated than before. Among all fields, medical field is also making rapid progress and becoming more innovative. Now in this field small sized and more accurate equipment is now available as compared to past. As population and diseases are increasing day by day. Hospitals are not fully equipped to cater every disease and treatments given to patients are not satisfactory. Vital diseases are the one in which patient need continuous monitoring of its body health parameters like sugar level, heart disease etc. Sufficient doctors are not available to check each patient separately and with satisfaction. The system proposed in this paper basically help those patients and their health parameters can be monitored remotely. Large number of patients can be monitored from remote location at any time by a single doctor and can be alerted in case of any alarming situation. The main focus of this paper is to describe the application of Zigbee as well as GSM [1], [2] in medical field. In this system, a specific gadget equipped with different sensors is given to patient.

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It will monitor the health parameters of the patient and keep on updating the values. When any specific parameter will rise above the threshold value, a warning message will be sent to the doctor.

The paper is organized is such a way that section II is focused on motivation. System components are diagnosed in the section III. Section IV reflects the system operational description. The paper is concluded with discussion on conclusions and future works.

II. MOTIVATION

A. Patient monitoring system

It is the system in which different body parameters of patient are monitored and observed. An existing example of such system is an ICU (intensive care unit), where sensors are attached to the patient body. The results are displayed on respective patient monitoring screen and are observed by the doctors.

In under developed countries the health issues are of serious concerns. The number of people suffering from different diseases is quite high. The main cause is high population, pollution and less health care facilities. Some serious diseases require regular monitoring. Otherwise, these can be fatal. The following are some diseases in which patient should be monitored on regular basis:

- heart disease
- diabetes
- kidney diseases
- liver disease
- lungs disease

. System developed in this paper provides the necessary solution for our problem.

III. SYSTEM COMPONENTS

The system components are divided into two sections i.e.; transmitter and receiver. These are elaborated as under:

A. Transmitter section

Transmitter section constitutes ECG electrodes, temperature sensor, Blood pressure sensor, Arduino, Zigbee transmitter and antenna. These are explained as under:

1. ECG electrodes

Electrocardiography is term used for recording the electrical activity of heart over a specific period of time by using electrodes attached to human skin.

Figure 1: ECG Electrodes

Human heart gives off electrical signal current when it beats. ECG records the electrical activity generated by heart [5]. Although these signals are of very small amplitude but are sensed precisely by the ECG electrodes attached to the body of patient. ECG tells us about heart rhythm, heart rate and many more. ECG electrodes of our system are shown in Figure 1. The other device, which is used to sense the pulse rate, is implemented. In this human heart rate is measured by a PIC microcontroller through his finger.

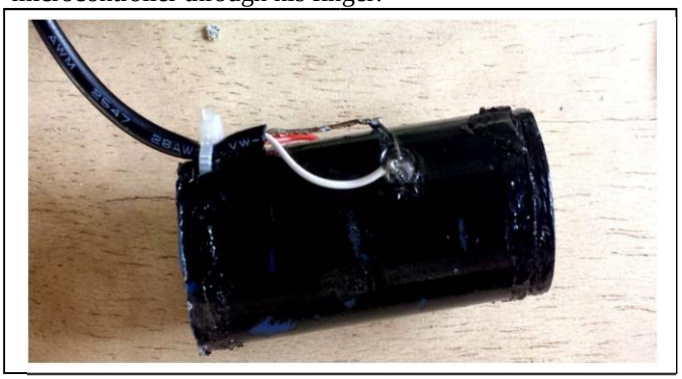


Figure 2: Heart Rate Sensor

When the heart beats, basically it pumps the blood into the body. So this creates some fluctuations in the volume of blood in artery. That blood fluctuation is measured through a sensor working on optical mechanism. Although that signal is low but it is amplified and then blood volume fluctuation is counted in term of heart rate through the tip of a finger as shown in Figure 2.

There is another IC that is used in the circuit, which senses heart rate that is LM324. It is basically an amplifier, which amplifies the output from the heart rate sensor. This IC consists of 4 independent operational amplifiers. And these four operational amplifiers are operated through a single power supply instead of 4-power supply for each. [7]

2. Temperature Sensor

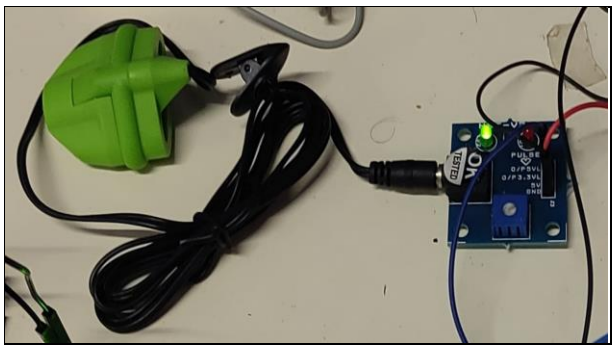
The other sensor, which is attached with the body of the patient, is temperature sensor. That sensor senses the temperature of a patient [10]. The IC that is used to sense the temperature is LM35 as shown in Figure 3, which consist of 3 pins. 1st pin is of 2-40 volts and 2nd pin is for output voltage and 3rd pin is for ground. As the temperature of the body increases, the output voltage of IC LM35 also increases.

Figure 3: Temperature sensor

Basically, it is a diode whose voltage changes with respect to the temperature. As we connect this sensor to the body of a patient. As the temperature of the body increases, the output voltage of that IC also increases with accordance to that temperature. So in this way our sensor measures the temperature.

3. Blood Pressure Sensor

Blood pressure is the one which measures the pressure of blood in the arteries. When the human heart expands and contracts it causes a change in the flow of blood in the arteries which are measured by the blood pressure sensor which can store upto 80 readings [11] with time and date.



4. Arduino

The Arduino kit is programmed in such a way that it interacts with the patient's wireless sensors and get values from them. These are then sent to the receiver through Zigbee transmitter. The one used in our system is shown in Figure 4.

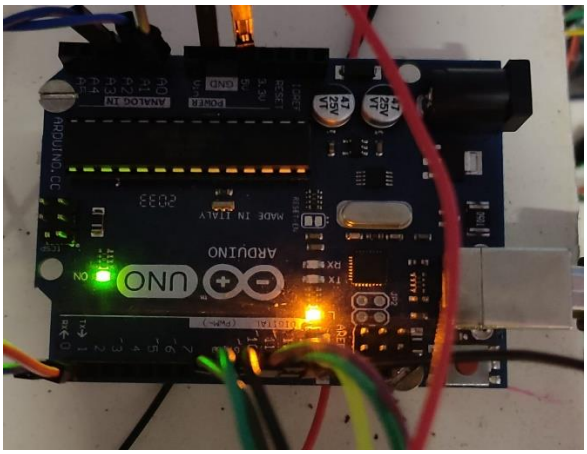
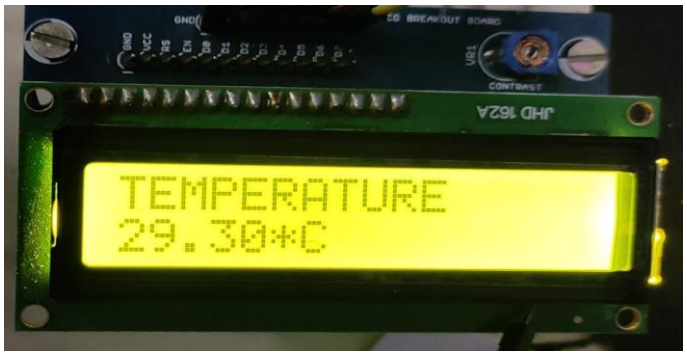


Figure 4: Arduino

5. LCD display

The LCD display is used to monitor the sensor readings live at the remote location of the patient as shown in Figure 5.



6. Zigbee Transmitter

It is a low-cost low power, low range transmitter, which is used to transmit data from one specified location to the other, projected location.

It consists of a transmitter and a receiver. Transmitter is connected at the patient location. Sensors send data to Arduino, which sends it to the Zigbee transmitter in well-organized form. This sends it to the receiver Zigbee module. The one used in our system is shown in Figure 6.

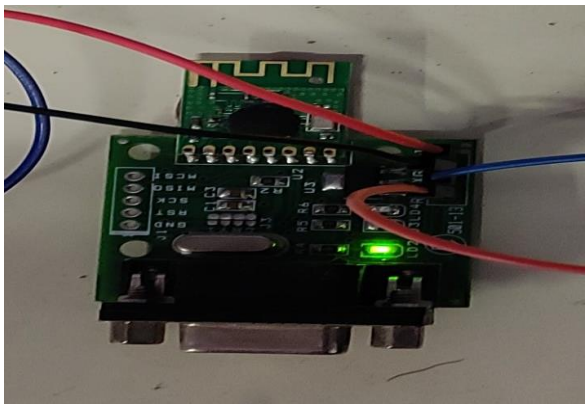


Figure 6: Zigbee Transmitter

B. Receiver Section

Now the receiver section is basically at two locations. One is at the neighbourhood and other at the doctor's location. Receiver section constitutes Zigbee receiver, data monitoring section, GSM module and doctors cell phone. These are explained as under:

1. Zigbee Receiver

It looks like the same device as on the transmitter side. Basically, the Zigbee receiver is connected to the laptop through a portable wire as shown in Figure 7.

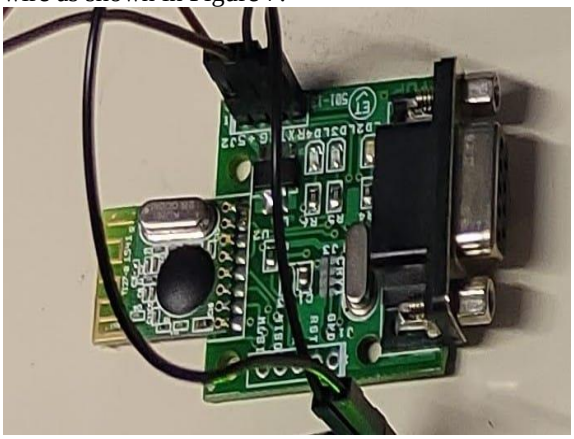


Figure 7: Zigbee Receiver

2. Data Monitoring Section

There is software named as MATLAB environment. The data sent from the transmitter side is received in the receiver and is displayed in that software in the laptop in well-organized form. The data is not only monitored but also compared with the already defined normal values. If the data is out of the normal range of values, then it sends a warning message to the doctor cell phone via GSM module.

3. GSM

GSM kit is on the receiver side and it is basically used in our system for alerting the doctor when the condition of the patient is severe. [6]

Figure 8: GSM kit

The GSM kit is shown in Figure 8. There is a slot in this kit where we can insert SIM and through which we can send our alerting message to the doctor's clinic or hospital where we are required to send it. The GSM module used in our project is SIM900. There is another device connected to this GSM and that is its antenna, which is shown in Figure 8. This is used to enhance the signal quality to send the message. It is implanted on the roof or out of the window. And it is connected to the GSM kit through a wire at the antenna slot.

4. Doctor Cell phone

The doctor cell phone receives emergency message regarding patients serious condition and acts accordingly as per requirements to provide solution of the problem.

Figure 9: Antenna

IV. System Operational Description

Our system is depicted in Figure 10.

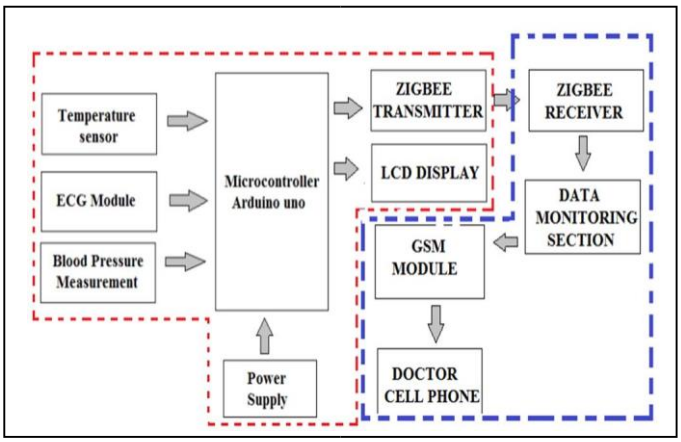


Figure 10: Block diagram

The red dotted line part is system transmitter section and the blue dotted line section is system receiver section. As seen in the Figure 9, all the sensors are connected to the microcontroller. Power supply to all the equipment's is supplied. The programming in the microcontroller is done in such a way that it receives data from all sensors and display it on the LCD screen before sending it to the Zigbee transmitter. Zigbee receiver at the neighborhood receives the data from the Zigbee transmitter. The received data is monitored by data monitoring section by using the MATLAB environment. If the received data is within the normal range then the patient is normal. If the received data is out of the normal range then data monitoring section instructs the GSM module to send emergency SMS on the doctor's cell phone.

We have assigned limits with reference to each sensor. It means that for example if we assigned a value of body temperature as 25-100 degree centigrade. If the value of the temperature sensor attached to the body of the patient remains in between these two limit, lower limit 25 degree and upper limit 100 degree, then the patient is fine but if the value of the sensor cross that specified either the lower limit or the upper limit then will generate a warning message. That message will be transmitted to the doctor, under whose observation is the patient through GSM.

V. Conclusion & Future Work

E-health monitoring system of a patient is useful for those patients, which are in their initial stage of disease. In this way they are observed and medicated in less costly way in their own home instead of hiring a room in the hospital and hiring a doctor for the regular observation continuously in the hospital. This scheme can be more improved if we add prescription in this project too. It means that we programmed our microcontroller in such a way that if it seems an alarming situation then neither it will alert the relatives/doctors but also prescribe the medicine that patient should take in that scenario. It will be then much more helpful for the patient and the caretaker too.

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LI-FI BASED TEXT COMMUNICATION BETWEEN TWO VEHICLES

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Abstract: -- This paper presents the most recent innovation called LI-FI which has been fostered a great deal in recent years. Utilizing the idea of LI-FI two vehicles are spoken with the assistance of LEDs bulbs with the assistance of transmitter and beneficiary circuit. With the assistance of this innovation, the street mishap can be controlled and numerous human lives can be saved. A very chip device called an ultrasonic sensor which is used to measure the distance is used here just to communicate the two vehicles when they come in contact in some range which is preferred for the ultrasonic sensor. Utilizing this LI-FI the information is communicated from one vehicle to another. The information that is communicated through LIFI can be any information like sound, video, or text. This innovation was presented not many years back, which needs more orderly inquiry on its manageability for traffic light reasons. This idea can be executed for a minimal price and with higher proficiency. At present, the everyday exercises use a parcel of LEDs based lights for brightening, which can likewise be utilized for correspondence on the grounds of the benefits like quick exchanging, high power proficiency, and protection to human vision. Subsequently, this undertaking presents eco-friendly information correspondence between Vehicle-to-Vehicle through noticeable light which comprises LEDs that send light signals to the collector. The collector circuit comprises of sunlight-based charger associated with the intensifier and speakers to recuperate back the intensified adaptation of the unique info signal. VLC has a brilliant future and it goes about as a supplement to the current RF correspondence by higher efficiency.

INTRODUCTION

Li-Fi is the transmission of data through light by using fiber optics and sending data through a LED that varies in intensity, faster than the human eye can follow. Integrated chips inside LED will do the processing and amplification of data. The light intensity can be manipulated to send data by very small changes in the results. The technology transfers Thousands of data simultaneously at a higher speed with the help of special modulation and demodulation techniques. Li-Fi technology is high-intensity brightness LEDs. Light-emitting diodes can be made to switch on and off faster since the operating speed of LEDs is even less than one us, than the human eye can detect, causing the light source to appear continuously. This on-off activity cannot be seen with the naked eyes of the human and that enables a kind of data transmission using binary codes. Switching on an LED is a logic 1 switch off is a logic 0 the data can be encoded from the light wave and the exact information can be achieved. Modulation is so fast that the human eye doesn't notice a light-sensitive device (photodetector) receives the signal and converts it back into original data. This method of using the light waves and frequency in it and sending the required data refers as Visible Light Communication (VLC) though its potential to compete with conventional Wi-Fi has inspired the popular characteristics Li-Fi. Visible Light Communication Li-Fi is one of the very efficient versions of Wi-Fi, which is based on visible light communication (VLC). This Li-Fi uses light for a data communications medium using visible light waves as an optical carrier for data transmission and illumination

OBJECTIVE

The primary objective of our project is to analyze the data related to speed, distance and direction and interpret the results to make driving more convenient.

METHODOLOGY

The proposed project deals with communication between two vehicles and an approach to speed and direction detection which aims to be as simple as possible to enable the real-time Computation while being able to adapt to a variety of highway and urban scenarios under different Conditions using Li-Fi which is capable of transmitting and receiving of data regarding upcoming directional turns of respective vehicles and also provide proximity alert when Vehicle approaches closer than the pre-required distance. The upcoming directional turns data Will be transferred using Li-Fi technology which is triggered by giving a manual input using a Keypad. This signal is processed using a microprocessor. Then the signal is given to a light Source which encodes the data and transmits it via light signal. This encoded data is detected by the Receiver side and is decoded and processed using a microprocessor and displayed. Light Fidelity (Li-Fi) technology and Radio Frequency communication are collaboratively used to develop a new algorithm Vehicle-to-Vehicle in the intersection to facilitate time-critical information to be disseminated to all the adjacent vehicles. The vehicles will share their parameters with the nearby vehicle such as speed, the distance between each other the direction of movement of the vehicle with nearby vehicles at the intersection, and the time duration to reach the intersection point. With these parameters, the driver can aware of the vehicles around him, and helps him to control the vehicle to avoid an accident. Basically, this involves a dedicated short-range communication by an anti-breaking system (Autopilot mode) controlling accident avoidance to prevent the accident occurrence. At the 4-way intersection point, the vehicles will communicate among themselves and give way based on Master-Slave configuration to give way for the vehicle based on priority.

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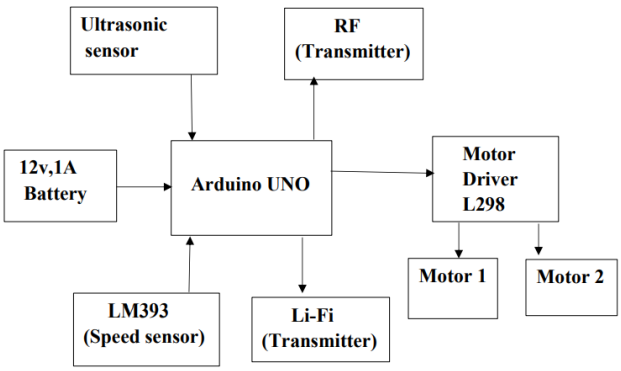
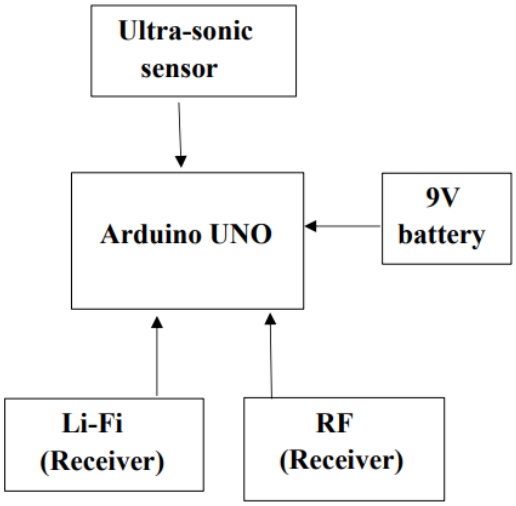
BLOCK DIAGRAM





Stationary Vehicle

RESULT & DISCUSSION

This system is specifically designed to ensure safety for the drivers and the co-passengers by keeping in control of the vehicle using the information obtained from the sensors. By doing so we can avoid most road accidents and can promote safe driving.

FUTURE SCOPE

We have been successful in sending low amounts of data but sending data like multimedia (photo, video) and image data is our main point of concern. In the future, we wish to implement our model in the field of IoT as well. We can use our model in hospitals as the main media of communication between systems and devices like live tracking of patients' condition – heart rate, blood pressure, etc.

CONCLUSION

The future holds the unrevealed answer as the possibilities are huge and if this technology is brought into practice every light-emitting device would be like a Wi-Fi device and transmitting signals, this will lead to a better, safer, cleaner, and greener world. This concept allure a great deal of research as the increasing number of devices are using the Wi-Fi, airwaves are said to be encumbered making it difficult to be reliable high-speed data transmitting signal. This will immensely solve the problem and allow the internet to places where traditional wireless signals are banned such as aircraft. The transmission cost is low with a high speed of data transfer which increases the speed of communication in a reliable way.

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"SOLAR BASED ELECTRIC VEHICLE CHARGING"

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Abstract –Utilizing solar energy to provide power supply for electrical vehicles which is eco friendly and cost effective

I INTRODUCTION

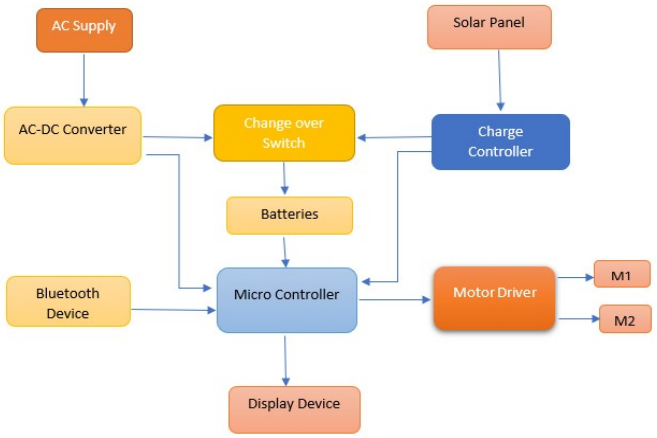
The deterioration of air quality, issues of global warming, and continuous depletion of fossil fuels are serious issues to consider. The conventional electricity generation sector and the transportation sector are the major contributors to these issues. The advent of the renewable energy-based generation and electrification of transportation fleet is aimed to provide a sustainable solution to these issues. The need for a green and sustainable mode of transportation and the advancement of a battery technology has sparked interest in electric vehicles (EVs) as a viable mode of transportation. Due to the intermittent nature of the renewable energy particularly solar photovoltaic (PV), storage technologies such as batteries need to be deployed to smooth out the fluctuating power output. The battery pack of the EVs can be leveraged for this purpose making

EVs more feasible than internal combustion engine (ICE) vehicles. In this article, PV-EV charger as recharging as well as discharging of the vehicle for rated power output. A pulse width modulation (PWM) - based charging control Strategy has been tested. As EVs are equipped with high voltage batteries to increase the driving range and improve the fuel efficiency, a universal input charging station for EVs is developed to deploy it commercially for the quicker appropriation of the electrified transportation framework in the country.

II OBJECTIVE

- Utilizing solar energy to provide power supply for electrical vehicles which is eco friendly and cost effective.
- The objective of this project is to investigate the problem of providing an outdoor power source for charging devices in an environmentally friendly way to help decrease the demand for power from other methods.
- In this work will be utilizing solar energy to provide the supply for an outdoor charging station for devices such as electric vehicles. Solar energy continues to be researched and enhanced as an alternative source of energy.

III METHODOLOGY



Microcontroller:

A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip. Sometimes referred to as an embedded controller or microcontroller unit (MCU), microcontrollers are found in vehicles, robots, office machines, medical devices, mobile radio transceivers, vending machines and home appliances, among other devices. They are essentially simple miniature personal computers (PCs) designed to control small features of a larger component, without a complex front-end operating system (OS).

Solar Panel:

A solar cell panel, solar electric panel, photo-voltaic (PV) module or just solar panel is an assembly of photo-voltaic cells mounted in a framework for installation. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV modules is called a PV panel, and a system of PV panels is called an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

AC-DC Converter:

AC-DC converters take the AC power from wall outlets and convert it to unregulated DC. These power supplies include transformers that change the voltage of the AC that comes through wall outlets, rectifiers to save it from AC to DC and a filter that removes noise from the peaks and troths of the AC power waves.

Charge controller:

The Charge Controller is a switching device that can connect and disconnect the charger to the battery and it will take control over charging and to stop charging at the correct voltage. This will protect the batteries from damage from over charging and regulate the power going from the solar panels to the batteries. A microcontroller in the circuit will read the level of the batteries and then cut off the source of the solar panels to the batteries, once it sees the battery is at the fully charged state. If this was not in place, the solar panels would keep feeding the batteries energy and the batteries would become overheated and damage the internal components.

Charge over Switch:

A changeover switch is designed to transfer a house (or business) electricity from the commercial power grid to a local generator when an outage occurs. Also known as “transfer switches,” they connect directly to the generator, commercial power supply or line, and the house.

Motor Drive:

DC motor drives are defined as amplifiers or power modules that interface between a controller and a DC motor. They convert step and direction input from the controller to currents and voltages compatible with the motor.

Bluetooth Device:

HC-05 is a Bluetooth module which can communicate in two ways. Which means, it is full-duplex. We can use it with most micro controllers. Because it operates Serial Port Protocol (SSP). The module communicates with the help of USART (Universal Synchronous/Asynchronous Receiver/Transmitter) at the baud rate of 9600. and it also support other baud rate. So, we can interface this module with any microcontroller which supports USART. The HC-05 can operate in two modes. One is Data mode and other is AT command mode. When the enable pin is "LOW" the HC-05 is in Data Mode. If that pin set as "HIGH" the module is in AT command mode. Here we operate this module in Data Mode.

LCD:

LCD 16x2 is a 16-pin device that has 2 rows that can accommodate 16 characters each. LCD 16x2 can be used in 4-bit mode or 8-bit mode. It is also possible to create custom characters. It has 8 data lines and 3 control lines that can be used for control purposes.

IV EXPECTED OUTCOME

The proposed project is a low-cost project with the solar based charging of vehicle. There is need for solar charging to supplement the proposed capacity and augment the available charging options by reducing the distance time gap between two charging stations.

This project aims at:

- Supplementing the proposed charging infrastructure capacity
- Increase option for recharging
- Demonstration of a Distributed Energy Resource (DER)
- Generating public awareness about the technology and benefits
- Improving the life of battery by preventing overheating during charging

V FUTURE SCOPE

For project demo concern, we have developed a prototype module. In future, this project can be taken to the product level. To make this project as user friendly and durable, we need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system.

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VI CONCLUSION

This work is budgetary restrictions as an initially presented. Most Design projects use industry sponsored projects as a way to introduce the student to working under real industry guidelines and also for companies to be introduced to the next generation of potential employees. This solar station concept came from students; no industry sponsor was involved in the thought process of the design. Having an industry sponsor gives the students a technical supervisor and collaborator to assist with any research and design issues that may arise in addition to financial support. Eliminating dependence on fossil fuels and limited resources while designing an environmentally friendly, self-sustainable, outdoor energy source is the goal for the solar powered charging station. As well, rapidly advancing solar innovations and designs could lend themselves to creating a more efficient charging station.

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"VOICE AND EYE BASED DIRECTION AND SPEED CONTROL OF WHEEL CHAIR"

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***ABSTRACT*- Smart Wheel Chair is mechanically controlled devices designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the wheels for wheelchair. Furtherore it also provides an opportunity for visually or physically impaired persons to move from one place to another. The wheelchair is also provided with obstacle detection system which reduces the chance of collision while on the journey. Smart wheelchair has gained a lot of interests in the recent times. The paper aims to build a similar wheel chair which would have a sort of intelligence and hence helps the user on his/her movement. In this paper we present a low cost and real time system which enables a person to control his wheelchair with eye movements. This system is enabled by voice control. Once enabled, it processes consecutive frames from the system to detect the direction of eye movement. Hence, the problems faced by the people can be easily solved by using technology for controlling the wheelchair.**

INTRODUCTION

World Health Organization (WHO) and World Bank says that there are 70 million people are handicapped in the world. Unfortunately day by day the number of handicapped people is going on increasing due to road accidents as well as disease like paralysis. A wheelchair is a wheeled mobility device in which the user sits. The device is propelled either manually by pushing the wheels with the hands or via various automated systems. Wheelchairs are used by people for whom walking is difficult or impossible due to illness, injury, or disability. People with walking disability.

If a person is handicapped then he is dependent on other person for his day to day work like transport, food, orientation etc. So a voice operated wheel chair is developed which will operate automatically on the commands from the handicapped user for movement purpose. According to a study conducted by Christopher & Dana Reeve Foundation, nearly every 1 person in 50 is suffering from paralysis due to damaging of nervous system. This figure approximates to 6 million people worldwide and has increased by 33 percent from previous estimation[6]. The causes of Paralysis are mainly due to spinal cord injury stated in the figure. We are using accelerometer in our

system, accelerometers are also used earlier to monitor patients physical activities and their posture. A similar wired system has been developed to assist the physically challenged people suffering from Quadriplegia to control the motion of wheelchair motors by head movements [1]. These devices are useful especially in transportation from one place to another. The machines can also be used in old age homes where the old age persons have difficulty in their movements. The devices serve as a boon for those who have lost their mobility. Different types of smart wheelchair have been developed in the past but the new generations of wheelchairs are being developed and used which features the use of artificial intelligence and hence leaves a little to tinker about to the user who uses the wheel chair[3]. This paper proposes a system that can assist the disabled people to control the motion of their wheelchair by the hand movements wirelessly.

PROPOSED METHODOLOGY

The proposed system can be mounted on primary functioning body part to control the wheelchair movement i.e. hand, head. The system consists of a Transmitter which acts as a wireless remote that can be mounted on hand or head. Transmitter end consists of a microcontroller development board employing MEMS accelerometer which senses the tilt of the platform it is mounted on[2]. The system having positioning of an accelerometer on upper side hand to detect roll and pitch angle.

To simplify the operations of the motorized wheelchair as to make it easier and simpler for the disabled person to operate[4],[5]. To construct a wheelchair control module and interface it with the speech recognition board as well as a wireless microphone unit.To controlling the wheel chair using eye movement.

The Smart Wheelchair is designed and completed by the complete methodology which were our guideline throughout this project. The power supply is given to the microcontroller ,and it is operated by giving the inputs as shown in the block diagram[9]. IR sensors detect the object in front of the wheel chair. Whenever the wheelchair is going to desire the direction the IR sensors transmits the IR waves without any interruption. The audio signal is converted to electrical signal goes to the voice recognition to recognize the voice signal which has been trained to the model. MEMS sensor is used to determine the commands[10]. [11]Here we use 4 way relay,so that the microcontroller sense signal to the relay. The motor driver is inserted between arduino and motor.Motor driver take the input signals from the Arduino and generate corresponding output to the motor.

BLOCK DIAGRAM

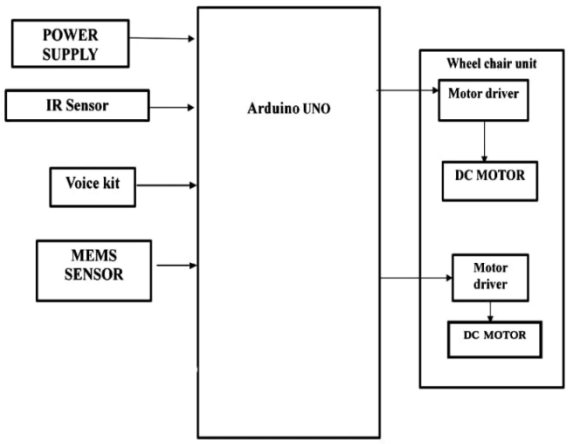

Fig. Wheelchair unit with microcontroller

IRSENSOR Active IRsensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems.

MEMS Inertial sensors are used to detect linear and rotational motion of an object. There are two types of inertial sensors - accelerometers that detect linear acceleration and gyroscopes that detect rotational motion. Accelerometers and gyros are widely used in several applications, including aerospace, military, automotive, mobile phones, and consumer electronics. For example, in mobile phones, gyroscope and accelerometer sensors are used for screen rotation, gaming, virtual reality, and augmented reality applications. In automobiles, accelerometer and gyroscope

are used for detection vehicle rollover, airbag release control, ABS, active suspension, traction control, and seat belt control. Many military applications like smart ammunition, flight control, etc. also make use of these sensors. In aerospace applications, these sensors are used for measuring microgravity and monitoring the movement and rotation of equipment/devices.

ARDUINO IDE works on the three most popular operating systems: Windows, Mac OS, and Linux. Aside from that, the application is also accessible from the cloud. These options provide programmers with the choice of creating and saving their sketches on the cloud or building their programs locally and upload it directly to the board.

Voice recognition products are quickly becoming part of everyday life. For example, Google's smart home kit allows you to set your devices to begin working before you even get home. You can turn on the lights and heat, unlock your door, and monitor your spaces seamlessly and remotely. Speech recognition identifies the words you use. You can search for a video on YouTube without typing or turn on a smart TV without clicking a button. Voice recognition takes it one step further, ensuring that only your voice can unlock your home. The technology identifies your specific voice and you rely on its ability to do so to keep you safe. Voice-enabled devices also recognize specific voices within a home. These recognition abilities prevent your kids from using devices to shop without your permission. They also help to differentiate from family members who are scheduling appointments with connected devices.

4-Relay unit is an integrated 4-way relay module which can be controlled by I2C protocol. The maximum control voltage of each relay is AC-250V/DC-28V, the rated current is 10A and the instantaneous current can hold up to 16A. Each relay can be controlled independently, each on it's own. Each relay has status (LED) indictor as well to show the state of the relay at any given time.

RESULT & DISCUSSION

The data obtained from a basic WST-wheelchair skill test are represented graphically. The presented system was tested with test subjects, in an age range of 20–30 years. All the testing subjects were healthy and were asked to drive the wheelchair via eye and voice control modes separately through a fixed distance[7]. All participants operated the wheelchair up to the targeted distance separately for each movement (forward, backward, rollover soft surface, turn left and right). The main goal was to note the system's response time for both optical and vocal commands, separately.

FUTURE SCOPE

Smart Wheel Chair has a wide range of application and scope in following areas:

- Physically Challenged People Physically Disabled People can use it as per their purposes. People suffering from certain paralysis can use either voice or eye movement as per requirement.
- Patients in the Hospitals People suffering from certain paralysis can use either voice or eye movement as per requirement.
- Old Age Homes People at old age homes can use this chair as per their requirement..

CONCLUSION

An eye and voice-controlled interface for a wheelchair to assist the mobility of physically impaired people has been designed so that they may be able to perform their daily life activities without additional support from a caregiver or healthcare professional.

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"IOT BASED POWER THEFT DETECTION AND SMART METER MONITOTING SYSTEM"

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ABSTRACT

We can't imagine today's life without electricity, almost all the things, equipments and appliances we are using in day to day life are using electric power to run smoothly. Solar energy is the alternative but is has some limitations like environmental changes, high initial cost etc. So from rural to urban and from domestic to industrial areas the use of electricity is increased but with the power theft hand in hand. So the solution can be -A smart energy meter. Basically energy meter is a device that calculates the cost of electricity consumed by homes, business, or an electrical device. Using IOT based Electricity Theft Detection a system one can find the fraudulent user by showing the status of energy meter at the back end of electricity office. In this paper Arduino based power theft detection and protection system is designed. An increase in the demand of electric power for household, commercial and industrial loads lead to management of electric distribution system become more complicated. Lack of information at the bases station regarding status of the distribution network has been identified as the major bottleneck to its effective monitoring and controlling. Electrical power theft detection and protection system is used to detect and protect an unauthorized tapping on distribution line. In this paper ACS712 series current sensor has been used as the interfacing instrument between the power line current and Arduino

INTRODUCTION

Generation, transmission and distribution of electrical energy involve many operational losses. Whereas, losses implicated in generation can be technically defined, but transmission and distribution losses cannot be precisely quantified with the sending end information. This illustrates the involvement of nontechnical parameter in transmission and distribution system. Overall technical losses occur naturally and caused because of power dissipation in transmission lines, transformers, and other power system components was discussed in [1]. Technical losses in transmission and distributions computed with the information about total load and energy billed. On the other hand, nontechnical losses cannot be precisely computed. It can be estimated from the difference between the total energy supplied to the customers and the total energy billed. This kind of loss can be a power theft in the form of meter tampering, stealing or illegal connections billing irregularities, and unpaid bills. power theft, so has become a government [2]. It has also different impact like financial and quality of supplied power. The financial impact of power theft has two fold manifestations, first there is income lost or not collected after delivery of the service, second the income lost due to not charging customers more. If there is power theft, it also leads to non-efficient utilization of generated

power. So, now a day merely generating more power is not enough, controlling the electrical system has become very important. This can improve power quality to a great extent and prevent power theft of different forms. But some forms of electricity are difficulty to measure, and thus to control. For example, theft that involves tampering with meter to distort the billing information or direct information to the power system results in commercial loss, is nearly impossible to measure.

Since there is lack of information on both commercial and the legitimate loads in the system, it is difficult to measure commercial loss. This is due to insufficient inputs for any meaningful loss calculation. Despite the best efforts by utility, the current results of commercial losses measurements are often inaccurate, because the figures rely heavily on the records of detected cases, rather than actual measurement of the electrical power system [3]. Even if utility do have some control over the magnitude of commercial losses, they are not able to have full control. This has led to a huge lose for electric utilities. In the future, electricity supply has to be reliable, quality and secured. In order to do so, utilities need to have better information about the operation and the state of the distribution networks. For this to materialize, in the future, there will an increasing penetration of distributed generation connected to customer's premises and a shift from the traditional dominant large central power plants electricity generation concept to more complex power delivery [4].

When electricity theft happens getting information is the first step for controlling and taking measure. In this study an electricity theft detection system has been designed. It can be used to detect when the transmission line was taped by unauthorized person through a piece of wire. In system the current sensors are used to sense the total amount of current consumed by the load. If any tapping has had happened in the line during transmission, the two current sensors read different valves, which indicates that electricity theft has been occurred. The theft information is then quickly accessed by the Arduino and sends SMS to the concerned body through the GSM module .

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OBJECTIVE

- To provide automated load energy reading over animmediate basis.
- To use the electricity in an optimized manner.
- Reduce the power wastage.

METHODOLOGY

- We are using Arduino ATMEGA 2560 as main controller and adding Wi-Fi feature.
- Voltage and current sensors are used to read the Corresponding voltage and current information and generate equivalent analogsignals.
- These analog signals are passed to the Arduino microcontroller and values are updated to server through ESP8266.
- A Passive sensor is used to detect the tampering. If there was any tampering, the output of sensor will be HIGH.
- Based on the output of sensor an alert message is passed.
- Relay used to control the access of power to the consumer.

BLOCK DIAGRAM

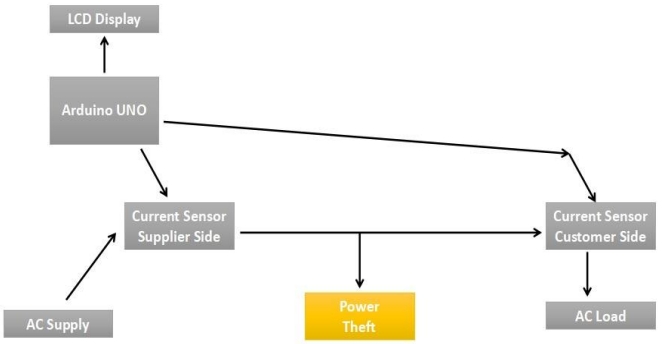

Figure shows power theft detection and smart meter monitoring

RESULT & DISCUSSION

Electricity thefts are increasing every year across domestic as well as industrial domains which affect the economic status of the country. Various wireless communication systems are available to detect the power theft, but lacks the required infrastructure needed to employ them. The project's aim is to design a system to monitor the power consumed by load and to detect and eliminate the power theft in transmission lines and energy meters. This work is also focused on communicating the theft information to Electricity Board (EB) through IOT. As a network of devices is connected like sensors it has the ability to exchange real time information through internet. In this project Raspberry Pi is utilized to detect power theft and send command to GSM module which sends the theft information message to EB. The implementation of this system will help save large amount of electricity.

CONCLUSION

This paper presents a framework for IOT based real time power theft detection and smart meter monitoring system. A linear regression-based approach is presented to detect the power theft. A new IOT based architecture is used for implementing communication infrastructure for the theft identification and alerting system. Android applications are developed for easy monitoring of energy utilization/billing information and alerting the theft for authorities. A prototype system is implemented and various test scenarios are considered to validate the proposed system. The future work for the presented system lies in improving the theft detection algorithm to use past history of each consumer to detect the theft at each smart meter level.

ACKNOWLEDGEMENT

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CONTROL AND SAFETY UNIT OF BLDC MOTOR

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1.Abstract

In this paper, a brushless DC (BLDC) motor control system is implemented to apply to an x-by-wire system based on ISO 26262 which is a functional safety standard for road vehicle. Recently, conventional mechanical and hydraulic systems are replaced by electric/electronic (E/E) systems to enhance the vehicle driving performance and safety. Particularly, because x-by-wire systems have the safety-critical functions, the reliability of the systems is needed to be improved by considering functional safety. For hardware and software requirement considered functional safety,electronic control unit (ECU) of the proposed BLOC motor control system has a microcontroller with an asymmetric dual-core architecture and an external watchdog. Functional safety oriented monitoring functions are implemented byusing the ECU design and also verified by using hardware-in-the-loop simulation (HILS). The proposed system is very effective for detecting the software faults and mitigating the influence of the hardware failures with the functional safety compliant ECU

2.Introduction

In modern automotive industry, vehicles are equipped with the x-by-wire systems that replace the conventional mechanical and hydraulic devices with electric/electronic (EIE) devices. X-by-wire systems enable the elimination of some traditional component, contribute to assist the driver in safety critical situation and enhance the driving performance.

Functional safety applies to all kinds of function implemented by using E/E devices and also automotive safety related functions. Functional safety standard provides measure to reduce the risks resulting from the malfunction of the systems. ISO 26262 is the automotive functional safety standard and important issue of current automobile development. ISO 26262 provides an automotive safety life cycle and risk-based approach to determine Automotive Safety Integrity Level (ASIL) .

In this paper, a brushless DC (BLOC) motor control system, which fulfill the functional safety requirements, is proposed and designed by an ECU that satisfies some of hardware and software requirements of ISO 26262. The ECU consists of Infineon's 32-bit microcontroller TC1798 with an asymmetric dual-core architecture and an external watchdog. Functional safety-oriented functions are implemented by using the ECU. The mitigation of the influence of the hardware failures or software faults are verified with hardware-in-the-loopsimulation (HILS)

3.Functional Safety

Functional safety is influenced by the development, production, maintenance and management process. ISO 26262 addresses the safety-related aspects for developing a product. Hazard analysis and risk assessment is conducted, in which hazards and risks are classified and have an ASIL assigned. Fig. 1 shows the hierarchical approach by which the safety goals are determined as a result of the hazard analysis and risk assessment. In the phase of product development, technical safety requirements are determined to describe how to implement the functional safety concept..

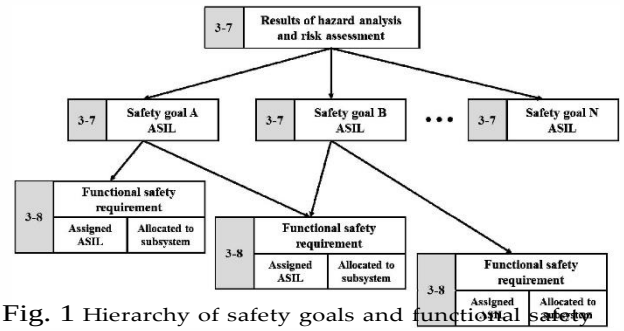

Fig. 1 Hierarchy of safety goals and functional safety requirements.

4.Functional Safety Compliant BLDC Motor Control

3.1 Functional safety compliant hardware architecture

The ECU architecture has an asymmetric dual-core architecture with an external watchdog as shown in Fig. 2. Primary processing unit runs the application software, while secondary processing unit monitors results of operation on the primary processing unit. The external watchdog monitors the supply voltages of devices in the ECU. The Processor and external watchdog are linked to each other over a serial peripheral interface (SPI). During maintaining the communication, the external watchdog remains an active state. If a critical error is raised in the processor, the external watchdog receive a message from the processor and set to the disabled state. Primary processing unit communicates with secondary processing unit by using shared memory.

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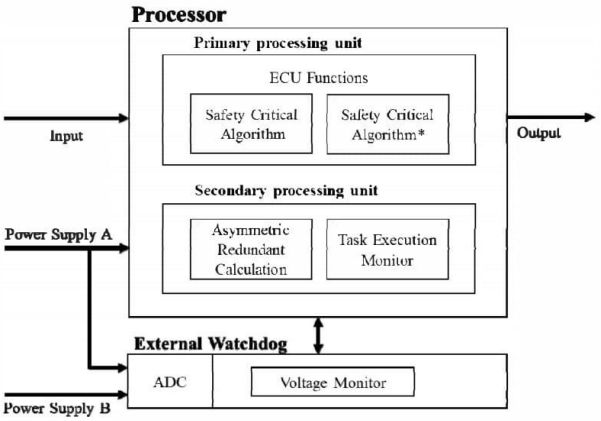

Fig. 2 Asymmetric dual-core architecture with an external watchdog.

For the system, Annex D of ISO 26262-5:11 can be used as an evaluation of diagnostic coverage (DC) supported by the suitable reason. Typical faults or failures of the hardware components are shown in TableI that is a part of Annex D. Annex D provides guidelines which are adapted based on analysis of the system components such as a power supply, sensors, actuators, memories, processing units, communication and etc. The designed system achieves 60% of diagnostic coverage for power supply and 99% of DC for control logic.

Furthermore, ISO 26262 specifies appropriate safety mechanism to be implemented in the ECU architectureto detect faults or failures of components. The Diagnostic coverage of the safety mechanism associated with processing units, program sequence monitoring and clock is categorized such as the following Table 2 and 3 .

Table 1 Analyzed faults of failure modes in derivation of diagnostic coverage.

Element	Analyzed failure modes for DC		
	Low (60 %)	Medium (90 %)	High (99 %)
Power supply	Under and over Voltage	Drift, Under and over Voltage	Drift and oscillation, Under and over Voltage, Power spikes
Control logic	No code execution, Execution too slow, Stack overflow/ underflow	Wrong coding or no execution, Execution too slow, Stack overflow/ underflow	Wrong coding, wrong or no execution, Execution out of order, Execution too fast or too slow, Stack overflow/ underflow

Table 2 Safety mechanisms associated with processing units.

Safety mechanism/measure	Typical DC considered achievable
Software diversified redundancy (one hardware channel)	High
Reciprocal comparison by software	High
HW redundancy (e.g., dual-core lockstep, asymmetric redundancy, coded processing)	High

Table 3 Safety mechanisms associated with program sequence monitoring/Clock.

Safety mechanism/measure	Typical DC considered achievable
Watchdog with separate time base and time-window	Medium
Logical monitoring of program sequence	Medium
Combination of temporal and logical monitoring of program sequences with time dependency	High

The safety functions consist of three monitor functions. First, asymmetric redundant calculationensures the reliability of safety-critical algorithms. The safety-critical algorithms' code has the redundant implementation of two differently-ordered algorithms. The calculation results of the algorithms are compared.

Second, the task execution monitor ensures thecorrect sequence of tasks such as algorithms and their allowed run time. The asymmetric redundant calculation and the task execution monitor are non-critical tests. If these non-critical tests fail, error count of these monitor functions is incremented. When the error count is greater than the threshold count, the external watchdog set to the disabled state. And the whole system resets to achieve the safe state [8].

Third, the external watchdog monitors the voltages which supply to the processor or other safety-critical hardware in the system. If any voltages are not in between threshold voltage which is predetermined value, the external watchdog immediately set to the disabled state to reset the system as the voltage monitor is critical tests [9].

3.2 Current and speed controllers

Dual-loop control block diagram for controlling the BLOC motor is shown in Fig. 3. The speed and the current controller are proportional-integral (PI) feedback controllers on the outer and inner loop. On the current control loop, the analog to digital conversion (AOC) of current measured by the current sensor is conducted by two independent ADC modules. On the speed control loop, the output pulses of hall sensor are connected to the counter module (CCU6) for accepting the pulses.

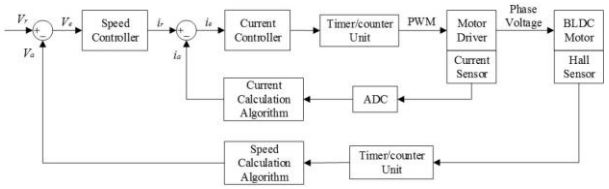

Fig. 3 Block diagram of BLDC motor control.

3.3 BLDC motor control algorithm considering functional safety

BLOC motor control algorithms have the functional safety oriented monitor functions. The asymmetric redundant calculation and the task execution monitor are executed every 8Ams based on the fact that communication period between a primary processing unit and a secondary processing unit. With the starting of the system, the execution time and sequence of the control algorithm are monitored. Also the calculationresults of the algorithms are monitored in the communication period. Fig. 4 illustrates a schedule of the asymmetric redundant calculation and task execution monitor.

The asymmetric redundant calculation compares two calculation results of the BLOC motor controller to check for an equal condition in the period, as shown in Fig. 5. The task execution monitor checks predefined run time and execution sequence of the safety-critical algorithm. In The BLDC motor control system, run time of BLOC motor control algorithm and execution sequence of the peed and current controller are monitored and its safety mechanism is as shown in Fig.

6. If monitor functions detect an error, the error count is incremented. When it is greater than the threshold count Threshold' then the external watchdog is disabled state and reset the system to switch into the safe state [6-7].

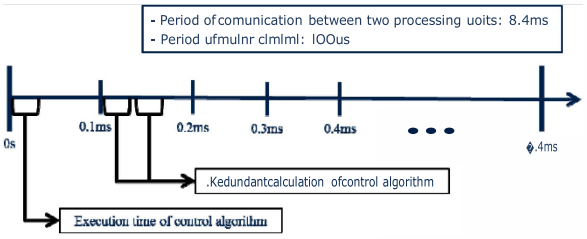

Fig. 4 BLOC motor control schedule applied to two monitor functions.

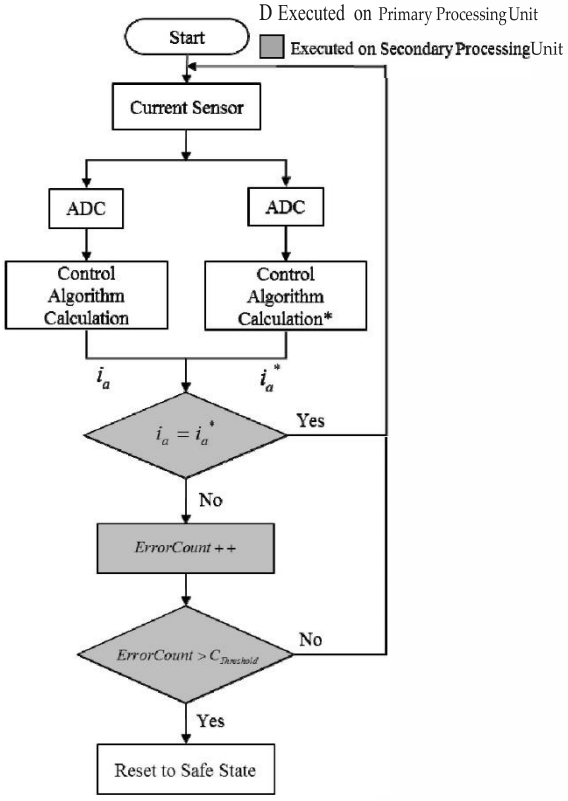

Fig. 5 Safety mechanism of the asymmetric redundant calculation.

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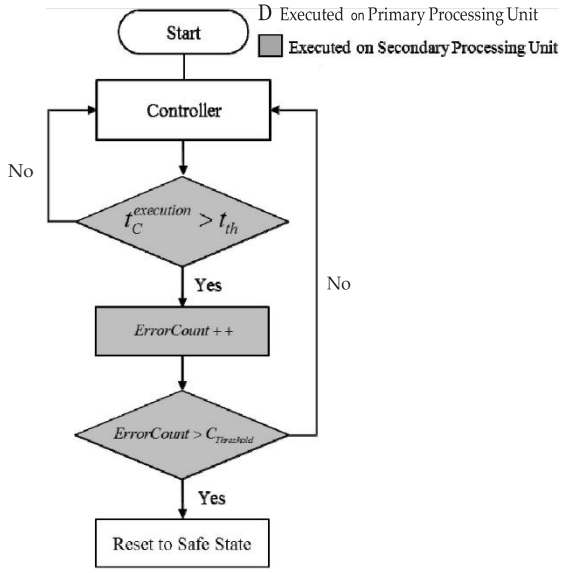

Fig. 6 Safety mechanism of the task execution monitor.

5.Experiment And Results

4.1 Configuration of experimental system

The ECU consists of Infineon 32-bit microcontroller TC1798, an external watchdog CIC61508, motor driver and current sensors as shown in Fig. 7. The pulse width modulation (PWM) signals for controlling the BLDC motor are generated by the Capture/Compare Unit 6 (CCU6) which is timer/counter unit. Also hall sensor inputs are sampled by CCU6. Analog signal from current sensor is converted to digital signal by AOCmodules.

The experimental setup of the BLDC motor control system is shown in Fig. 8 and contains a PC, a debugger, the ECU and the BLOC motor.

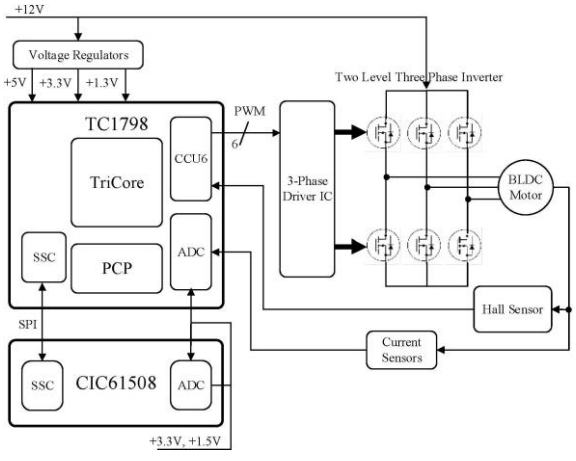

Fig. 7 Functional safety compliant ECU architecture for BLOC motor control system

Fig. 8 Experimental setup.

4.2 Experimental results

In this section, functional safety oriented monitoring functions such as the asymmetric redundant calculation, task execution monitor and voltage monitor are verified by using HILS. Speed and current response of the motor have speed of 2500rpm and current of O.6A. During the course of operating asymmetric redundant calculation, the calculation results of algorithm to control the motor are different by forcing to change one of the calculation results, then the system's reset occurs at 3.35s. After that, the system will be safe state and control the motor as shown in Figs. 9–10.

Execution sequence and time of algorithm or task to control the motor is checked by task execution monitor. The task is in wrong order by forcing to change the order or task execution time of the task exceeds their allowed run time by adding delay in the task intentionally. And the system resets and then will control the motor again as shown in Figs. 11–12.

External watchdog monitors the supply voltage to the microcontroller, the external watchdog and motor driver. The upper and lower threshold voltages are set 2.7V and 1.3V, respectively. In case of getting out of the threshold voltage by using potentiometer at 3.1s, the external watchdog resets the system as shown in Fig. 13.

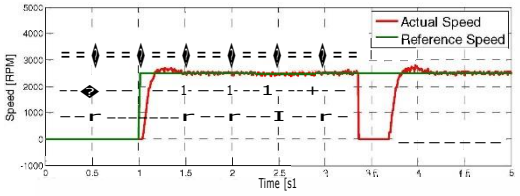

Fig. 9 Asymmetric redundant calculation - speed response.

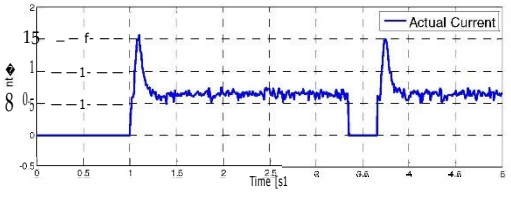

Fig. 10 Asymmetric redundant calculation - current response.

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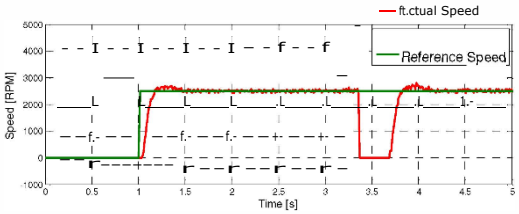

Fig. 11 Task execution monitor - speed response.

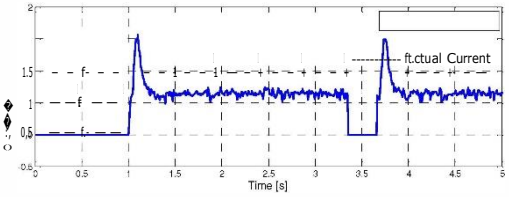

Fig. 12 Task execution monitor - current response.

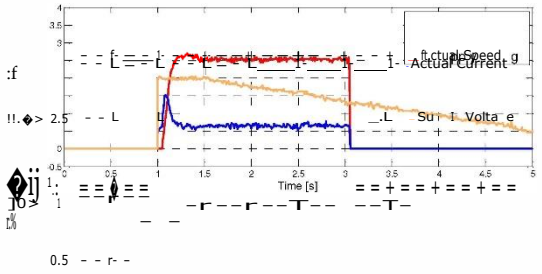

Fig. 13 Voltage monitor.

4. CONCLUSION

In this paper, functional safety compliant BLDC motor control system was implemented by the ECU including a microcontroller with asymmetric dual-core architecture and an external watchdog. Safety functions such as asymmetric redundant calculation, the task execution monitor and a voltage monitor were fulfilled on the ECU. Furthermore, the proposed safety-related BLDC motor control logic can be effectively used with the designed BLDC motor control system HILS. Nevertheless hardware failures and software faults happen in the system, BLOC motor can be controlled with the safety functions.

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A SMART SOLAR PV MONITORING SYSTEM USING IOT

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***ABSTRACT*- Renewable energy sources are proven to be reliable and accepted as the best alternative for fulfilling our increasing energy needs. Solar photovoltaic energy is the emerging and enticing clean technologies with zero carbon emission in today's world. To harness the solar power generation, it is indeed necessary to pay serious attention to its maintenance as well as application. The IoT based solar energy monitoring system is proposed to collect and analyzes the solar energy parameters to predict the performance for ensuring stable power generation. The main advantage of the system is to determine optimal performance for better maintenance of solar PV (photovoltaic). The prime target of PV monitoring system is to offer a cost-effective solution, which incessantly displays remote energy yields and its performance either on the computer or through smart phones. The proposed system is tested with a solar module of 125-watts to monitor string voltage, string current, temperature, and irradiance. This PV monitoring system is developed by a smart Wi-Fi enabled CC3200 microcontroller with latest embedded ARM processor that communicates and uploads the data in cloud platform with the Blynk application. Also the Wireless monitoring system maximizes the operational reliability of a PV system with minimum system cost.**

I. INTRODUCTION

Power generation is a major factor in many developing countries. Due to the improvement of the industrial and commercial sector, energy demand reaches its peak. Hence all are poignant towards renewable energy source to produce green energy for meeting out our energy consumption. This can help the society to decrease greenhouse gas emission and ozone layer depletion for future generation. Among this solar photovoltaic technique is gaining popularity due to huge availability, reduced cost, easy installation, and maintenance. Currently, Internet of Things (IoT) is an evolving

technology that makes things smarter and user-friendly when connected through the communication protocol and cloud platform. The efficiency of the solar panel is influenced by basic parameters such as current, voltage, Irradiance, and temperature. Hence real-time solar monitoring system is essential for increasing the performance of the PV panel by comparing with the experimental result to initiate preventive action. In recent years there had been a lot of research attempts made in solar energy. A simple forecasting database is modeled using MySQL to collect the raw data, filter un-relevant values and produce forecast without the assistance of any modern automation tools. In addition, machine intelligence techniques are used for forecasting to obtain robust performance. A real-time supervising 20 Computer Science & Information Technology (CS & IT)

A low-cost solar panel monitoring is developed based on IoT for online visualization and improving the performance. This helps to take preventive maintenance and tracking the fault location . An IoT based cloud monitoring system is proposed and developed using the Raspberry pi for remote PV plant. The basic characteristics of a PV system are analyzed using LABVIEW tool for real-time measurement to study the fault diagnosis in PV plant . A smart monitoring system is developed with a microcontroller and Labview to gain the maximum efficiency with the use of sun trackers . A remote Solar monitoring and control system is proposed for implementation at the plant level and promotes the decisional process for central control station which has the crucial role for processing, storage, warning and displaying .PV monitoring system is developed based on wired and wireless networks to transmit the parameters to a remote coordinator that offers a web-based application for remote access . A practical graphical user interface is developed using Lab view for online monitoring for solar PV. Arduino controller is used for analyzing the measured parameters and sends the data to the server for making a useful decision which improves the performance of PV panel . A cost- effective smart architecture is proposed to optimize the efficiency of the PV panel by detecting the performance degradation through continuous monitoring system . HEM algorithm based smart controller is implemented for choosing the source priority to maximize the use of Solar PV for home power management .Therefore, the proposed work illustrate the real-time Solar PV monitoring system using cost efficient Smart Controller communicate with the cloud platform provides large storage space and fast data access.

The paper is structured as follows: Section II describes the conventional work. Section III presents the proposed work and its functionality. Section IV illustrates the results of Solar monitoring system. Section V summarizes the proposed work and its application.

II. RELATED WORK

A virtually reliable Solar PV monitoring system is developed with LABVIEW software is shown in Fig.1 a practical development tool for computing the performance of a 5-Watt Solar Module. The electrical parameters like voltage, current, temperature, humidity and irradiance are measured using sensors and store the data in the DAQ (Data Acquisition) unit, which provide an interface to the PC. LABVIEW tool plot the I-V and P-V graph based on the data acquired and also compute the Maximum voltage, Maximum current, Fill factor and efficiency of the solar panel.

III. PROPOSED WORK

The real-time solar energy monitoring system is proposed based on the three-layer architecture of Internet of Things (IoT). The three-stage architecture is shown in Fig 2. The lower layer contains sensing and actuating devices like sensors, actuators, RFID, camera, and controllers since it is a combination of sensing and processing layer. The next layer is a middle layer which encompasses network layer with wired and wireless network like LAN, Bluetooth, Zigbee, 4G, Wi-Fi etc., act as a gateway to route the packets (data) to the transport layer that contains TCP/IP, UDP, for further transmission of data to the upper end. The final stage is the application

layer deliver user interface and cloud platform for remote access.

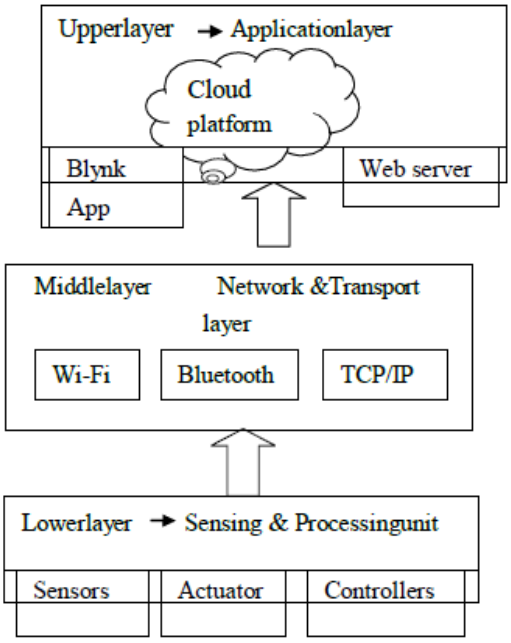


Figure.2 Three layer architecture of Internet of Things

The block diagram of IoT based solar monitoring system is shown in Fig.3.This illustrates the outline of our proposed work. Poly Crystalline silicon of 125-watt solar panel is used for a monitoring system. The voltage and current sensors are used to measure the respective voltage and current from the panel. The temperature sensor is placed on the solar PV module to measure the current temperature which greatly affects the efficiency of the solar panel. Pyranometer is an instrument to measure the amount of solar irradiance in a planar surface in terms of W/m^2. The Microcontroller plays a pivotal role in handling the measured data for processing and forwards the data to the cloud platform through Wi-Fi module for concurrent observation and decision making.

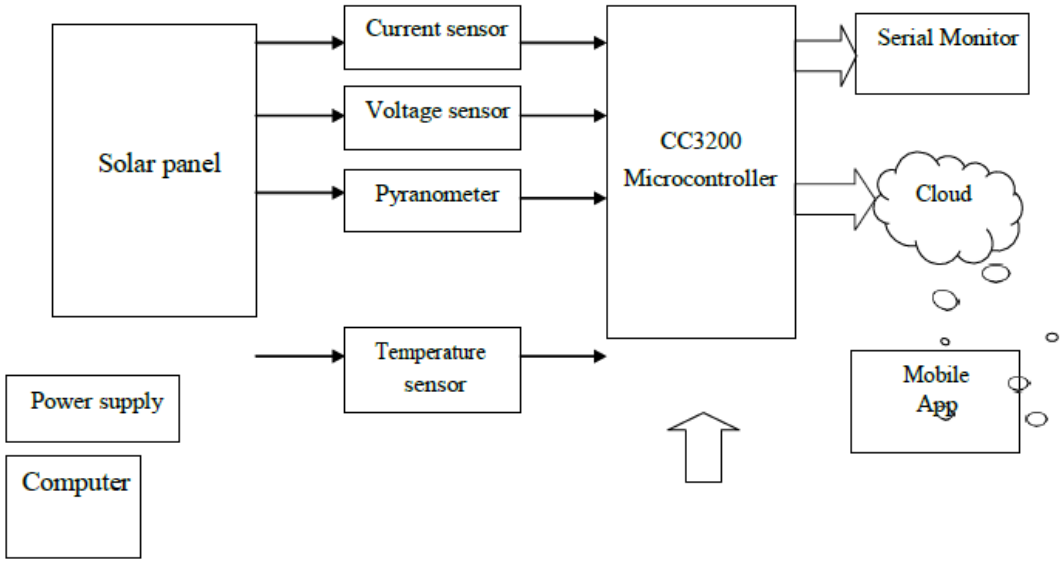


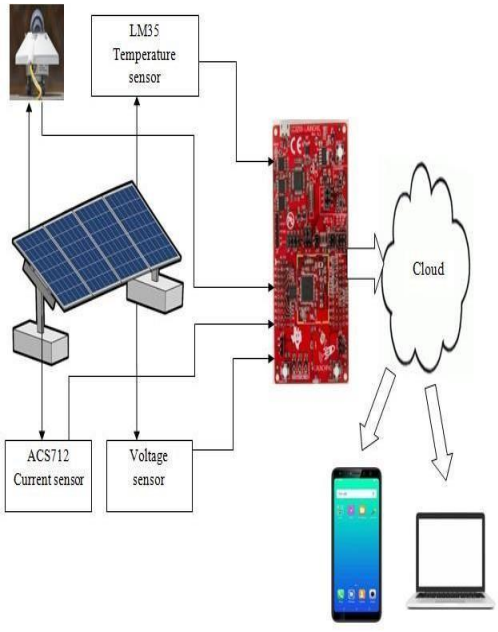
Figure.3 Real-time Solar Energy Monitoring System

IV. RESULTS AND DISCUSSION

A polycrystalline 125-Watt photovoltaic module is taken for the experimental implementation and testing the performance with standard ratings of the solar panel as mentioned in Table 1. The proposed work is carried out in a solar energy testing center at Madurai Kamaraj University. The hardware setup is shown in Fig.8 and Fig.9. A high precision pyranometer is used to measure the solar radiance on a plane surface. LM 35 a sensing device to measure the current temperature in the solar panel. These two parameters highly influence the performance of the solar panel.

Since irradiance is corresponding to current and temperature affects the voltage of the solar module. Hence the power generation of the solar panel relies on temperature and irradiance. The proposed system programming codes are developed in C language via Energia IDE. This is a non-proprietary integrated development environment designed for Texas Instruments like CC3200 Microcontroller. The blynk libraries are included in the programming function to communicate and transfer the sensed values to the Cloud platform. The electrical characteristics are monitored and displayed successfully through a mobile application. The result in Fig.10 shows the real-time Solar PV monitoring system through Blynk. The inference of output is the increase in temperature reduces the voltage generation in PV and also the rise in irradiance shows a moderate increase in current. Hence these two parameters become the deciding factor for the performance of solar module. The results shown in Fig.11 are displayed in the Web server. The Fig.13 shows the output in serial monitor of PC. The obtained result is nearer to the Standard ratings of a solar panel.

Figure.8 Hardware implementation of proposed work



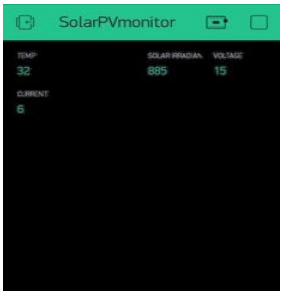
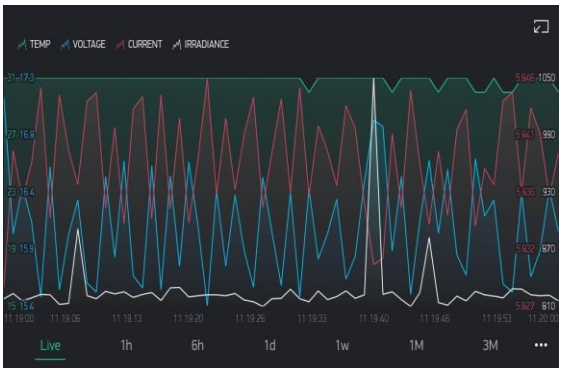



Figure.9 Experimental setup of Solar PV Monitoring System

Fig.12 represents graph of solar power monitoring system through blynk application.

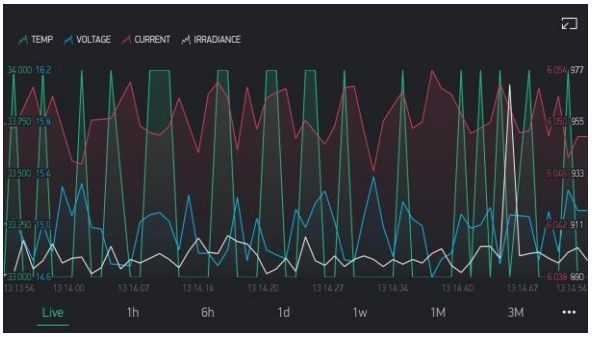
The experiment is carried out for a week with different time intervals from 10.00AM to 05.00PM in a Solar Energy testing centre at Madurai, India. The electrical parameters of PV module are analyzed by continuous monitoring for estimating the behavior of solar panel. The graph shows the variation in temperature due to climatic condition which influences the voltage generation and irradiance affects the current parameter of PV module. The standard operating temperature of the solar panel is 25°C. Generally, the temperature above the standard test condition may reduce the performance of solar panel . The decrease in temperature shows the rise in voltage as shown in Fig 12(a), (b), (c), (d), (e), (f) and the current directly correlate with irradiance. Hence, the change in solar radiation impacts the current characteristics in PV panel. The temperature reduces from 31°C to 30°C during morning hours from 10.30 AM to 11.30AM; the voltage goes to peak and then oscillates until reaching the stable state, at the instance irradiance is also maximum at this temperature which is shown in Fig.12 (a) and (b). The result of 12(c) represents the fall in temperature after 11.30AM and simultaneously the irradiance shows sharp reduction in spectral range. The Fig.12 (d) display the rise in temperature after 01.00 PM, at this stage irradiance level increase as current increases and the voltage generation reduces when there is a rise in temperature. The graph plotted in 12 (e) and (f) is observed after peak hours (i.e.) 02.00 PM to 05.00 PM. During the interval the temperature changes frequently from high to low and low to high and also solar radiation varies according to environmental condition. Hence the result shows the maximum power generation of solar panel which is nearly close to standard rating of PV.

(a) Solar power monitoring at 10.50AM

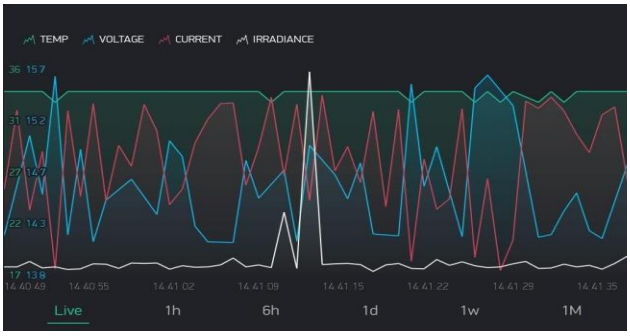


(b) Solar power monitoring at 11.20AM

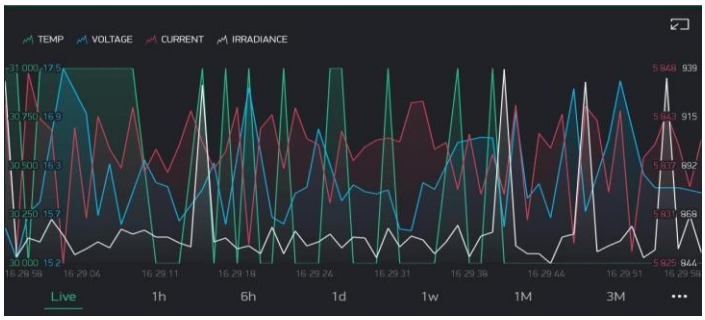
(c) Solar power monitoring after11.30AM



(d) Solar power monitoring after 1.00PM



(e) Solar power monitoring after 2.00PM



(f) Solar power monitoring after4.00PM

Fig.12(a-f) Graphical view of solar energy monitoring system through blynk application

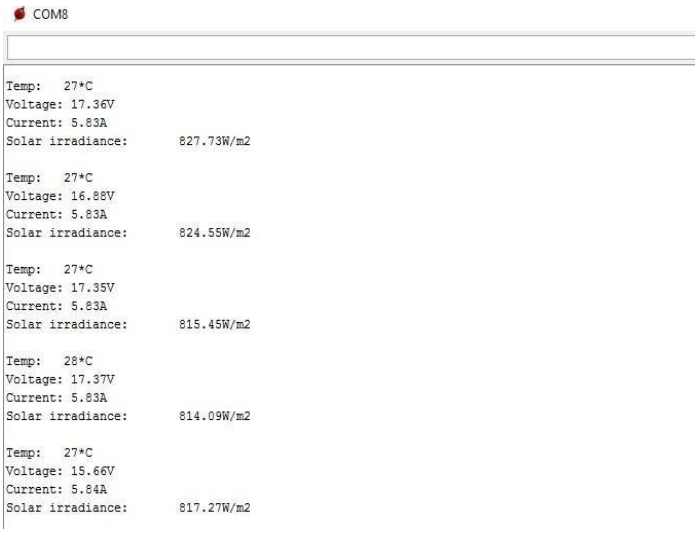


Fig.13 Solar PV Monitoring Output through Serial Monitor

V. CONCLUSIONS

An IoT based virtual solar energy monitoring system is developed using a low-cost smart microcontroller. The cloud-based Blynk application shows the measured solar parameter in realtime through mobile. The monitored parameters show the optimized result that matches approximately with Electrical ratings of solar module tested under Standard Test Condition (STC). The proposed work helps to predict the performance of the Solar PV module

through remote access. This can be extended for a large-scale solar plant to take preventive action by regularly monitoring the performance of the solar plant. It will be highly useful for the industrial and commercial application.

VI. ACKNOMLEDGEMENTS

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Smart Movable Road Divider

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Abstract-This paper presents Smart Movable Road Divider for controlling the traffic congestion in metropolitan cities and to provide a free path for the vehicle. The work presented in this paper focuses on reducing the latency in traffic and free path for vehicle. The existing Road Dividers consists of equal number of lanes. Usually, in morning and evening peak hours the opposite side of the Road Divider is generally underutilized. To overcome this, Smart Movable Road Divider is implemented where the divider is moved based on the density of the traffic using IR Sensors. If the density of the traffic is high on one side, the divider is moved to the other side. Then the density of traffic is stored in cloud which is possible through IoT. A free path for Vehicle is provided using RF Module by controlling the traffic signal. A Prototype is developed and tested for the Congestion control which also works on safety measures by intimating the drivers about the movement of the Divider.

Keywords—IR Sensors, Arduino Mega, density of the traffic, RF Module

I. INTRODUCTION

Across the World many Nations are facing Traffic Congestion problems due to the number of automobiles increasing day by day. Though the number of vehicles increased, the Road infrastructure is nearly the same which cannot be able to cope up with the changes like unpredictable travel delays, congestion and accidents. The main problem with Static Road Divider is that the number of lanes on either side of the road is fixed. Since the resources are limited and population as well as the number of cars per family is increasing, there is a significant increase in the number of cars on roads. Controlling of traffic on the road has become a severe problem in today's society. There are so many situations where the vehicle gets stuck in traffic, it has to wait for some minutes to hours to clear the traffic congestion due to which the patient's life might be at risk because of the latency in the traffic. Increasing traffic and road surface has few severe environmental issues related with it, such issues include traffic jams, traffic congestion, and numerous types pollution and related health problems. Congestion in traffic eventually results in slow speeds, which increases the time of travel which stands out as one of the major issues in metropolitan cities. The Interaction between the vehicles slows the speed of the traffic flow when there is high demand which results in some congestion. This can be a possibility for any mode of transportation, tis article will focus on traffic congestion on civic roads. As demand approaches the capacity of a road, extreme traffic congestion sets in.

When vehicles are fully stopped for periods of time, this is colloquially known as a traffic jam or traffic snarl-up. To overcome these problems and to save many lives we have proposed this paper which provides the functionality of path clearance. The number of lanes on either side of the lane is fixed which a problem with static roads is. The number of cars per family is increasing though the resource and population are limited there is a signific ant increase in number of cars on roads, which leads for a better utilization of existing resources like number of lanes available. The main focus of this article is to take the traffic controlling to a new era by avoiding traffic congestion, and to control high density traffic and to reduce the time of journey in peak hours for a better and smarter solution for the above said traffic problems. In this proposed work, a module has been developed which is used for measuring the density of the traffic. The density of the traffic is measured using IR Sensors by deploying it on either side of the lane. If the density is high on one side the divider is moved to the other side for free flow of the vehicles. The density of the traffic is stored in cloud and is updated every thirty seconds.

The stored information is represented in graphical form. It is stored in an open source IoT application called Thing Speak. By this, the traffic congestion is reduced and time consumed is less compared to Static Road Dividers. During the emergency, the Vehicle Unit intimates with the Traffic Unit through an RF Module and it detects the Vehicle and the traffic signal goes green providing free path, which ensures that the Vehicle the hospital without any delay. This solution aims to maximize ze the efficiency of existing road structure and to minimize the traffic congestion.

The whole paper is systemized as follows, Section II talks about the Literature survey. Section III discusses about the present scenario of the traffic congestion problems and the respective measures and implementation details to prevent the same. Section IV discusses about the results of the proposed model and finally paper contents are concise in Section V.

II. LITERATURE REVIEW

Before going into the details of our smart movable road divider, we will review some of the existing system related to traffic congestion.

S. Jyothirmayee et.al. [I] proposed a paper on Controlling of Traffic using Movable Road Dividers. This article provid es a solution of movable traffic dividers for metropolitan areas instead of widening the roads for congestion problems. This solution helps in configuring the road capacity, so that an optimal benefit from road way usage.

Er Faruk Bin Poyen et al. [2] discussed about the dynamic traffic signal system which will automatically change on sensing the traffic density at junctions. Rajeshwari Sundar et.al. [3] presented a solution to pass emergency vehicles

easily by an intelligent traffic control system, by which each individual vehicle is equipped with radio frequency identification tag which counts the vehicles on a particular path during a specified duration. Shabbir Bhusari et.al. [4] developed a system execution based on density of the vehicle that is vehicle count. Number of vehicles is calculated to know the density of the traffic is high and signals will be allotted accordingly. K Vidya et.al. [5] developed a density-based traffic signal system. Traffic congestion is a severe problem in major cities across the world. Number of vehicles is calculated on either side of the road and if the density is high at one side of the junction, it provides longer green light compared to standard allotted time of the traffic signal.

Priyanka Kanke et.al. [6] proposed a paper on Road Traffic Analysis using Image Processing. This paper presents an application to monitor traffic flow and analysis by computer visualization method. This uses image processing and pattern recognition methods for analysis of road traffic considering the constraints. Soufiene Djahel et.al. [7] proposed a paper on Reducing Emergency Services Response Time in Smart Cities: An Advanced Adaptive and Fuzzy Approach. They have designed an advanced adaptive traffic control system that enables faster emergency services response in smart cities while maintaining a minimal increase in congestion level around the route of the emergency vehicle. The Authors in [8-12] have proposed. The frequent traffic jams at major junctions call for an efficient traffic management system in place.

III. METHODOLOGY

In this proposed system, a module has been developed based on microcontroller that is Arduino Mega which consists of an IR Sensors which is used for measuring the density of the traffic. When the signal turns red, the traffic density is measured and the action should take place before the signals turns into green. If the traffic density is high then our divider will move to the opposite direction since the density of the traffic is high a message is displayed on the Led stating that “High Traffic”.

If the traffic density is normal then no type of action is taken the divider will be at the center of the road. In this case the traffic density is normal then a message is display ed on Led stating that there is "Less Traffic and in the case of medium traffic the Led will display as "Medium Traffic ". It consists of two unit basically Traffic unit and Vehicle unit.

A. Traffic Unit

The following Fig. 1 consists of a block diagram which includes the components required to develop a traffic unit. The Traffic unit is responsible for undertaking general traffic and road management tasks such as road safety, accident, investigations and recording, road traffic law enforcement, investing of road traffic offences. These tasks are mainly caused by road traffic congestion.

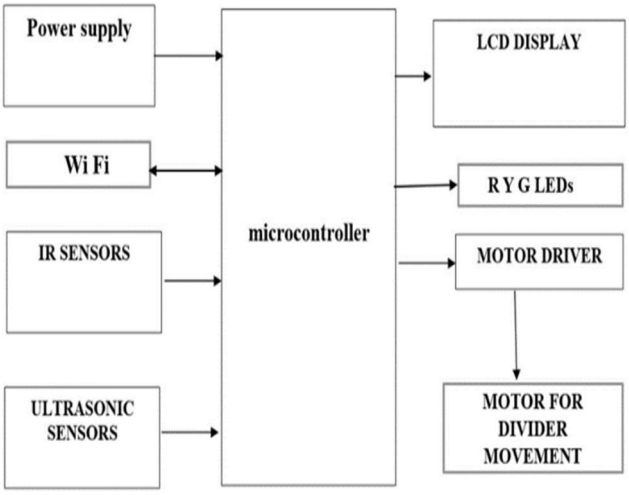

Fig.1: Smart Movable Road Divider Block Diagram

B. Working Principle

Many IR sensors are deployed on the either side of the divider to detect the presence of density of the vehicles, now depending on the density of the vehicles as sensed by observing the IR sensors the divider is moved on either side to give more space for the traffic to flow smoothly in the dense area. LCD is used to display purpose to intimate the drivers to move away from the divider for the safety measures. Node MCU is basically a WIFI module which connects the local WIFI network for internet and can be updated to the cloud website about the traffic status. Divider is moved with the help of motors. The Arduino is the brain of the project which controls the overall divider action and intimations. When the signal turns red, the traffic density is measured and the action should take place before the signals turns into green. If the traffic density is high then the extended divider comes up and the normal divider goes to ground position. Based on the density of the traffic status the divider moves to the respective lane. If the condition is true the divider moves accordingly else the next condition is followed and the divider moves to its normal state.

The steps for the proposed system are as follows:

- ***Step 1: Initialize the microcontroller and other components.***
- ***Step 2: Get the status from the IR sensors.***
- ***Step 3: If the IR 1 is high at lane I, then it displays no traffic in lane 1.***
- ***Step 4: /f the IR 2 is high at lane 2, then it displays no traffic in lane 2.***
- ***Step 5: If the IR 1 and 2 is high at lane I, then it displays medium traffic in lane I.***
- ***Step 6: If the IR 1 and 2 is high at lane 2, then it displays medium traffic in lane 2.***
- ***Step 7: If the IR 1, 2 and 3 is high at lane I, then it displays high traffic in lane I and the divider move towards lane 2.***
- ***Step 8: If the IR 1, 2* and 3 is high at *lane 2, then it displays high traffic in lane 2 and the divider moves towards lane 1.***
- ***Step 9: After the traffic flow gets normal the divider moves to its initial state.***

C. *Traffic in Peak Hours*

The working scenario of our paper can be understood by the Fig. 2 and Fig. 3 given below. Nowadays due to the traffic congestion on roads an Intelligent Transport system is required to minimize and solve the current traffic issues. So, in order to address the issues, we are proposed and developed a scheme in which we have analyzed the behavior of the traffic and understood the flow of traffic and some solutions have been discovered to address this prob lems as mentioned above. Finally, a Movable Road Divider is proposed in place of traditional dividers, for this we have adopted a mechanism of setting up a mechanical setup which is movable and is been installed in order to manage the traffic issues in the peak hours and helps in reducing the traffic in peak hours. Finally, congestion issues can be minimized to some extant due to the fact that the increase in population day to day and arise in utilization of private transportation due to the sophisticated life style.

To effectively changing the configuration of the existing roadways and to optimize its usage by the incoming vehicular traffic which specifically aims to minimize the traffic congestion issue with the optimum efficiency of existing road structure this can be used.

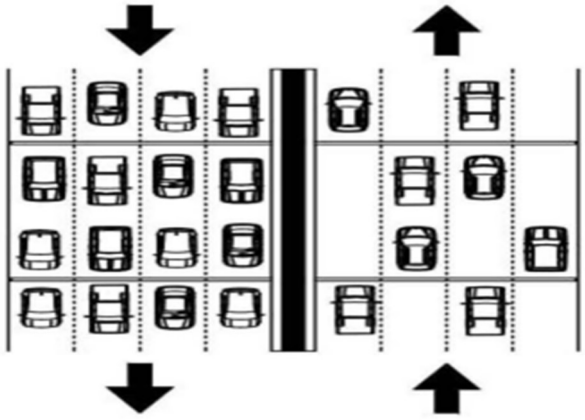

Fig. 2: Scenario without our system

The standards and solution are prese nted in this article which is suggested after a thorough study and examining. The causes, impeding factors and their solution based on their geographical conditions, economic structure, topo graphical conditions, etc. are studied and presented.

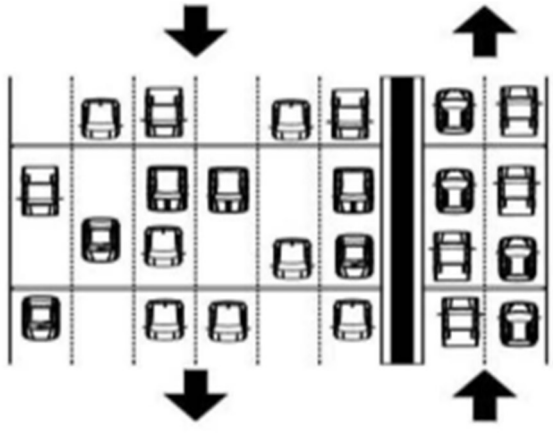

Fig. 3: Scenario with our system

IV. RESULT

The experiment on movable road divider was conducted with many IR sensors which are deployed on the either side of the divider to detect the presence of density of vehicles, it senses the traffic density. Now depending on density of vehicles as determined by observing the IR sensors the divider is moved on either side to give more space for the traffic to flow smoothly in the dense area. LCD is used to display purpose to intimate the drivers to move away from the divider for the safety measures. Node MCU is basically a WIFI module which connects the local WIFI network for internet and can be updated to the cloud. Divider is moved with the help of motors. The below Fig. 4 represents the prototype of Smart Movable Road Divider. The Arduino is the brain of the project which controls the overall divider action and intimations. And it detects the vehicle then it makes the signal green to pass vehicle.

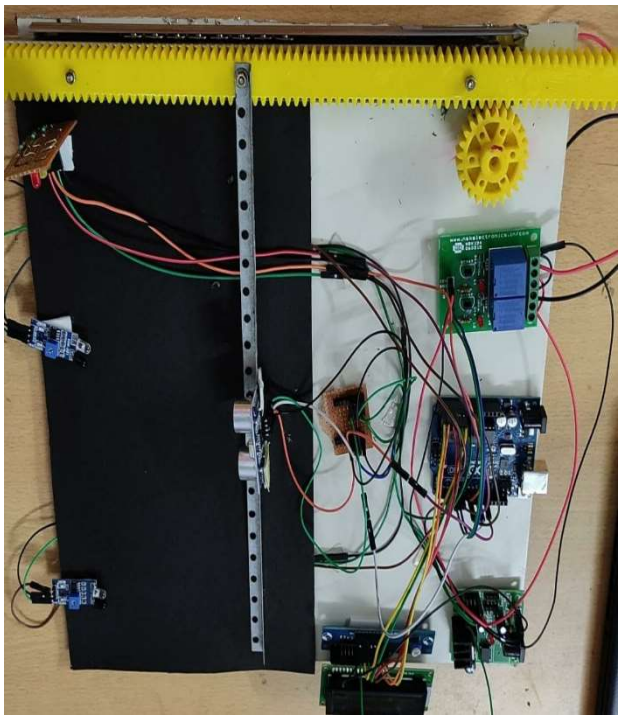

Fig. 4: Prototype of Smart Movable Road Divider

The below Fig. 5 represents the prototype of Movable Road Divider, where the traffic is high in lane I and the divider is moved towards lane 2 after intimating the drivers about the movement of the divider through the buzzer.

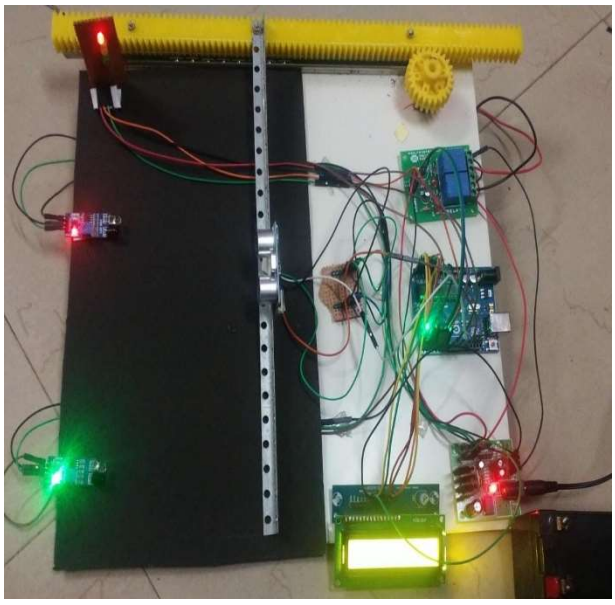

Fig. 5: Divider moved toward s lane 2

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The Fig. 6 represents the prototype of Movable Road Divider, where the traffic is high in lane 2 and the divider is moved towards lane 1 after intimating the drivers about the movement of the divider through the buzzer and the divider is moved back once the traffic is normal.

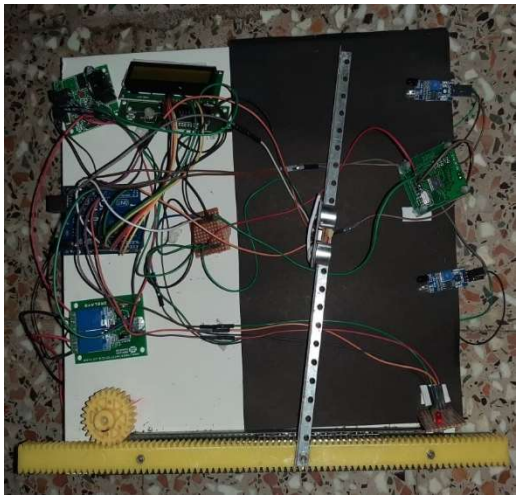

Fig. 6: Divider moved towards lane I

The LCD display shown in below Fig. 6 will indicate the drivers about the density of the traffic. When there is no traffic, on both the lanes, the display shows "No Traffic" in lane I and 2. The density of the traffic is displayed for both the lanes. If the density of the traffic is less, the LCD display will be "Less Traffic" corresponding to the lanes. If the density of the traffic is medium, then "Medium Traffic" will be displayed on the LCD display.

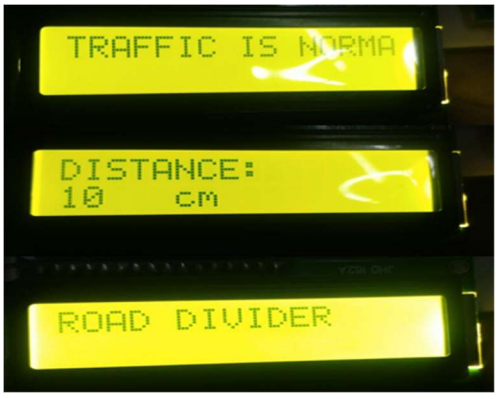

Fig. 7: LCD Display

If the traffic is high, then "High Traffic" is displayed on the LCD, a buzzer makes the sound, indicating that the divider is about to move and then the divider is moved.

V. CONCLUSION

Initially, in our paper we have analyzed about the traffic congestion problems in certain regions and we have done a comprehensive survey on the traffic congestion, causes and its problem. To avoid congestion and reduce the time of journey in the peak hours and to provide smarter and better solution for the above said traffic problems, for this we have proposed a prototype model of a Movable Road Divider. This idea aims to reduce traffic by smartly sensing the traffic flow on either side of the divider, and move the divider accordingly, hence saving the time and fuel. This also works on safety measures by intimating the drivers about the moment of the divider. This also allows the user that is Traffic Police to manually control the divider position based on requirements and to provide a free path for vehicle which ensures the vehicle to reach the hospital without any delay.

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INSPECTION OF FAULT IN LIVE WIRE USING QUADCOPTER.

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Abstract: -- This typs of drons can be differentiated in terms of the type (fixed-wing, multirotor, etc.), the degree of autonomy, the size and weight, and the power sources. These specifications are important, for example for the drone's cruising range, the maximum flight duration, and the loading capacity. Aside from the drone itself (i.e., the 'platform') various types of payloads can be distinguished, including freight (e.g., mail parcels, medicines, fire extinguishing material, flyers, etc.) and different types of sensors (e.g., cameras, sniffers, meteorological sensors, etc.). Applications of different payloads will be described. In order to perform a flight, drones have a need for (a certain amount of) wireless communications with a pilot on the ground. In addition, in most cases there is a need for communication with a payload, like a camera or a sensor. To allow this communication to take place frequency spectrum is required. The requirements for frequency spectrum depend on the type of drone, the flight characteristics, and the payload. Since frequency spectrum does not end at national borders, international coordination on the use of frequency spectrum is required. Legal issues on frequency spectrum usage and electronic equipment (national and international legal matters on frequency spectrum an equipment requirements) are discussed, as well as frequency spectrum and vulnerability (an insight in available frequency spectrum and associated risks in using the frequency spectrum) and surveillance.

I. INTRODUCTION

A drone, in a technological context, is an unmanned aircraft. Drones are more formally known as unmanned aerial vehicles (UAVs) or unmanned aircraft systems (UAS). Essentially, a drone is a flying robot. The aircraft may be remotely controlled or can fly autonomously through software-controlled flight plans in their embedded systems working in conjunction with onboard sensors and GPS. In the recent past, UAVs were most often associated with the military, where they were used initially for anti-aircraft target practice, intelligence gathering and then, more controversially, as weapons platforms.

Drones are now also used in a wide range of civilian roles ranging from search and rescue, surveillance, traffic monitoring, weather monitoring and firefighting to personal drones and business drone-based photography, as well as videography, agriculture and even delivery services.

Origin of a drone can be traced with special techniques to provide relevant information to the military. The very first aircraft with reusable type radio control mechanism was designed in the 30s and it worked like a base model for all new advancements of today's world.

Later, the military drones were developed with classic sensors and camera units and now they have been fixed inside missiles too. With so much advancement in technology, now you can easily find so many variants of drones. Few are used for military applications but others are finding the potential role in many big companies.

As per a recent new update, Google and Amazon are developing their drones so that parcels can be delivered by air with ease. One more interesting concept is presented by Facebook as they are thinking to develop some giant drones that can carry the signal to remote locations for direct internet access. Drones in today's world have also been an important part of the film

industry and news reporters are also using them to carry information from inaccessible locations.

II. OBJECTIVE

- In remote and hilly areas, the use of quadcopter for inspection in power lines actually provides quick overview and evaluation of the fault condition.
- It ensures the sharp and detailed detection of defects/faults in transmission lines using Thermal Sensor during active/live condition.

III. METHODOLOGY

The signal is transmitted from the manual controller to the control unit via laptop/mobile. These signals are fed to the motor drives through the control unit for the quadcopter mechanism. With the help of servomotors, the clampers are being in contact with the drone and live wire. The motor assists the motion of quadcopter along the transmission line for the inspection of fault using thermal sensor. Thermal sensor and Camera are installed to detect the thermal hotspots in the live wire and to inspect the physical damage of transmission line insulation. The live feed from the camera and thermal temperature of the live wire is monitored from time to time and hence fault can be detected. Battery cells are mainly used in smaller multirotor drones. These drones are short range and require less operating time than drones using kerosene. These drones are often for recreational use, making it more practical for the drone to run on a rechargeable battery cell. Before making any calculations, we need to know the total weight of the quadcopter.

1 x Frame	108 gram
1 x Receiver	4 gram
1 x Flight controller	25 gram
1 x Battery	167 gram (3s, another brand)
1 x Power distribution	(intergraded)
4 x ESC	4 x 8 = 32 gram
4 x Propeller	4 x 2 = 8 gram
4 x Motor	4 x 25 = 100 gram

This gives a total weight of 444 gram. The total lift is 1520 gram (previous step). This gives a weight to lift ratio of 0.29 (444/1520).

According the motor specifications, the motors require 8 Ampere at full power. Using a linear ratio, the assumed usage is 8 x 0.29 = 2,32 Ampere per motor. The total number of required amperes equals 9,28A during normal flight.The example battery has an rating of 2200mAH. But you should never discharge a LiPo pack down past 85% of its capacity, to be safe. This translates in 2200 x 0,85 = 1870 mAH for this battery Divide this number by the power used, gives the estimated flight time in hours. 1,870 / 9,28 = 0,2 hour. This means an estimated flight time of 12 minutes.

A. FLIGHT CONTROL BOARD (K.K.2.1.5):

The kk 2.1.5 flight controller is next big evolution of the first generation KK flight controller boards. The KK2.1.5 was engineered from the ground up to bring multi-rotor flight to everyone, not just the experts. The LCD screen and built in software makes install and setup easier than ever. A host of multi-rotor craft types are pre-installed, simply select your craft type, check motor layout/propeller direction, calibrate your ESCs and radio and we're ready to go.

Features:

- The KK2.1.5 Multi-Rotor controller is a flight control board for multi-rotor aircraft (Tricopters, Quadcopters, Hex copters etc). Its purpose is to stabilize the aircraft during flight. To do this it takes the signal from the 6050MPU gyro/acc (roll, pitch and yaw) then passes the signal to the Atmega644PA IC. The Atmega644PA IC unit then processes these signals according the user's selected firmware and passes control signals to the installed Electronic Speed Controllers (ESCs). These signals instruct the ESCs to make fine adjustments to the motors rotational speed which in turn stabilizes your multi-rotor craft.
- The KK2.1.5 Multi-Rotor control board also uses signals from your radio systems receiver (Rx) and passes these signals to the Atmega644PA IC via the aileron, elevator, throttle and rudder inputs. Once this information has been processed the IC will send varying signals to the ESCs which in turn adjust the rotational speed of each motor to induce controlled flight (up, down, backwards, forwards, left, right, yaw.

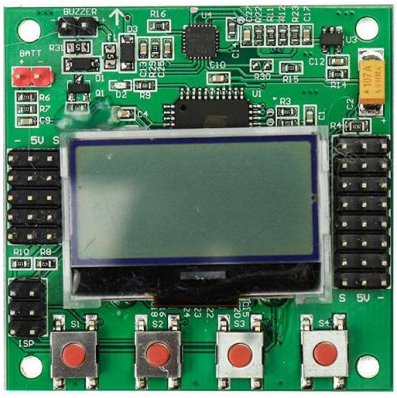

Fig 1: KK2.1.5 Module

B. ESC'S AND ARDUINO NANO BOARD:

Due to the differences in motor technology, different ESCs are required for drones with brushed motors and those with brushless motors. Multirotor drones may have an ESC for each rotor, or an integrated device that handles all the rotors with one system. Many drone ECSs are designed as a system-on-chip (SoC), which means that all components, such as the microcontroller and power management unit, are integrated into a single

module. This saves space and weight, making it an ideal solution for SWAP (size, weight and power) constrained UAVs. ESCs also have a refresh rate in Hertz, which is how many times a second the motor speed can be changed. Electronic speed controllers for quadcopters and other multirotor drones may have higher refresh rates, as their stability and manoeuvrability depends entirely on the balance of rotor speeds, and as such they require fine control over the motor RPM.Electronic Speed Controls can also handle active or regenerative braking, a process by which a motor's mechanical energy is converted into electrical energy that can be used to recharge the drone's battery. During periods where the drone is decelerating, the motor can act as a generator, and the ESC handles the excess current that can be fed back into the battery.

Fig 2: ESC Module

Arduino nano is a small size board and also flexible with a wide variety of applications.

FEATURES:

- ATmega328P Microcontroller is from 8-bit AVR family
- Operating voltage is 5V
- Input voltage (Vin) is 7V to 12V
- Input/Output Pins are 22
- Analog i/p pins are 6 from A0 to A5
- Digital pins are 14
- Power consumption is 19 mA
- I/O pins DC Current is 40 mA
- Flash memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK speed is 16 MHz
- Weight-7g
- Size of the printed circuit board is 18 X 45mm.

Fig 3 :Arduino nano

C. BLDC BRUSHLESS MOTORS:

There are several items to account for. This requires reading the motor specifications:

KV:	980kv each
Number of cells :	2-4S
Weight:	50 grams

KV is a constant that tells you the RPM of the motor when a potential difference of 1V is applied with no load. The motors 4 have connecting wires. This makes it impossible to apply direct voltage on the motors (always use an ESC). A higher voltage on the ESC gives a higher voltage on the motor. Resulting in a higher generated magnetic power. Or the same magnetic power, as with the lower voltage, at a higher rotational speed. This is why a higher voltage gives a higher speed. Using a 7.4 (2S) volt battery will give 7.4 x 980 = 7252 rpm with no load. An 11.1 (4S) volt battery will give 11.1 x 980 = 10,878 rpm.

Fig 4: BLDC Motors

D. CARBON-NYLON PROPELLER:

- Durable plastic construction provides both lightness and rigidity.
- Propellers 8045(8X4.5) ABS Black comes with Epoxy resin cover.
- Very strong and lightweight.
- It comes with a set of plastic reducers (3,3.17,4,5,6,8 mm).
- Quick to release, quick to attach
- New design propellers, with greater aerodynamic efficiency, good lifting capacity.

Fig 5: Carbon – Nylon Propeller

E. INFRARED SENSOR(MLX-90614):

Thermal, or infrared, sensors enable drone operators to see invisible temperature data. Deployed on drones, thermographic sensors make it possible to collect radiometric data over wide areas and hard-to-reach places. Recent advances, such as built-in visual imaging, heat analytics, and infrared intelligence, have made thermal analysis accessible and cost-effective for a wide range of applications, such as

- Scanning building electrical equipment, such as breaker panels, fuses, bolted connections, and switchgear.
- Identifying overheating equipment in electrical plants, substations, and towers.

Fig 6: MLX-90614 Module

F. ESP-32 WI-FI CAMERA MODULE:

This is an ultra-compact and reliable wireless module. The SIM900A is a complete Dual- band GSM/GPRS solution in a SMT module which can be embedded in the customer applications allowing you to benefit from small dimensions and cost-effective solutions. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.

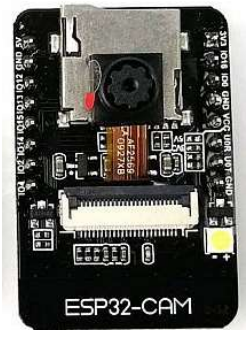

Fig 7: ESP32 – CAM Module

Features:

- Dual-Band GSM/GPRS 900/ 1800 MHz
- RS232 interface for direct communication with computer or MCU kit.
- Configurable baud rate.
- With slid in SIM card tray.
- With Stub antenna and SMA connector.
- Input Voltage: 12V DC.

IV. BLOCK DIAGRAM

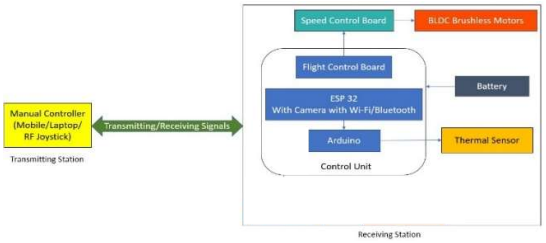

Fig 8: Over-view Block Diagram of Quadcopter with other modules

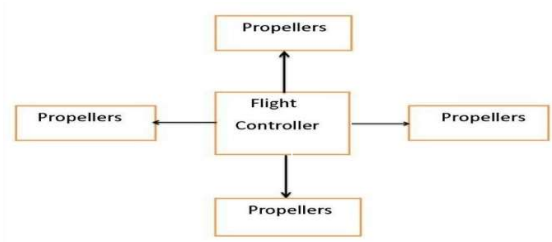

Fig 9: Over-view of Quadcopter

V. RESULT & DISCUSSION

This system is specifically designed to ensure that the fault can be detected before hand just by the use of thermal sensors and give the perimeter of the area in which fault would occur. We are even trying to avoid the skinning effect which occurs on the live wire while performing testing. But we have use base model instead of testing on live wire because of permission issues.

VI. FUTURE SCOPE

We have been working on it and will make sure that it works on high voltage lines also and predict the exact location of faults even before it's occurrence.

VII. CONCLUSION

This project provided an overview of the different technological aspects of drones.

This overview includes the type of drone currently used and its technical specifications, potential payloads and applications, frequency spectrum issues and the current and near-future technological development in drone technology.

The first important distinction made is that between the actual drone (the platform) and the attached equipment (the payload). This drone can be differentiated by the type (whether it is fixed-wing, multirotor or something else), the degree of autonomy, the size, weight, and the power source.

These technical specifications are determining factors for the drone's capabilities, for example it's range, flight duration, and loading capacity. The payload can consist of almost anything.

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"READER FOR BLINDS USING RASPBERRY PI"

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ABSTRACT

. This project has been built around Raspberry Pi processor board. It is controlling the peripherals like Camera, speaker,button which act as an interface between the system and the user. Optical Character Recognition or OCR is implemented in this project to recognize characters which are then read out by the system through a speaker. As shown in the project setup, the camera is mounted on a stand in such a position that if a paper is placed in between the area marked by angular braces, it captures a full view of the paper into the system.

Also, when the camera takes the snapshot of the paper, it is ensured that there is good lighting conditions. The content on the paper should be written in English (preferably Times New Roman) and be of good font size (preferably 24 or more as per MS Word). When all these conditions are met the system takes the photo, processes it and if it recognizes the content written on the paper it will announce on the speaker that the content on the paper has been successfully processed.

After this it speaks out the content that was converted in to text format in the system from processing the image of the paper. In this way Raspberry Pi Based Reader for Blind helps a blind person to read a paper without the help of any human reader or without the help of tactile writing system.

INTRODUCTION

There are many existing solutions to the problem of assisting individuals who are blind to read, however, none of them provide an efficient reading. We focus on improving the competence of blind people by providing them with a solution where the details are given in the form of audio signal. Raspberry Pi-Based Reader is an automatic document reader for visually impaired people using OCR technology. The proposed project uses a camera-based assistive device which can be used by individuals to read printed text. The scheme is to implement an embedded system based image capturing technique using Raspberry Pi board. The design is inspired by prior research with visually impaired people, and it is small and portable, that helps in achieving result in little setup. Here, we have put forward a text read out system for visually impaired people.

OCR and Text-to-Speech synthesis is used to convert images into audio output (Speech). The proposed apparatus has a camera which act as the input device for digitization and this digitized script is processed by OCR (software module). A procedure is followed for recognition of characters and the line of reading. In the context of software

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development the Open CV (Open source Computer Vision) libraries are employed to capture image of text and character recognition. The final identified text document is given to the output devices based on the choice of the user. Headset connected to the Raspberry Pi or a speaker act as the output device.

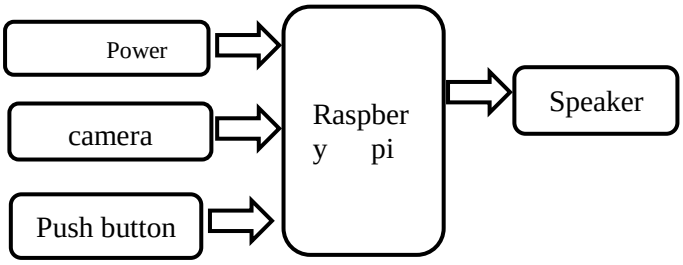
OBJECTIVE

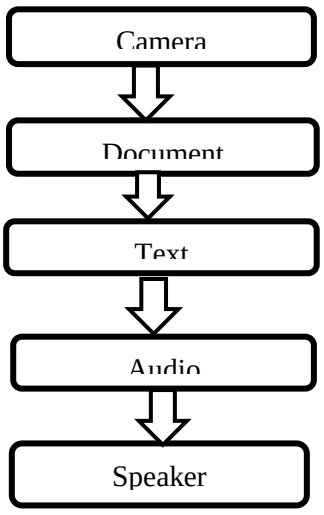
1. To implement blind reader using raspberry pi and camera.
2. To help the blind people to read the document.
3. The documents/image captured is converted to text using OCR and the text is converted to audio and is played/read aloud which helps the blind people.

METHODOLOGY

- Camera is interfaced to capture the image of a text document**.** The data is transfer to the OCR algorithm which converts the image data to text data.
- The OCR algorithm scans the image and checks each alphabet or letter. Then it gives a corresponding text output after verifying it with its database.
- Dictionary can be used to compare the words for autocorrection.
- The text to Pygame Mixer which convert the text data to an audio output and it is played through the earphones connected to the audio jack/speaker.

BLOCK DIAGRAM





RESULT & DISCUSSION

Image is captured and processed using OCR technology and Google Cloud Vision. Text to speech conversion is done using flite algorithm. Character Recognition The captured image is first enhanced, and character recognition is done either by online or offline methods. In the offline method, Tesseract library and Python programming are used. Here the text files are processed by various libraries like OpenCV, NumPy. In the online method, Google Cloud Vision is used.Dictionary The recognized characters are crosschecked with the database provided. The database used for the online process is taken from the cloud library whereas for offline we use a trained dataset. Image to Text Conversion Here, the image is converted to machine encoded text. In the online process, we use the Google cloud vision as the platform for the conversion where Application Program Interface (API) is used. Speech Synthesis This module performs the task of conversion of the transformed machine encoded text to the audible form. It is here, we represented a system to scan written text, for helping the blind individuals. Word recognition on the text regions is performed using OCR. For this methodology the camera acts as the input. As the Raspberry PI board is high powered it makes the camera streaming. The image is captured by pressing the button when the item for text reading is positioned ahead of the camera. The image is converted to the document using Tesseract library. Text-to-Speech synthesis is used to pronounce the document through the ear phones/speaker.

CONCLUSION

We have implemented voice assisted text reading system using raspberry pi. The experimental results are verified successfully and the output of hardware is also verified using different capturing images. Our methodology processed the captured image and reads out it clearly. The device output is in the form voice so, it can be easily hear by visually impaired people. This system is an efficient device as well as economically helpful for the blind people. This device is useful in blind school and colleges. This can be also used as application of artificial intelligence. It is helpful for illiterate people also this device is compact in size and very useful to the society.

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Abstract—Artificial Intelligence's development has acted as a catalyst in the world of technology. Things that were once only a figment of our imagination can now be realised. The birth of the self-driving car is an example of such a creation. Days have come when you can perform your work or even sleep in your automobile and yet arrive at your destination safely without touching the steering wheel or accelerator. This study provides a workable model of a self-driving car that can drive from one site to another, or on various sorts of tracks such as curved, straight, and straight followed by curved tracks. The images from the real world are sent to the Convolutional Neural Network, which then predicts one of the following directions. i.e. right, left, forward, or stop, which is then followed by sending a signal from the Arduino to the remote controlled car's controller, which causes the automobile to proceed in the desired direction without any human intervention.

Keywords— Artificial Intelligence, Self-driving car, Convolutional Neural Network, Raspberry PI

INTRODUCTION

A self-driving car can analyse surrounding without any human interactions and take decisions accordingly without any human interactions. A number of sensors are combined and are used to identify the pathway and road signal from the surroundings. An autonomous car is has reduced costs due to less wastage of fuel, increased safety, increased mobility, increased customer satisfaction and that's why it has more advantage than traditional cars. The biggest benefit of using a self-driving car is significantly fewer traffic accidents. More than 90% of all accidents are caused by some degree of human error, including distraction, impaired driving, or poor decision making. With self-driving cars making decisions and communicating with one another, the number of accidents should reduce.

Simulating self-driving automobiles on a smaller, more practicable, and affordable scale has become possible as self-driving car technology gets more economical. This allows a broader range of people to collaborate on, analyse, and develop the technologies utilised in today's autonomous vehicles. In order to simulate the surrounding world in real time, an autonomous vehicle needs use a variety of sensors. The main sensors used to gather data include cameras, ultrasonic sensors and IR Sensors. The data from these sensors must be integrated and synthesised into information that the car can use to navigate the area safely.

A front-facing camera, IR Sensor and long-range ultrasonic sensors are all part of the basic concept of any Autopilot system. Sensors detects vehicles and other moving objects Such as cars, trees, humans and any other obstruction in the vicinity of the vehicle, while the front-facing camera detects traffic lights. All of this data is collected in real time and merged into a neural network, which anticipates the car's behaviour accordingly.

Self-driving cars have the potential to transform urban mobility by delivering transportation that is sustainable, safe, convenient, and free of congestion. Vehicle autonomy as an AI application has various obstacles, including infallibly identifying traffic signals, signs, lane markings that are ambiguous, pedestrians, and so on. Due to the availability of Graphical Processing Units (GPU) and cloud platforms, these issues can be solved by utilising technological advancements in the disciplines of Machine Learning and Computer Vision.

BLOCK DIAGRAM

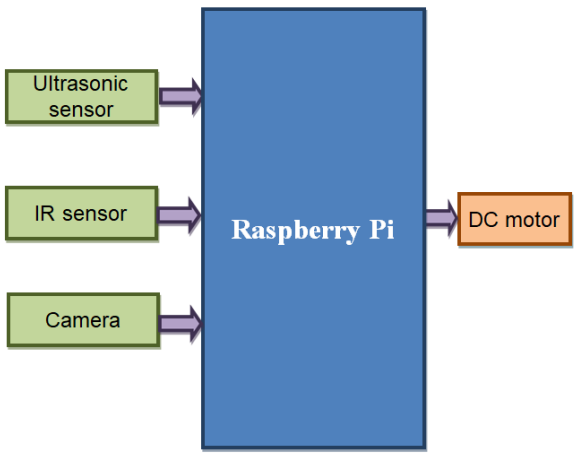

Fig. 1.0 Block diagram

Sensors are interfaced with the Raspberry pi and are programmed to act according the code developed by the user according to Fig 1.0

COMPONENTS USED:

A) RASPBERRY PI

The Raspberry Pi is a small, low-cost computer the size of a credit card that connects to a computer monitor or television and utilizes a conventional keyboard and mouse. The Raspberry Pi is a small, low-cost computer the size of a credit card that connects to a computer monitor or television and utilizes a conventional keyboard and mouse. It's a capable small device that allows individuals of all ages to learn about computers and programming languages like Scratch and Python. It can do everything a desktop computer does, including accessing the internet and watching high-definition video, as well as spreadsheets, word processing, and gaming.

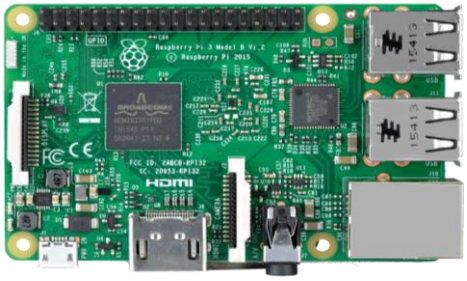

Fig. 2.0 Raspberry pi

B) IR SENSOR

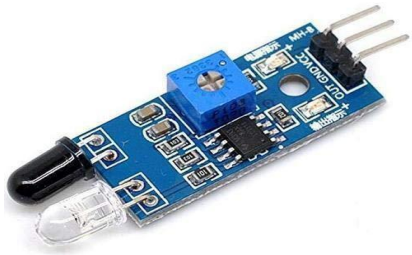

Fig. 3.0 IR Sensor

An infrared (IR) sensor is a type of electrical gadget that detects and measures infrared radiation in its surroundings. Infrared sensors are divided into two categories: active and passive. Infrared radiation is emitted and detected by active infrared sensors. A light emitting diode (LED) and a receiver make up active infrared sensors. When an object approaches the sensor, the LED's infrared light reflects off of it and is recognised by the receiver.

C) ULTRASONIC SENSOR

Fig. 4.0 Ultrasonic sensor

The Ultrasonic Sensor emits a high-frequency sound pulse and then measures the time it takes for the sound's echo to return. An ultrasonic sensor is an electronic device that uses ultrasonic sound waves to detect the distance between a target item and converts the reflected sound into an electrical signal. Ultrasonic waves travel quicker than audible sound waves (i.e. the sound that humans can hear).

D) H-BRIDGE

Fig. 5.0- H-bridge

The H-Bridge is used for switching the polarity of a voltage delivered to the load. These circuits are frequently used in robotics and other applications to enable DC motors to move forward or backward. The name comes from the usual schematic diagram representation, which shows four switching elements as the branches of a "H" and the load as the cross-bar.

E) DC MOTOR:

Fig. 6.0 DC Motor

Any rotary electrical motor that converts direct current (DC) electrical energy into mechanical energy is referred to as a DC motor. The most common varieties rely on magnetic fields to produce forces. Almost all DC motors contain an internal mechanism, either electromechanical or electronic, that changes the direction of current in a section of the motor on a regular basis.

CONCLUSION

Self-driven car has been designed with the help of raspberry pi and sensors This system provides a hassle-free experience. It reduces manual work and most of the work is automatically done. This method is convenient and safe as it avoids accidents and hazards. At last, the proposed technology increases the ease of living and is environment friendly.

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MACHINE LEARNING BASED HOME SECURITY AND AUTOMATION

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***Abstract*— The emerging technologies uses new ways of security. This paper presents a new technology using facial recognition for providing security for the home. In this work along with the security some parts of the house are automated which is necessary while entering and exiting the house. Simultaneously, this work also presents control the temperature and humidity of the house by using some sensors. The data obtained from the sensors are used for home automation. The implementation carried out using MATLAB. This technology will provide the smart security i.e., keyless entry to the house and also provide the automation which will be energy efficient and gives ease of control for the people in the house. [1-5]**

***Keywords:* - Face detection, security, automation, smart home.**

INTRODUCTION

Home automation or demotics is building automation for a home, called a smart home or smart house. A home automation system will monitor and/or control home attributes such as lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems. Providing security is a very important thing to do so as the technology is advancing, we tend to make a smart security for the home. At present we use facial recognition systems to unlock a phone or a laptop. We tend to introduce the same kind of technology to provide security along with the security we tend to interface soe of the basic automation systems that are required. [2,5]

Home automation is a network of hardware, communication, and electronic interfaces that work to integrate everyday devices with one another via the Internet. Each device has sensors and is connected through Wi-Fi, so you can manage them from your smartphone or tablet whether you're at home, or miles away. This allows you to turn on the lights, lock the front door, or even turn down the heat, no matter where you are. [5]

There are three main elements of a home automation system: sensors, controllers, and actuators. Sensors can monitor changes in daylight, temperature, or motion detection. Home automation systems can then adjust those settings (and more) to your preferences.
Controllers refer to the devices — personal computers, tablets or smartphones — used to send and receive messages about the status of automated features in your home.
Actuators may be light switches, motors, or motorized valves that control the actual mechanism, or function, of a home automation system. They are programmed to be activated by a remote command from a controller. [5]

Home Automation and Security System based on Arduino implies that whenever a person will enter the house then the count of number of the persons will get incremented, bulb will start glowing and alarm will start ringing. The count of the number of persons present in the room will be displayed on the LCD screen. Whenever the room gets empty i.e. the count of the person reduces to zero then the bulb will automatically stop glowing making the system power efficient.

In the modern world security is one of the major issues. As technology is getting advanced many security issues are arising. The existed developed security methods have some flaws and they can be hacked. The proposed system for resolving the security issue is based on face detection and recognition using Internet of Things (IoT). The face of a person is captured by the camera and compared with the acquired database. The authorized user can also utilize mobile application to give access to the premises to any unregistered person. In the case of unauthorized/unknown access, the face image of the person will be captured and notified to the concerned authorities through an email. An Alarm will be generated in the case of unauthorized access. The proposed system produced accurate results in both cases: authorized and unauthorized access. The introduced system provides a low-cost solution for monitoring and controlling the houses, different organizations like banks, universities, etc. [2]

This paper covers two areas one is automation and another one is security.

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BLOCK DIAGRAM

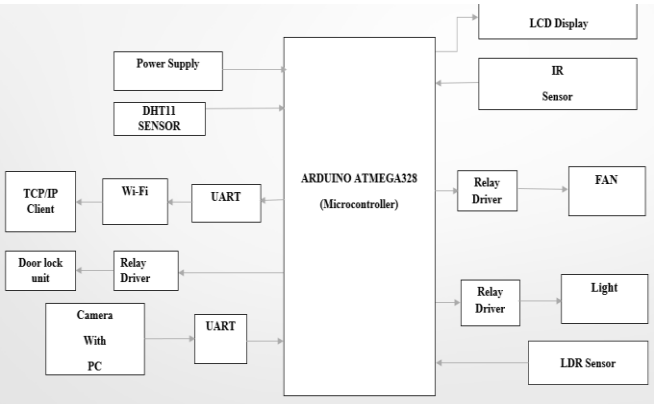


Fig-1.0: - Block diagram

AUTOMATION

Sensors are interfaced with the microcontroller and are programmed to act according the code developed by the user according to fig1.0.

COMPONENTS USED:

MICROCONTROLLER A microcontroller is embedded inside of a system to control a singular function in a device. It does this by interpreting data it receives from its I/O peripherals using its central processor. The temporary information that the microcontroller receives is stored in its data memory, where the processor accesses it and uses instructions stored in its program memory to decipher and apply the incoming data. It then uses its I/O peripherals to communicate and enact the appropriate action. [5]

Microcontrollers are used in a wide array of systems and devices. Devices often utilize multiple microcontrollers that work together within the device to handle their respective tasks. [5]

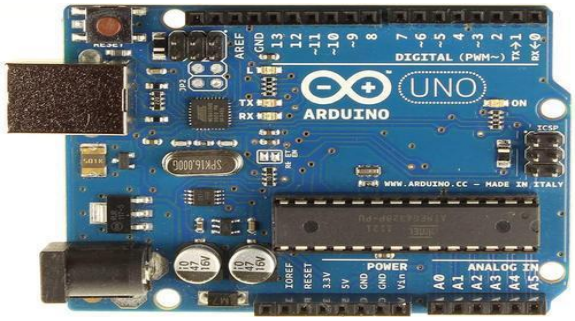
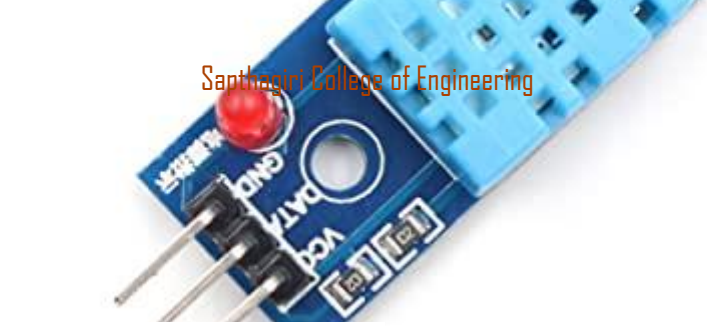


Fig 2.0: - Arduino Uno

Arduino Atmege328p is used for interfacing the sensors and the program is written by the user using Arduino Integrated Development Environment (IDE) [5]



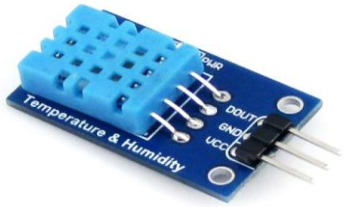


Fig 3.0: - DHT11 Sensor

The DHT11 is a commonly used Temperature and humidity sensor that comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. [1]

According to our program if the temperature exceeds the threshold value, then the fan turns on and turns off if the temperature is below the threshold value
If the humidity is more than the threshold value, the light turns on to lessen the humidity due to the heating of the lights and turns off if the humidity is less than the threshold value. [1]

IR SENSOR

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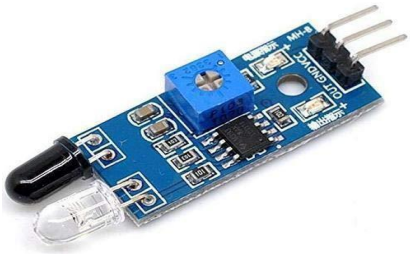

Fig 4.0:-IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. [5]

According the program if the number of people enter the house is more than the threshold value (say 5) then the fan gets turned on to provide comfort and if the threshold value is less than the threshold value then the fan turns off. [5]

LDR SENSOR

Fig 5.0: -LDR Sensor

An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits.
Light Dependent Resistors (LDR) are also called photoresistors. They are made of high resistance semiconductor material. When light hits the device, the photons give electrons energy. This makes them jump into the conductive band and thereby conduct electricity. [5]

According to our program if the light intensity falling
On the resistor is more than the threshold value then the light turns on if the light intensity is less than the threshold value than the light turns off. [5]

LIGHT AND FAN

For experimental purposes we have used 12v DC led light and 12v DC brushless DC motor fan.

5V RELAY

Fig 6.0: - Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. [5]

Wi-Fi MODULE:

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. [5]

Fig 7.0: - Wi-Fi Module

DOOR LOCK UNIT AND CAMERA

In this paper, we have interfaced the laptop's camera to the Arduino microcontroller for the detection of the authenticated or unauthenticated user. Using this, we capture the facial data of the person standing in front of the camera and compare it with the authenticated person's existing facial database. If the facial data matches, the microcontroller sends a signal to the door lock unit to give access to the authenticated user. [2]

FACIAL RECOGNITION

In this paper the security feature provided is by the facial recognition. As soon as the face is detected by the camera interfaced with the microcontroller it verifies with the database, if the face matches with the database, then it recognizes the authorized person and hence grants the access to the house by opening the door lock unit. And it sends a message to the owner regarding the moment of the authorized or un-authorized person to the owner's cell-phone using TCP/IP client. The program for facial recognition is written in MATLAB [3,4].

Authorized user facial data is saved in the database

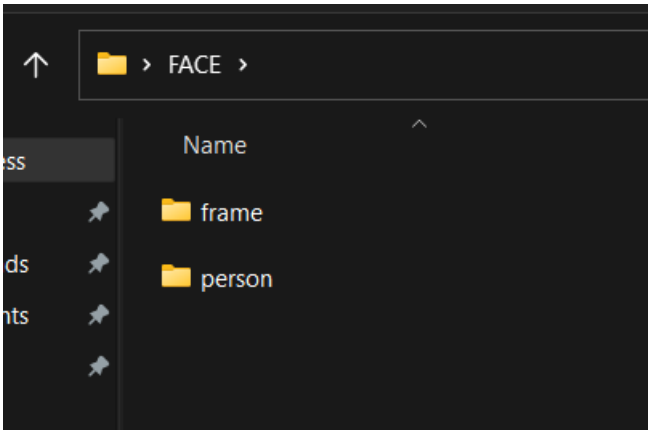

Fig 8.0: - Database Folder

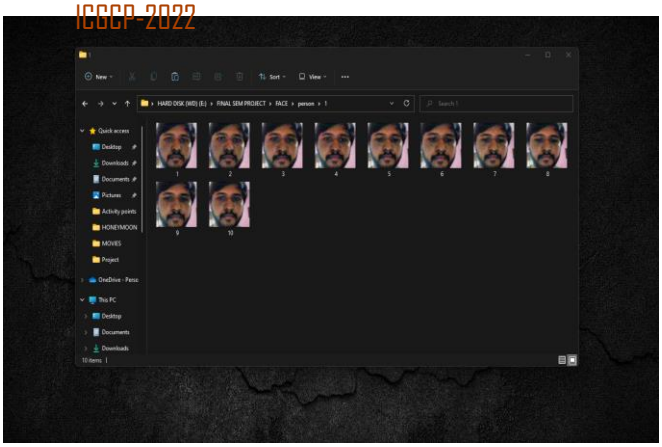

Fig 8.1: - Database Folder for Comparison

The code is run for facial recognition and the image is enhanced for proper recognition as shown in fig 9.0

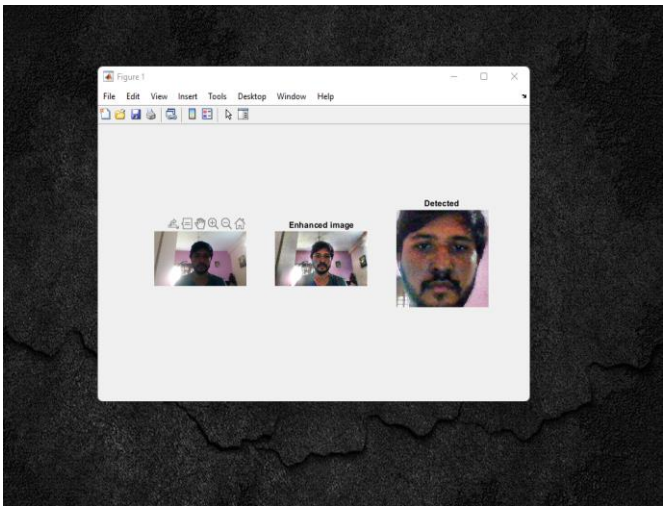

Fig 9.0: - Detection phase

If the facial data matches with the one in the database, then the authentication is given for the user as shown below

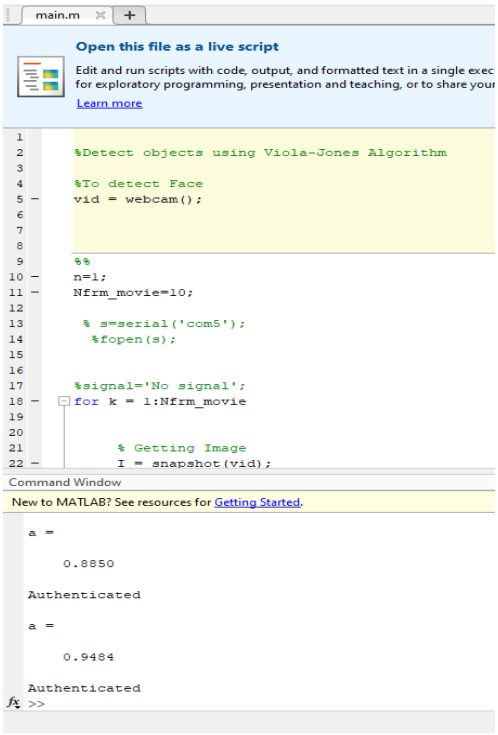

Fig 10.0: - Output Window (Authenticated)

If the facial data does not match with the database, then the user is not authenticated hence the door lock remains closed.

Fig 10.1: - Output Window (Unauthenticated)

Once the facial data matches with the database the signal is sent to the door lock unit to open and the sensors starts receiving the data and temperature and light intensity inside the house is maintained for the ease of comfort of the user. [1-4]

CONCLUSION

Intrusion using Face-recognition has been designed within the type of Home Security. The proposed system is cost effective. It provides a tension free environment. It reduces manual work and most of the work is automatically done. After applying multiple test cases, each time quite accurate results were achieved. At last, the proposed technology is able to achieve energy efficiency and increases the ease of living.

ACKNOWLEDGMENT

I am very much thankful for Principal and Management of Sapthagiri College of Engineering, Bangalore. My deep gratitude to our guide Mrs Rekha S N for continuous encouragement and giving time-to-time valuable suggestion for completion of real-time experiment successfully. Here I am thankful to all those who are co-operative and encouragement during this completion of paper.

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A Real Time Eye Blink Communication System to Assist Paralyzed Using Eye Blink

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Abstract: The incapacitated are those who have no control over their voluntary muscles and hence cannot move. This condition can occur due to neural system related disorders, accidents or even in those who are highly sedated due to medical circumstances .The people often find it very difficult to even communicate basic statements or requirements to the care-takes. Thus, in order to help them convey their message, we intend to develop an eye-blinks based communication system by incorporating real-time video processing concepts. This paper presents a communication based technology to assist paralyzed people. The realization is done using MATLAB SIMULINK with the help of Aurdino.

Keywords: Aurdino, Matlab, eye blink communication.

I. Introduction

With the advancements in technology witnessed in the past decade, several devices are being developed to assist those who are physically challenged. Few of the examples being Braille connectors for the blind, walking sticks for the blind, sign language recognition systems for the speech & hearing impaired, & the list goes on. However, systems help to communicate even the simplest currently unavailable. The caretaker must do the guesswork to understand. What the patient or person needs. This creates a lot of uneasiness for the person. To overcome this issue, we plan to develop a real time communication system, where the person can show certain requires to blinks to convey basic requirement to the caretaker. This shall be developed using the concepts of video processing. Motor neuron disease (MND) is a medical condition where the motor neurons of the patient are paralyzed and is it incurable. It also leads to weakness of muscles with respect to hand, feet or voice. Because of this, the patient cannot perform his voluntary actions and it is very difficult for patients to express is needs. Tetraplegia is also one such condition where people cannot move parts below the eye blink. In this electronic era, solutions for patients with above mentioned diseases are found, one such innovation is the proposed system explained throughout. The proposed system can be used to control and communicate with other people through eye blinks. Blink detection is an important enabling component in various domains such as human-computer interaction, mobile interaction, healthcare, and driving safety. For example, blink has been used as an input modality for people with disabilities to interact with computers and mobile phones.[1]

A few inquiries about have been done as of late to develop Human Computer Interface. Human Computer Interface as an assistive innovation helps the general population with engine incapacities and who can't move their arms thus mind boggling human PC interface must be more developed, specific to that of the information charges, adjusted - to the incapacity of the user, designed in a sheltered and straight forward. Under to human PC interface the most developed precede uses are eye Electrooculography is the strategy used to gauge the resting capability of the retina. The subsequent flags known as an Electro gram flag.This strategy was proposed by Emil-du-Bois Raymond (1848) he watched that the cornea of the eye is electrically positive in respect to the dark of the eye. In this the cathodes are set around the eye and fore set out toward recording the eye development Electrooculography flag has an extensive variety of uses such has location and following. Video oculography and Electrical ography are two noteworthy strategies in the ebb and flow look into utilized for the recognition of the eye course. Electro oculo graphic direction of a wheel chair utilizing eye development. A convenient remote eye development

controlled Human Computer Interface (HCI)for debilitated individual Eye controlled turning on and off the electronic gadgets Launching the rocket utilizing look in war field. The disadvantages in EOG are: There will be changes in the look amid the head development. The potential distinction between the retina and cornea changes with the element, for example, lighting, temperature varied. As far as bio signs to gauge the eye development the system utilized is electrooculography .The recording of the eye development should be possible through video oculography. The adjust related issues and identification of nystagmusis done through the technique called Electronystagmography.[4-3]

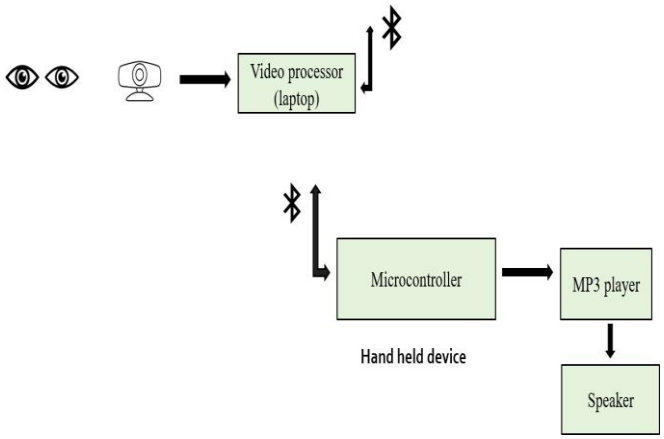

Fig.1:Block Diagram

II. OBJECTIVE

- To design and development of a communication system to assist paralyzed using eye blink.
- To develop the setup and capture images of the face of the person using the system ,for algorithm development.
- To store the sequence of the blink shown and decode this sequence into statements.
- Transmit the statement to the handheld device which is with the care-taker to speak it out.[1-2]

III. BASIC DETAILS OF IMAGE PROCESSING

A. Image: An Image is a spatial representation of a two dimensional or three-dimensional scene. It is an array or a matrix pixel (picture elements) arranged in columns and rows. An image is also a two-dimensional array specifically arranged in rows and columns.

B. Pixel: A pixel is the smallest unit of a digital image or graphic that can be displayed and represented on a digital display device. A pixel is the basic logical unit in digital graphics. Pixels are combined to form a complete image, video, text, or any visible thing on a computer display.

C. Resolution: Image resolution is typically described in PPI, which refers to how many pixels are displayed per inch of an image. Higher resolutions mean that there more pixels per inch (PPI), resulting in more pixel information and creating a high-quality, crisp image.

D. Intensity: In an image, intensity of a pixel is defined as the value of the pixel. For example in an 8 bit gray scale image there are 256 gray levels. Now any pixel in an image can have a value from 0 to 255 and that will be its intensity. Now coming to brightness, as already answered brightness is a relative term.

E. Working of camera: It is explained in the of flowchart,

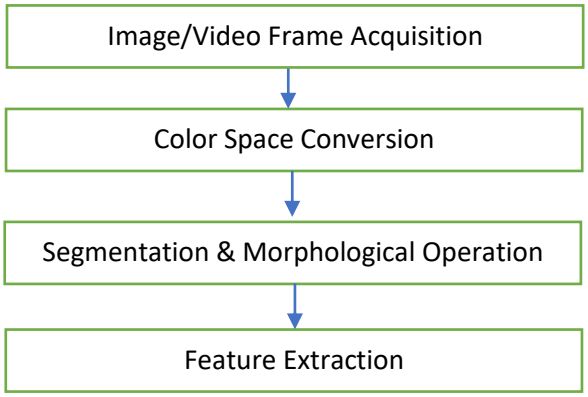

Fig.2:Flow chart

a. Image Acquisition: Image Acquisition is the first step in any image processing system. The general aim of any image acquisition is to transform an optical image (real-world data) into an array of numerical data which could be later manipulated on a computer. Image acquisition is achieved by suitable cameras.

b. Color space conversion: Color space conversion is the translation of the representation of a color from one basis to another. This typically occurs in the context of converting an image that is represented in one color space to another color space, the goal being to make the translated image look as similar as possible to the original.

c. Segmentation & Morphological operations:

Image segmentation is a method in which a digital image is broken down into various subgroups called Image segments which helps in reducing the complexity of the image to make further processing or analysis of the image simpler. Segmentation in easy words is assigning labels to pixels.

d. Feature Extraction: Feature extraction is a part of the dimensionality reduction process, in which, an initial set of the raw data is divided and reduced to more manageable groups. So when you want to process it will be easier. The most important characteristic of these large data sets is that they have a large number of variables.[2-6]

IV. METHODOLOGY

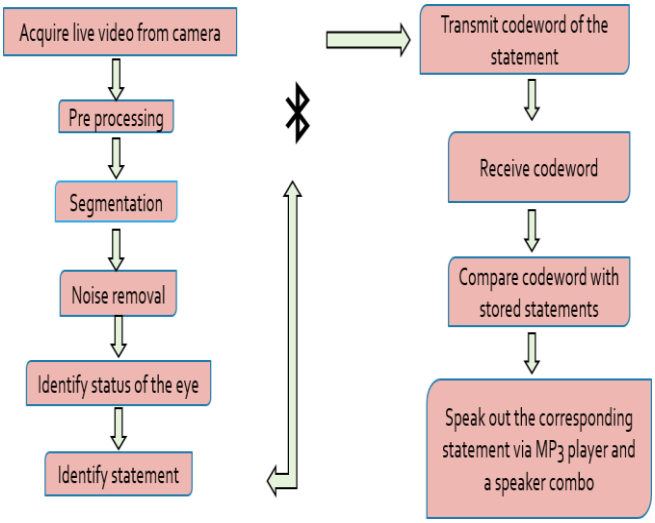

Fig.3: Methodology

MATLAB WORKING

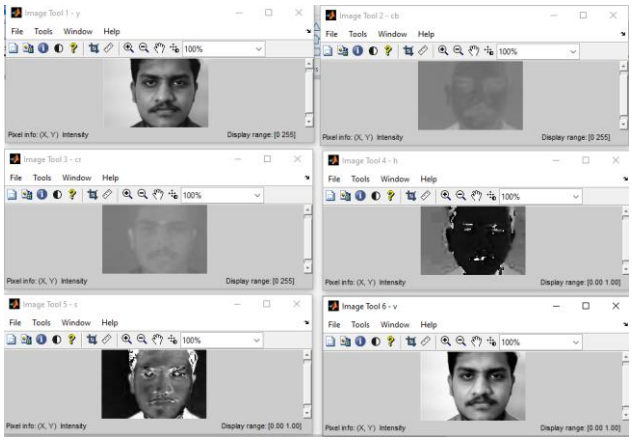

Fig.2: Colour Model Selection

Table 1: Average of colour model selection

Picture Name	Y	Cb	Cr	H	S	V
Normal	✓✓	X	✓	X	✓✓	✓✓

Table 1 shows the better colour model selection
Single tick indicate good colour model
Double tick indicate excellent colour model

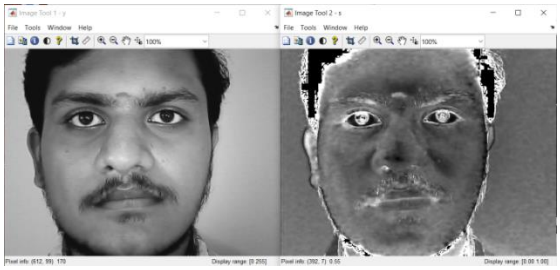

Fig.4: Selected best colour module

Inspecting Pixel Value

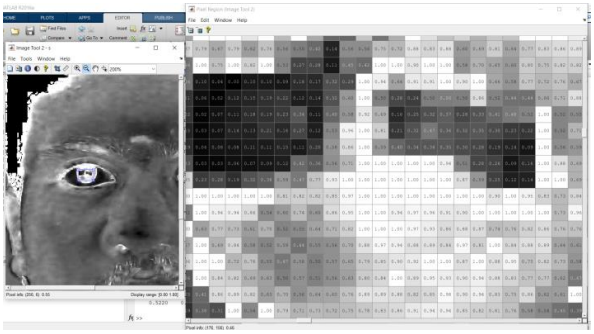

Fig.5: Inspecting Pixel Value

Table.2: Pixel Value Average For Different Photo

Name of the photo	EYE	Y min	Y min
LED 1	Right eye	16	24
	Left eye	17	22
LED 2	Right eye	19	22
	Left eye	17	21
LED 3	Right eye	16	24
	Left eye	19	26
NORMAL 1	Right eye	19	24
	Left eye	18	27
NORMAL 2	Right eye	19	22
	Left eye	19	24
AVERAGE		17.9	23.6

ISBN: 979-88-35073-61-0

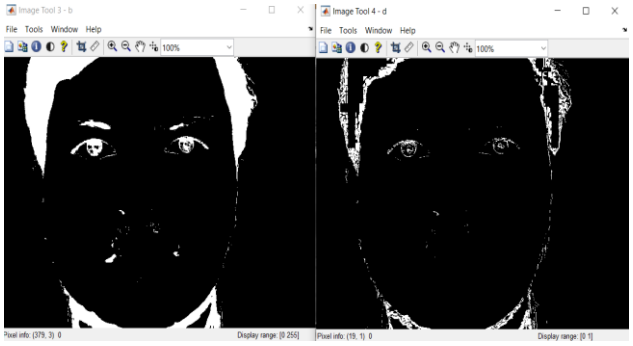

Fig.6: Segmentation

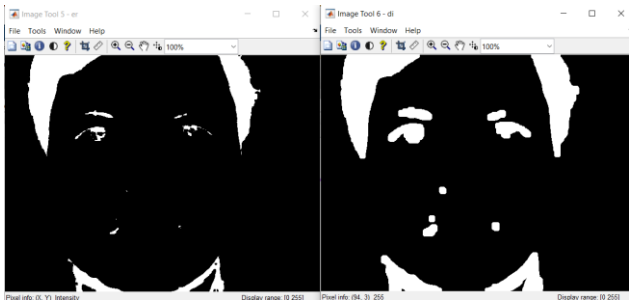

Fig.7: Noise removal

In noise removal we have two Erosion and Dilation

$$B(i,j)=\begin{cases}255, y(i,j)<=40\\ 0, y(i,j)>40\end{cases}$$

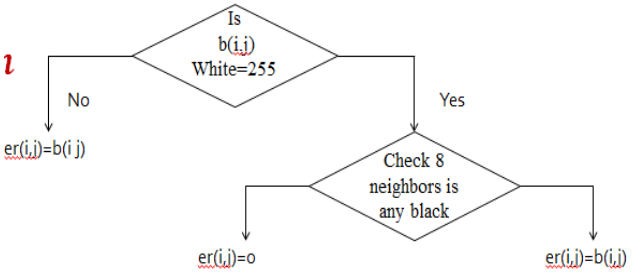

Fig.8: Noise Removal of Erosion

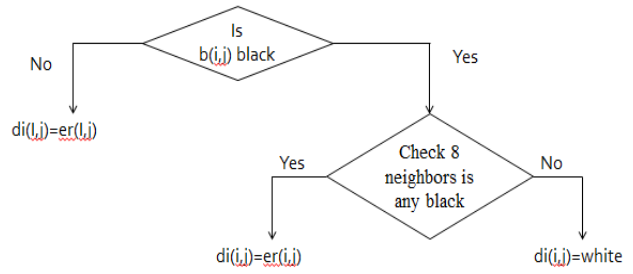

Fig.9: Noise Removal of Dilation

But we have one disadvantage in this. We cannot do video processing in MATLAB. That's why we use SIMULINK for further process. SIMULINK can be done both MAYLAB function and circuit.

V. SIMULINK MODEL

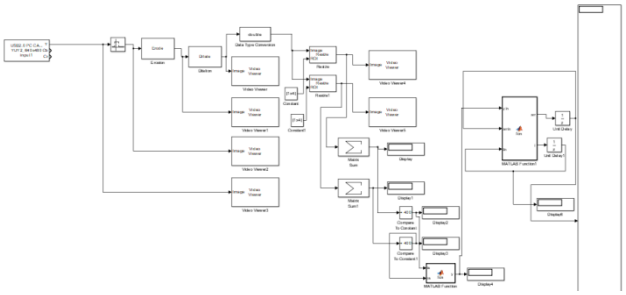

Fig.10: SIMILINK Model

Video processing we have done through Simulink. Camera is placed in front of the patient and matlab swill be running when the patient make the sequence receives the code from the sending Bluetooth and receiver Bluetooth well receiver the code word compare the code word with stored statement speaks out the corresponding statement via MP3 player and a speaker combo.[3-1]

VII. CONCLUSION

Eye blink detection is a very challenge problem for controlling mobile phones in a real time application. This is due to the movement of eyes and the variation of light for different distances from the mobile camera. The proposed method provides 8% of accuracy improvement for eye detection and blinking. When an artificial light is used the overall and detection accuracy are 98% and 100% respectively for a distance equal to 35 cm. Each frame takes an average of 71 ms for time execution which is very efficient for real time application.[5]

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Designing And Simulation of PV Cells Characterization Under Varying Temperature and Irradiance Using LabVIEW

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***Abstract*- Solar energy is a highly renewable energy source, causing no pollution to the external environment. In the recent years, the development and implementation of solar panels is increasing rapidly in both commercial and rural areas.**

Further research is being done for developing efficient solar panels. Considering the current development of solar panels, it is pivotal for the next generation of engineers to focus on research and development of solar panels. The objective of this thesis is to develop a solar panel simulator using LabVIEW software. LabVIEW software is used for its graphical programming, which makes understanding the working of solar panel easier.

Solar panel simulators can also be used for testing the solar panels for specific parameters. In this thesis, mathematical modelling of solar panel is used for simulation. The solar panel is simulated with a constant load. The effects of different load resistance on the operating point of the solar panel are analysed. Various model approaches are analysed and implemented prior to developing the final model. The current-voltage and the power-voltage characteristics of the solar panel for varying solar irradiance and temperature are simulated. [1-2]

I.INTRODUCTION

Nowadays, the demand for power is increasing rapidly. A huge crisis has been developed on the exhaustion of traditional energy sources for power generation. The demand for energy/power is growing rapidly and the supply from the available sources is not meeting the demand. The increase in the demand of traditional energy sources has led to focus on developing renewable energy sources like wind, sun, hydro, and biomass. Because of the environmental benefits of solar panel, the future should explore more on solar energy as a renewable source for energy production. [1]

India's incident solar power, only on its land area, is about 5000 Peta-Watt-hours per year (PWh/yr.) (i.e., 5000 trillion kWh/yr. or about 600 TW), which is far more than current total energy consumption [1]. In India the grid-interactive solar power generated as of December 2010 was merely 10 MW. By the end of March 2013, the installed grid connected PV systems had increased to 1686.44 MW [1]. Above statistics show the trend in adoption of solar PV technology and its potential in India. [1]

A photovoltaic (PV) system converts sunlight directly into electrical power. The basic element of a photovoltaic system is a photovoltaic cell. PV Cells can be grouped to form panels or modules. A single silicon PV cell typically generates 0.5V to 0.8V which is very low for practical use hence they are grouped in series or parallel to form panels or modules. Nevertheless, for all practical purposes the output characteristics of a panel are similar to the PV cell which is its basic element [1]. Hence the analysis of the output characteristics of a solar PV cell becomes an essential procedure. The PV cell represents the fundamental power conversion unit of a PV panel. The output characteristics of a PV cell depend largely on the solar insolation or irradiance (G), cell temperature (Tc), series resistance (Rs) and Shunt resistance (Rsh). Rs and Rsh remain constant after the cell has been manufactured so their effect is not considered in the model and their values are selected so as to have negligible effect on the output characteristics. [2]

The maximum power (Pm) derived from the PV cell or its maximum operating power point depends on the load resistance (R). Due to the non-linear output characteristics of the PV cell, a tool for modelling and simulation is proved to be useful for deriving the maximum power from the PV cell by determining the optimal load resistance ('R). Several researchers have used different ways to simulate the output characteristics of silicon PV cells, using the MATLAB software [1]. This paper however presents the solar PV cell modelling and simulation using LabVIEW where the graphical programming has replaced the conventional programming techniques and also it comes with an effective user interface. The developed tool facilitates the prediction of PV cell behaviour over a range of temperatures and irradiance levels other than STC which proves resourceful during the design of PV panels and serves as a guide for the selection of PV cells for a panel designer.

The efficiency for mono-crystalline cells is generally between 15% to 20% and between 9% to 12% for polycrystalline. In case

of thin film cells, the efficiency is 10% for a-Si, 12% for CuInSe2 and 9% for CdTe [1]. Since mono-crystalline silicon-based PV cells have the highest efficiency and popularity, this paper focuses on them. In the following sections, single-diode solar PV cell circuit model and the equation relating the current and voltage of the cell is presented. Other essential basic relations for modelling are also listed. The design concept is explained and the LabVIEW block diagram and front panel are shown. The simulation results for varying cell temperatures and irradiance levels on the output characteristics of the PV cell are shown and analysed. Also, the validation of the presented system is demonstrated by comparing simulated results with the datasheet values of existing commercial PV cell. The determination of optimal load resistance ('R) using the developed tool for the maximum power point operation for a range of cell temperatures and irradiance levels is demonstrated. [1]

II.PV CELL

The solar cell is a semi-conductor device, which converts the solar energy into electrical energy. The conversion of sunlight (Solar Energy) into electric energy takes place only when the light is falling on the cells of the solar panel. The working of a solar cell primarily depends upon its photovoltaic effect hence a solar cell also known as Photovoltaic cell. A solar panel consists of numbers of solar cells connected in series or parallel. The number of solar cells connected in a series generates the desired output voltage and connected in parallel generates the desired output current.[1]

The solar cell produces electricity while light strikes on it and the voltage or potential difference established across the terminals of the cell is fixed to 0.5 volt and it is nearly independent of intensity of incident light whereas the current capacity of cell is nearly proportional to the intensity of incident light as well as the area that exposed to the light. Each of the solar cells has one positive and one negative terminal like all other type of battery cells. Typically, a PV-Cell has negative front contact and positive back contact. A semiconductor p-n junction is in the middle of these two contacts.

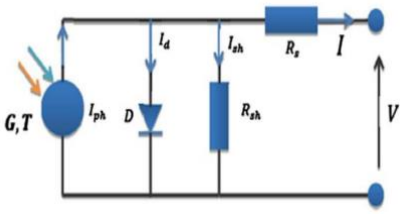

Fig.1 Equivalent circuit of one-diode solar cell

The circuit representation of a PV- Cell using Diode Model. A diode is connected across a load (in this case a Resistor.) and the corresponding Output Voltage (Voc) and Current (Im) is calculated using Voltage and Current Sensors.

Short Circuit Current of Solar Cell: The maximum current that a solar cell can deliver without harming its own construction is called Short-Circuit Current. It is measured by short circuiting the terminals of the cell at most optimized condition of the cell for producing maximum output. The term optimized condition is used because for fixed exposed cell surface the rate of production of current in a solar cell also depends upon the intensity of light and the angle at which the light falls on the cell. As the current production also depends upon the surface area of the cell exposed to light, it is better to express it as Maximum Current Density (Jsc) instead of maximum Current (Isc).

$$Jsc = \frac{Isc}{A}$$

Open Circuit Voltage of Solar Cell: It is measured by measuring voltage across the terminals of the cell when no load is connected to the cell. This voltage depends upon the techniques of manufacturing and temperature but not fairly on the intensity of light and area of exposed surface. Normally open circuit voltage of solar cell nearly equal to 0.5 to 0.6 volt. It is normally denoted by Voc.

Maximum Power Point of Solar Cell: The maximum electrical power one solar cell can deliver at its standard test condition. If we draw the V-I characteristics of a solar cell maximum power will occur at the bend point of the characteristic curve. It is shown in the V-I characteristics of solar cell by Pm. However, to deliver maximum power, resistance of load should match with the characteristic resistance of the source. When solar cells are connected in series, we get the desired output voltage. When solar cells are connected in parallel, we get desired output current. The power generated is calculated using Ohms law, V=I*R. The voltage corresponding to MPP is the maximum voltage Vm; the current corresponding to MPP is Im. Figure 4 shows the current-voltage and power-voltage characteristic curve of typical solar cell, and the points of short-circuit current, open-circuit voltage, Vm, Im and MPP line are shown.

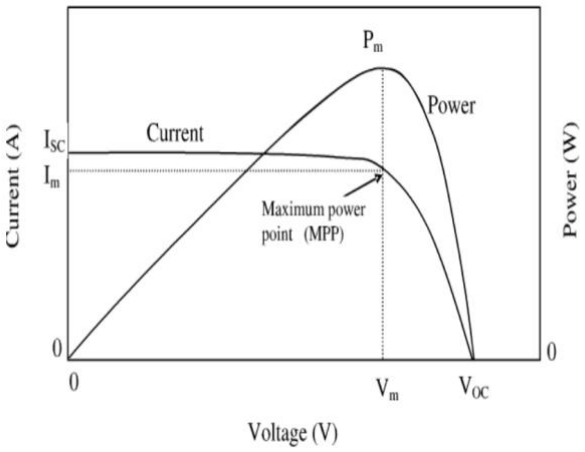

Fig.2 I-V and P-V characteristic of solar cell

The current at which maximum power occurs is called Maximum Current and is represented in the V-I characteristics of solar cell by Im.

The voltage at which maximum power occurs is called Maximum Voltage and is shown in the V-I characteristics of solar cell by Vm.

Efficiency of Solar Cell: It is defined as the ratio of maximum electrical power output to the radiation power input to the cell and it is expressed in percentage. It is considered that the radiation power on the earth is about 1000 watt/square meter hence if the exposed surface area of the cell is A then total radiation power on the cell will be 1000 A watts. Hence the efficiency of a solar cell may be expressed as

$$Efficiency(\eta) = \frac{P_m}{P_{in}} \approx \frac{P_m}{1000A}$$

Solar cells generally work best at low temperatures. Higher temperatures cause the semiconductor properties to shift, resulting in a slight increase in current, but a much larger decrease in voltage. Extreme increases in temperature can also damage the cell and other module materials, leading to shorter operating lifetimes. Since much of the sunlight shining on cells becomes heat, proper thermal management improves both efficiency and lifetime. [1-2]

III.MODEL DESIGNING

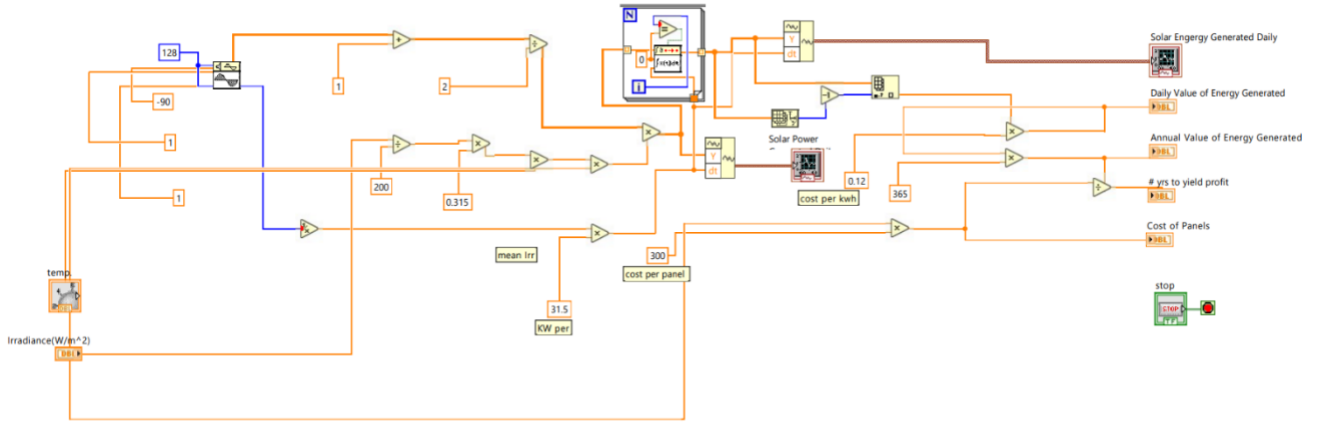

Fig.3 Block Diagram for PV-Cell Simulation

The Back-End Blocks are responsible for the processing of the input data and computes the Output which is desired by the User. The Input is computed to give the Power Generated and the Energy Output.

In this simulation the block diagram collects the inputs from the user such as the no. of panels, wattage, cost per panel, variance in temperature and irradiance, and then computes the power output for the given panel and demonstrates the result in the form of a graph of Power Generated Vs. Hours of use. A Nested For-Loop is used to evaluate the results where the number of iterations the looping going to execute is determined the Number of Panels given as input by the user. The Output is again transferred to the Front-End Control Panel where the user can interact with the Output and generate Feed-Back Control. The below figure represents the Block Diagram built to generate the Energy Output for a No. of Solar PV-Cells working under varying conditions of Temperature and Irradiance. [1-3]

Calculation of Power Generated:

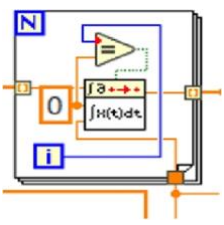

Fig.4 Block Diagram for Power Calculation

The above Block Diagram represents an Integration Function which calculates the power generated by the Solar Panels. It uses a For Loop for calculating the limits of integration, where it takes its limits from 0 to No. of Panels (given as input).

Wave-Form Generation: The below Figure shows the Block Diagram for generating the output waveforms. The waveforms are produced by storing the results of each iteration in an array and then by transforming that array into waveform. A Differentiating function is used to produce a continuous curve in the 2-axis Co-ordinate system.

Graph:

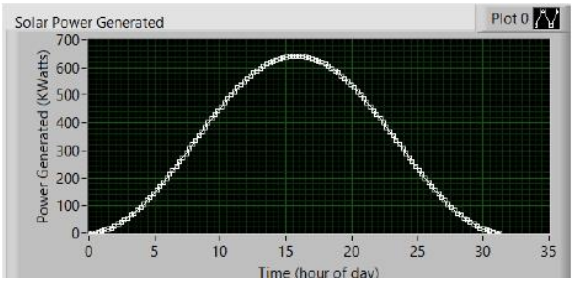

Fig.5 Graph of Power Vs. No. of Hours

The above graph shown in figure represent the Power Output from the panels Vs Number of Hours of daily use. Power Generated is represented by the X-Axis and the Number of Hours is represented by the Y-axis.

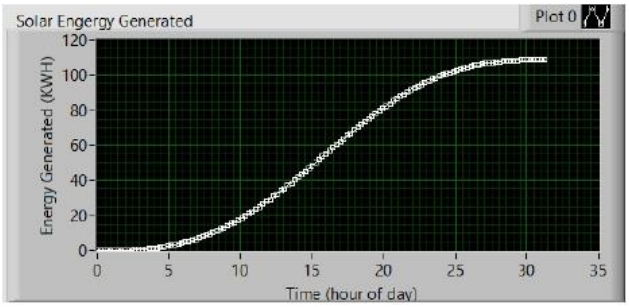

Fig.6 Graph of Energy Vs. No. of Hours

The above figure represents the Energy Output from the panels Vs Number of Hours of daily use. Energy Generated is represented by the X-Axis and the Number of Hours is represented by the Y-axis. [1-3]

Front End Control Panel:

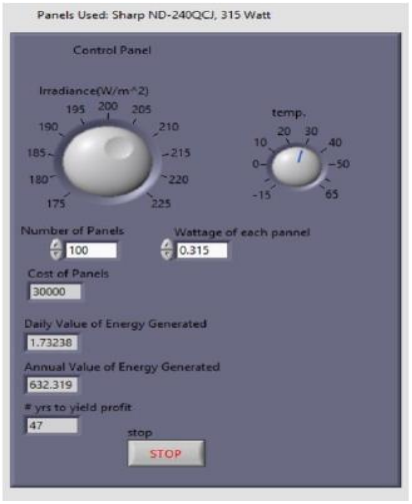

Fig.7 Front End Control Panel

The Front Panel Controls Various Inputs provided by the User such as Temperature, Irradiance, No. of Solar Panels, Energy Output of Each Panel and Transfers the input data to the back-end program for further Processing.

Block Diagram for Calculating No. of Panels:

The Back-End Block Diagram representation of the simulation which is processed in order to calculate the No. of Panels required to drive the load considered. The user is required to enter the load details which is then calculated to give out the power output and also the Number of panels required for the supply of load.

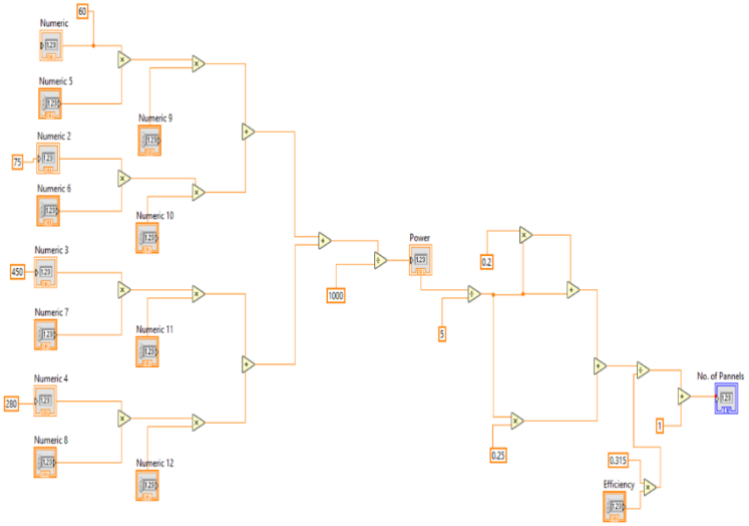

Fig.8 Block Diagram for Calculating No. of Panels

Front panel:

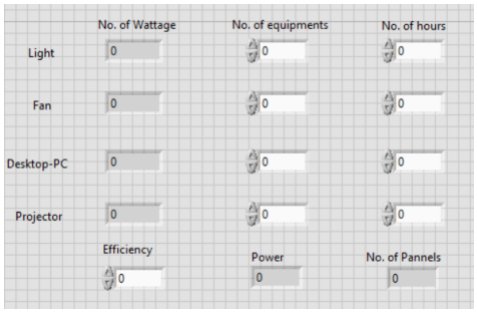

Fig.9 Front Panel

The Figure Shows the Total Load along with the Total Number of Panels required to supply the connected Load.

Simulation for pv-cell characteristics with varying conditions:

Front Panel:

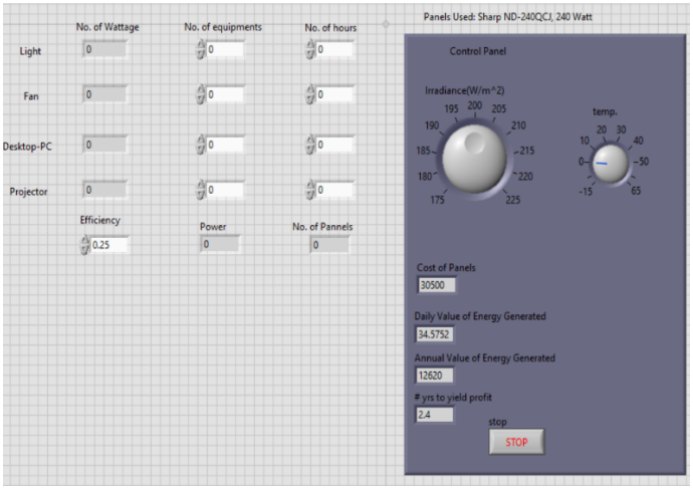

Fig.10 Front End Control Panel

The above Figure is the Front-end Control Panel which controls the simulation for obtaining the Power and Energy outputs under the varying conditions of Temperature and Irradiance over a wide range of test conditions. The user provides the necessary inputs such as the No. of Equipment's, Wattage, and the No. of Hours each Equipment is used as an average to calculate the daily requirement of power and then the test conditions are varied for Temperature and Irradiance. The user can interact and access the controls at any point of Run-time to analyse the transient effects of the system. [1]

Block Diagram:

The block diagram shown in the figure is the block diagram representation which computes the Power and Energy Output and also computes the total number of panels required to drive the load. The simulation also takes into account the efficiency of the panels and also simulates the PV-Cell characteristics under varying conditions of Temperature and Irradiance. [1-3]

V.SIMULATION RESULT

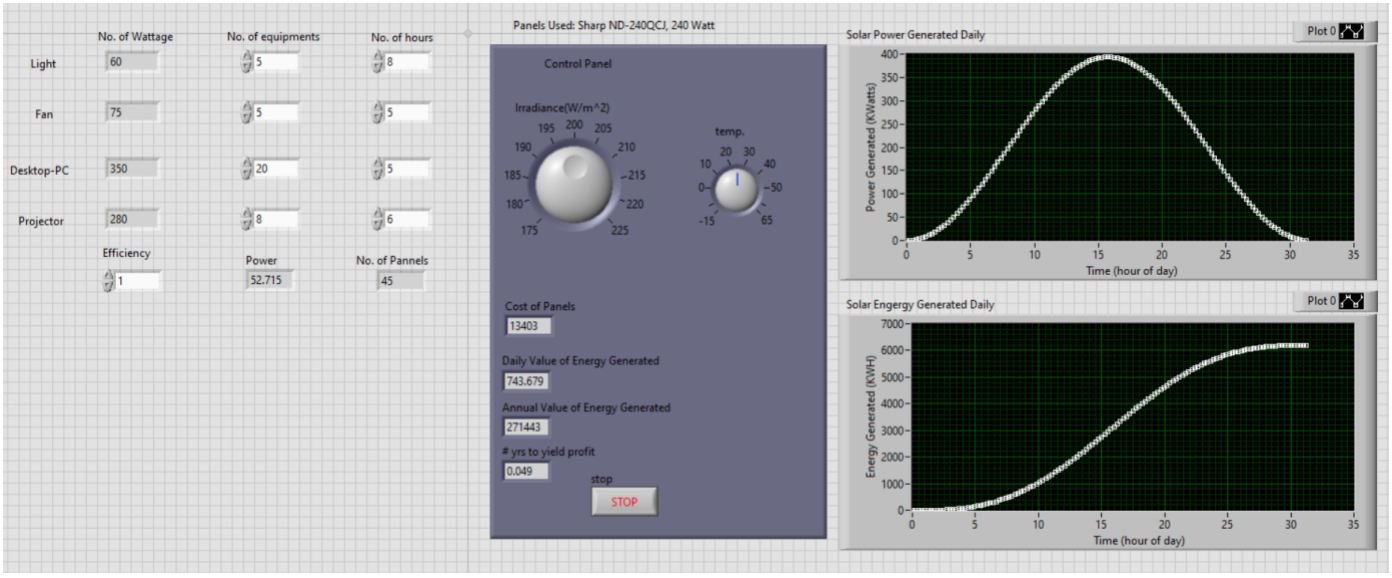

Fig.12 Front panel of the pv cell

IV.CALCULATIONS

Considering the Power Systems Simulation (PSS) Lab as the case study for our simulation, and a standard data-sheet for Voc, Isc, Pmax, Vmax, Imax, for a single panel we are calculating the No. of Panels which are required for designing, considering the losses in power conversion and the Efficiency of 20%.

Now, we calculate the total Power consumption by the equipments over the day.

TABLE I: List of equipments and Usage:

Equipments	**Wattage**	**No. of equipments**	**No. of hours**	**Total(W/d)**
Light	60	5	8	2400
Fan	75	5	5	1875
Desktop-PC	350	20	5	35.0k
Projector	280	8	6	13.4k

Total wattage used: 52.715

Considering 20% Efficiency at Generation and 25% of Extra for Losses and Over-load.

Total Load = (52.715)+(0.20*52.715)+(0.25*52.715).

= 76.42Kw.

~ 80Kw.

*Considering Optimum Sunlight for 5 hours throughout the day = 80Kw/5

= 16Kw.

Solar module configuration:

Solar Module Type = SOMERA VSM.72.AAA.03.04 (Monocrystalline)

Voc=47.4V

Isc=9.56A

Vmax=38.1V

Imax=9.18A

Pout=(340-370W) =350W

No. of panels required=[16/350]*10^3

=45 panels

By keeping the irrandiance at 200W/m^2 and temperature at 25°C, we have found the wattage used daily and yearly.

Above figure shows the results of the analysed simulation to compute Power Output Vs No. of Hours used\day for a selected PV-Cell under varying Conditions of Temperature and Irradiance. Energy Output Vs No. of Hours used\day for a selected PV-Cell under varying conditions of Temperature and Irradiance is observed and time to yield profit from the grid found out. Design and simulation of the load to calculate the Number of Required Solar Panels. Design and simulation helps to study and understand the Power and Energy Output Characteristics of the selected PV-Module under varying conditions of Temperature and Irradiance. [1-3]

CONCULSION

The "Design and Simulation of PV-Cell Characterisation under varying conditions of Temperature and Irradiance" is simulated in a virtual environment software, which is LabVIEW. This software allows its user to change input parameter even when the system is processing. This enables the user to study the system in transient conditions. The design and simulation results are in acceptable range of errors and the expected Output Characteristics for PV-Cell under varying conditions of Temperature and Irradiance is Obtained.

ACKNOWLEDGMENT

We consider myself privileged to express my gratitude and respect towards all those who have helped me throughout the course of my project. We are thankful to them for their aspiring guidance, friendly advice and for sharing with me their illuminating views.

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Crop Protection Against Rainfall With Automated Agriculture

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ABSTRACT:

The IOT Technology is now in its prime and the wealth of Knowledge available is mind-blowing. Embedded technology plays a major role in integrating the various functions associated with it. This needsto tie up the various sources of the Department in a closed loop system. This proposal greatly reduces the manpower, saves various real world objects such as weather, crop and water, will assist the fArduinoers i agriculturerelated activities on its own. The system calculates the optimum inputs using the sensor network and supplies them through the actuators. A database of relevant crops is stored on the cloud and sensor data compared with the optimum data on the cloud.time and operates efficiently without human interference. This project puts forth the first step in achieving the desired target. With the advent in technology, the existing systems are developed tohave in built intelligence.

INTRODUCTION:

Agriculture is the backbone of our country.About 70% of India's revenue comes from agriculture.Agriculture in India is still carried out in conventional way and lags behind in integrating modern technologies. Around 55 percent of India's population has been engaged

in agriculture and allied activities which constitute only 15 percent of GDP so it becomes much important for the stakeholders involved to come out of the Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you. conventional agricultural practices and modernize the agriculture usingtechnology.

Also consider the water availability throughout India. It is one of the valuable resources to protect and save for future needs. Embedded based automatic irrigation system is suitable for farmers available at low cost easily install. This system should help the farmers who provide water to the crops at stringent time and quantity. Automatic irrigation system observes the moisture sensors and temperature variations around the crop area that gives a precise time of operating the motors into turning ON and OFF. So automatically avoids the human errors and check soil moisture level.

LITERATURE SURVEY:

According to Dr .N .Suma[1] et.al, IOT based smart agriculture monitoring system thenever of decreasing water tables, drying up of rivers and tanks, unpredictable environment present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture sensor at suitable locations for monitoring of crops is implemented in. An algorithm developed with threshold values of temperature and soil moisture can beprogrammed into a microcontroller-based gateway to control water quantity. According to Ravi Kishore Kodali[2] et.al,Iot Based Smart Greenhouse India receives ample amount of precipitation and have many large river systems but still only one third of the total agricultural land is connected via canal irrigation system. Remaining majority of the portion is dependent on monsoon or tube wells. Places with excess water faces problem of land sanity du to over irrigation and water logging. Water collected on the surface also blocks pores in the soil and kills beneficial microorganisms.

Hence, problem lies in the mismanaged use of water. For optimum use of water, we use drip irrigation. It is an irrigation method to save water by allowing water to target the roots of plant. Water obtained from all the sources like canal, rainwater harvesting, tube well etc. are not allowed to irrigate the fields directly, instead it is first stored into an underground tank. Tank is equipped with an ultrasonic sensor which measures the level of water continuously and alerts the user with a SMS whenever water level falls below the threshold mark.

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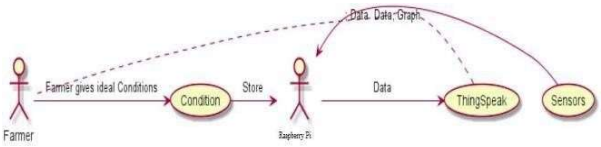


METHODOLOGY

An Intelligent system is designed to protect the crops from natural disasters such as over rains, floods and even from excessive heat. The various sensors being used in the project will beset to the default values which are suitable for the crop cultivation. A movablesheet made up of polythene/foaming sheet is designed to protect agricultural field. During rains and other suddenweather changes the sensors being used in the land detects and changed values will be intimated by sending messages/calls to farmers using Wifi.

Farmer can move panel according to his crop requirements. If the farmer doesn't reply, the system works in automatic mode which will be set by default, such that the moisture sensorwithin the land detects themoisture levels in land and initiates the appropriate action required to increase the yield.

The Wireless Sensor networks can be used for monitoring spatial-temporal changes in climate,

hydrology, pressure, motion, soil moisture, plant eco-physiology, pests and reporting best options to the agriculturist. Having such information at regularly would be a big boon. In order to be aware of the adverse conditions which challenge the agriculturists, automatic actuated devices can be used to control irrigation, fertilization.Irrigation is also one of the important activities in precision agriculture.

The rain sensor is activated when there is rainfall and it will gives intimation to the controller. Controller closes the roof as soon as the rain is detected, also send a SMS to the farmer by using Wifi. Once rain stops the controller automatically opens the roof. This model also comes with manual control mode with SMS. i.e, owner or farmer can open / close the roofmanually by sending SMS.

The water falling on the sheet will be falling on other side of the land due to the mechanism and by

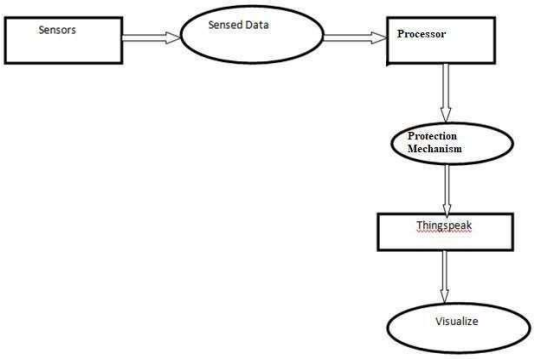
using the water pump the water can be stored (Rain water Harvesting) and farmer can use it according to his requirements.

The design explains about the various components being used in the project and even description of each of them with their specifications. The design includes block diagram and the hardware implementation of the complete project.

systems design. Systems design is therefore the processof defining and developing systems to satisfy specified requirements of the user. The UML has become the standard language in object oriented analysis and design

DATA FLOW DIAGRAM:

A dataflow diagram is a graphical representation of the "flow" of data through an information system, modeling itsprocess aspects. A



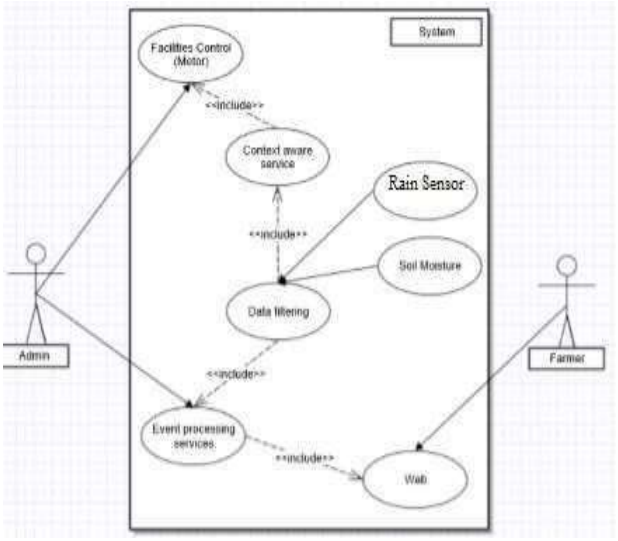
DFD is often used as a preliminary stepto create an overview of the system without going into great

detail, which can later be elaborated. DFDs

canalso be used for the visualization of data processing. A DFD shows what kind of information will be input to and output from the system, how the data will advance through the system, andwhere the data will be stored.

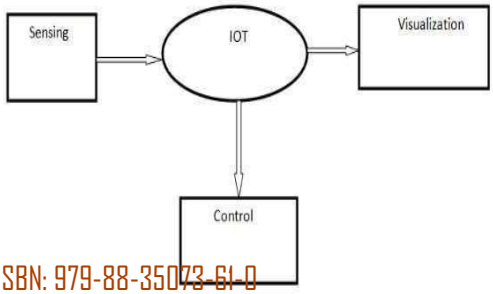
USE CASE DIAGRAM A use case diagram at its simplest is a representation of a user's interaction with the system that shows therelationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well. While a

use case itself might drill into a lot of detail about every possibility, a use case diagram can help provide a higher-level view of the system. It has been said before that "Use case diagrams are the blueprints for your system".



SEQUENCE DIAGRAM:

A sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these interactions take place. We can also use the terms event diagrams or event scenarios to refer to a sequence diagram. System Modules



Implementation

In case of heavy rainfall the farmer will be sent with a signal or a message to start the operations. As soon as the GSM module receives the signal using IC MAX232 themicrocontroller is enabled.

We have used various sensors such as humidity sensor, rain sensor, temperature sensor, moisture sensor
,light sensor, motion detection sensorwhich will be initially set to default values suitable for the cultivation.

The first operation of microcontroller is to activate the dcmotor which works on Flemming's left hand rule in such a way that it starts rotating in clockwise direction to cover the double coated polythene/foaming sheets over the crops. The motor can even operate in anti clockwise direction with the help of Hbridge.

ISBN: 979-88-35073-61-0

Hence the crops are covered by the double coated polythene sheet over the agricultural land and the crops are protected. The required protection is fabricated by four adjustable poleswhich enables the adjustment of height. The microcontroller is used to control this operation using wifi technology which enables the farmer to control the operations from the remote place.

Aerial Application of Pesticides," in Optimising Pesticide Use, John The system works in automaticmode by default i.e. when farmer doesn't respond to the request from wifi , it checks the moisture content of the soil using moisturesensor and initiatesappropriate action required to protectthe crop else the farmer canmanually make changes as per his

WORKING PRINCIPLE:

In case of heavy rainfall the fArduinoer will send a signal or a message to start the operations. As soon as the GSM / Wifi module receives the signal using IC MAX232 the microcontroller is enabled. The first operation

by the double coated polythene sheet over the agriculture land & crop is protected. The required protection is fabricated by four adjustable poles which enables the adjustment of height. The microcontroller is used to control this operationusing GSM / Wifi technology which enables the fArduinoer to control the operation from the remote place. Even System works in automated mode i.e. when former doesn't respond to the request from GSM / Wifi, it checks the moisture content of the soil using moisture sensor and initiates appropriate action required to protect crop.

of microcontroller is to activate the dc motor in such a way that it starts rotating in clockwise direction to cover the double coated polythene sheet over the crops. Hence the crop is covered

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"EMPOWERED, SMART AND SECURED VEHICLE SYSTEM"

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ABSTRACT

Everyone buys a vehicle (4wheeler) in this modern era but there is always a problem in its security, safety, consumption, and asylum. It would be amazing if all this were taken care of in a single vehicle. But there is none of the vehicle at present which can guarantee that a vehicle cannot be stolen, minimal number of accident chances, could balance the fuel consumption if the fuel has been completely drained or could avoid from small scratches all around the car.

All these could be resolved by using Empowered, Smart and Secured Vehicle System. This alerts you about the surroundings and could give an idea about the distance from the vehicle to the nearest object that could damage the vehicle. We invest on vehicles so that it is used for our wellbeing in our day-day purpose, but since burglary and theft rate has increased, we can't expect a vehicle not to be stolen instead we could stop from being stolen using GSM and GPS technology.

1.INTRODUCTION

These day's vehicle robbery cases are higher than any other time, it has gotten to be fundamental to give a vehicle a superb security with the main solid hostile to These burglary gadget. Vehicle focal locking framework guarantees the best ensure to secure your vehicle from various types of burglary cases. It is a vehicle security gadget that offers fantastic insurance to your vehicle. However this framework couldn't, A demonstrate to give complete security and openness to the vehicle in the event of burglary. So a more created framework makes utilization of an inserted framework focused around GSM innovation. The outlined and created framework is introduced in the vehicle. Whether one is holder of single vehicle or in excess of

1000, Vehicle Tracking System (VTS) is an answer for spot, track and secure your portable resources. It is intended for exact and ongoing following and reporting of your vehicle(s), regardless of where it is placed

Combination of high-affectability GPS units in vehicle following frameworks has empowered these gadgets to work in different varieties of situations, for example, characteristic ravines, urban gulches and much under substantial foliage, the length of system scope is solid. Right now GPS vehicle following guarantees their wellbeing as voyaging. This vehicle following framework found in clients vehicles as a burglary counteractive action and salvage gadget. Vehicle manager or Police take after the sign emitted by the following framework to place a victimized vehicle in parallel the stolen vehicle motor rate going to diminished and pushed to off. In the wake of exchanging on the motor, engine can't restart without consent of watchword. This framework introduced for the four wheelers, Vehicle following generally utilized as a part of naval force administrators for war fleet administration capacities, directing, send off, ready for and security. The applications incorporate observing driving execution of a guardian with a teenager driver. Vehicle following frameworks acknowledged in shopper vehicles as a burglary avoidance and recovery gadget. In the event that the burglary recognized, the framework sends the SMS to the vehicle holder. After that vehicle manager sends the SMS to GSM modem appended to the

controller, issue the important signs to stop the robbery.

2.SURVEY

A new international Interpol Statistics revealed that 4.2 million vehicles reported stolen in 2008 from 149 countries around the world. U.S statistics shows that a car is stolen every 28.8 sec, adding up to more than 1 million cases of auto theft each year. Vehicle theft has become the nation's first property crime, costing more than $7.4 billion a year. One of insurance companies in Jordan said, striking that the phenomenon of car theft is not a private problem but had turn to insurance companies, especially if the type of insurance is comprehensive, there are 25 insurance companies in Jordan and are daily dealing with an almost fixed rate of 3-10 communications about car stealing. Many car owners rely on a car alarm system to protect their vehicles from criminals. Unfortunately, even the most sophisticated car alarm systems are not enough to prevent auto theft (Hunter and Ashjaee, 1988; Reynolds et al., 1990). Wahab et al. (1997) described a real-time vehicle location tracking system which uses the current technologies of Global Positioning System (NAVSTAR GPS) to provide continuous position and velocity tracking of moving vehicle (Alaqeeli et al., 2003), presented a novel signal acquisition and tracking method that reduces the number of operations, simplifies the HW implementation and decrease time needed.

This paper proposes a dynamic security strategy that is about authorizing and conforming the rightful owner of the object else action is to be taken place. It based on the Microcontroller and GSM detection of anyone to enter in the secure area or vehicle When a person wants to enter in the vehicle, he/she must enter the premises with the method which is normal in nature i.e.: by using keys or security cards then the person is allowed to enter in the cabin or particular area. If the user tampers with the entrance or door of vehicle or any other subject where the system is installed, then the rightful owner of the property receives an alert message sent by GSM module that your vehicle or property in under unauthorized control or being stolen. we can also identify the person responsible and can even track the location and path of stolen vehicle or object with the help of GPS device. and stolen vehicle can be stopped using GSM by sending the STOP message to vehicle unit

3.OBJECTIVE

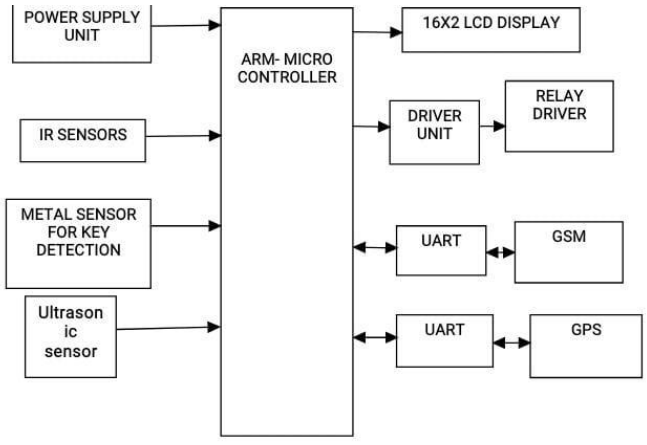
- To provide the anti-theft system using GSM

4. METHODOLOGY

Antitheft Vehicle Tracking:

This paper proposes a dynamic security strategy that is about authorizing and conforming the rightful owner of the object else action is to be taken place. It based on the Microcontroller and GSM detection of anyone to enter in the secure area or vehicle When a person wants to enter in the vehicle, he/she must enter the premises with the method which is normal in nature i.e.: by using keys or security cards then the person is allowed to enter in the cabin or particular area. If the user tampers with the entrance or door of vehicle or any other subject where the system is installed, then the rightful owner of the property receives an alert message sent by GSM module that your vehicle or property in under unauthorized control or being stolen. we can also identify the person responsible and can even track the location and path of stolen vehicle or object with the help of GPS device. and stolen vehicle can be stopped using GSM by sending the STOP message to vehicle unit

5. BLOCK DIAGRAM



6. CONCLUSION

Tracking framework or system is getting to be progressively vital in expansive urban areas and it is more secured than different frameworks. It has continuous ability, rises with a specific end goal to fortify the relations among individuals, vehicle and street by assembling present day data advances or technologies and ready to structures a real time accurate, compelling exhaustive transportation framework. Updating this setup is simple which makes it open to future a prerequisite which likewise makes it more efficient. The proposed work is cost-effective, reliable and has the function of preventing theft and providing accurate tracking system. A smart anti-theft system is one of the essential systems that homogenize both GPS and GSM systems. It is fundamental because of the huge numbers of uses of both GSM and GPS frameworks and the wide use of them by a great many individuals all through the world. This framework intended for clients in area development and transport business, provides realtime information such as location, speed and expected arrival time of the user is moving vehicles in a EMPOWERED, SMART AND SECURED VEHICLE SYSTEM 2021-22 Dept. of Electrical & Electronics, SCE, Bengaluru 34 concise and easy-to-read format. This framework might likewise valuable for correspondence process among the two focuses

security has been developed to mitigate this problem.

The car will be started with RFID or fingerprint or password. If an unauthorized person wants to open the door of the vehicle, it will ask for correct RFID or password or fingerprint. The tilt sensor is used to measure any breaking of windows or doors and movement of the vehicle, a message will be sent to the owner’s mobile containing the location of the car via GPS-GSM module.

The system also gives an alarm. Furthermore, the connection to the fuel injector of the car is deactivated to prevent the unauthorized start of the vehicle anyhow. This anti-theft security system enhances the chances of recovering the car.

Stealing the vehicle is the major threat to car or vehicle owners. Nowadays, it is increasing day by day. If not recovered soon, stolen vehicle are generally sold, revamped or even burned, if the resale price is considered to be too low. When a vehicle is stolen, it becomes hard to locate and track it, which considerably decreases the chances of recovering it. An Anti-Theft vehicle

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"SMART VOTING SYSTEM"

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ABSTRACT

The Voting process is heart of democracy and India is largest democracy in the world where every citizen above 18 years has right to vote. For good democracy, a voting system should be correct, transparent and fully authentic. Biometrics technology is very advanced and more accurate in secure and feasible authentication to the voters. The proposed voting system is mainly for those people who are not capable to come to the voting booth. This electronic voting machine is more secured and better than exiting voting process. The advancement in wireless and web technologies given rise to the new applications in e-Government services such as online tax filing, license renewal, and benefits claims. The proposed work uses android mobile OS to develop an application and fingerprint supported biometric control information to make voting process more secure. Using android smart mobile device makes the system even more robust. Voting is most pivotal process of democratic society through which people determine it's government. Governments around the world are increasingly considering the replacement of traditional paper-based voting schemes with electronic voting systems. In this paper we describe the design, construction and operation of a digital voting machine using a microcontroller profoundly. Again we also portray counting system of votes, market survey and cost analysis.

1. INTRODUCTION

In India, voting is an important tool to collect and reflect people's opinions. So it must be more efficient, reliable, and secure. Elections in India are conducted almost exclusively using electronic voting machines developed by a pair of government-owned companies, the Electronics Corporation of India (ECIL) and Bharat Electronics Limited (BEL).India spends lot of money to improve their whole voting system to Provide a better government to their citizens. Traditionally, Voting is conducted in centralized or distributed places called voting booths. Voters go to voting booths and cast their votes under the supervision of authorized parties. Earlier in India, the voting process was mostly manual and paper based. In election a voter used ballot paper to cast his vote. This process is time consuming and very much prone to security, error and fraud. To overcome some of these issues, now a day paper based voting system was changed to electronic voting machine which is more secured. But still voters have to take tremendous effort to cast their ballots. What is Electronic Voting System? It is a system where the recording, casting or counting of votes in political elections and referendums involves information and communication technologies. Electronic voting machines cleared up lots of problems and barriers faced by the paper based voting process, but still people neglect that aspect of their civil right because the registration process is tedious and they have to take tremendous effort to cast their ballots. Voters have to go voting booths stand in long lingering line on the day of voting. Because of long lingering line, voting process which is actually few minutes process, takes whole day of people. For a variety of reasons, voters may be unable to attend voting booths physically, but need to vote remotely, for example, from home or while travelling abroad. Hence, there is great demand for remote voting procedures that are easy, transparent, and, most importantly secure. Another reason for the lack of participation within the voting process is that of security. In some cases political riots may occur because of different allegiance to the various political parties. Voters may not want to turn up at the polling station in fear that. Voting for any social issue is essential for modern democratic societies now a day. So it is becoming very important to make the voting process more easy and efficient.

2. OBJECTIVE

- To provide the authenticated voting system using Embedded technology to avoid scam in voting.

3. EXISTING SYSTEM

In the current voting system, the ballet machines were used in which the symbols of various political parties are displayed. When we press the button with the respective party's symbol the voting is done. The chance of fake person casting their vote is more in the existing system. The voting person may use the fake voting card and cast his vote, this may cause problem. In the existing system, the person has travel long places to his constituency to cast his vote. Therefore, we need an effective method to identify the fake voters during voting.

4. PROPOSED SYSTEM

In this system, the interface accepts the fingerprint data of the voters. Facial authentication process is used for detecting the right person and also making the system to work in online, which will help the voters to cast their vote from their place itself. On successful authentication, the interface allows to vote. The fingerprint data is used for authentication because fingerprint is faster, efficient and is unique to each individual. A central database is maintained which contains all the demographic and biometric data of every voter enrolled. The proposed system also counts the number of votes to each parties and finally generate the result.

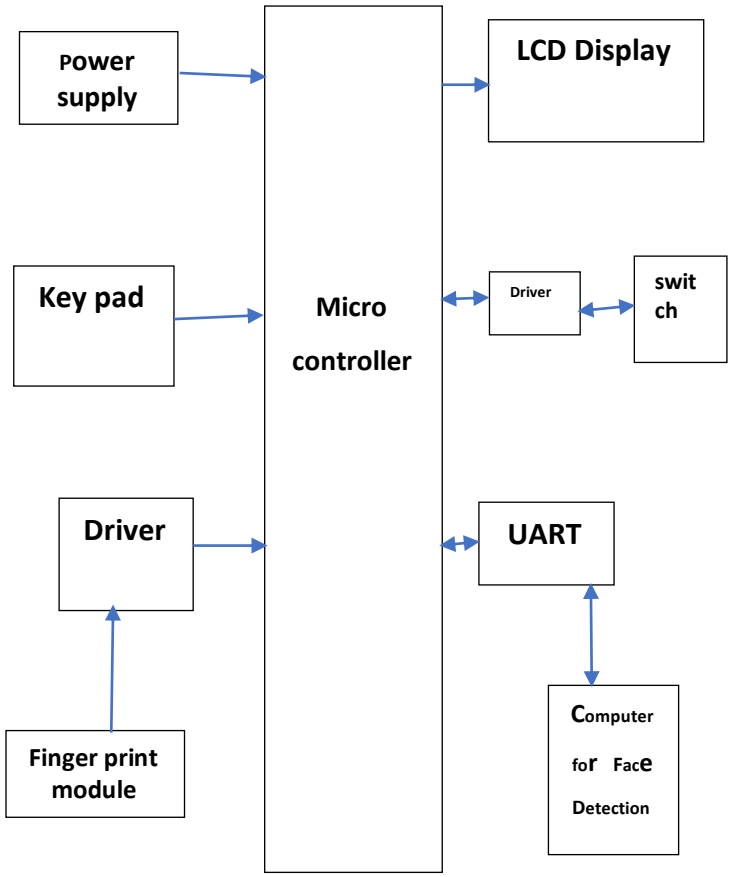
5. METHODOLOGY

Authentication: In this phase, voter authenticates by showing his or her voting card, this step is public and verified by the presiding officer. At the end of authentication process, presiding officer allow to voter to cast his or her vote.

Vote: The vote takes place in a protected booth where ballot unit is placed .This will enable the voter to cast his vote by pressing the blue button on the Balloting Unit against the candidate and symbol of his choice.

Vote counting: At the end of voting time, the control units are delivered to a counting center. In public view, an election official breaks a seal on the control unit and presses the RESULT button, The display on the control unit shows the number of votes received by each candidate and the results are then announced by election commission of India.

6. BLOCK DIAGRAM



7. CONCLUSION

Fingerprint Based Voting Machine is designed to make the procedure of voting easier and more convenient as it is a modified system. It has proved to be very advantageous in providing security EVM is capable of saving considerable printing stationery and transport of large volumes of electoral material. It is easy to transport, store, and maintain. It completely rules out the chance of invalid votes. In total, the complete system (including all the hardware components and software routines) is working as per the initial specifications and requirements of our project. So certain aspects of the system can be modified as operational experience is gained with it. As the users work with the system, they develop various new ideas for the development and enhancement of the project. The proposed system has been designed and implemented successfully using a PIC microcontroller, which was shown to be superior over the existing Electronic Voting Machine. The proposed system has the benefit of using a

biometric authentication and controls the process of voting avoiding unnecessary things like rigging, ballot papers, casings etc.

8. Acknowledgement

We are very much thankful for Principal and Management of Sapthagiri College of Engineering, Bangalore. Our deep gratitude to our guide Mrs Preetha N P for continuous encouragement and giving time-to-time valuable suggestion for completion of real-time experiment successfully. Here we are thankful to all those who are co-operative and encouragement during this completion of paper.

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Electrical Vehicle Charging Station Using PSO

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Abstract: *At present, the transportation division experiences an upset, wherein low carbon and green environment are the main objectives. Electric Vehicles (EVs) are the future of transportation sector. The promotion of EVs(EVs) has carried an undeniably overwhelming weight to the installation of charging stations. To satisfy the need of rapid energy supply during the driving time frame, it is important to set up fast charging station in open territories (public areas). However, the random arrival of EVs to the charging stations, and interface with the grid network for fast charging, causes power fluctuations and peak-valley loads every now and again, thus causing disturbance in the power system. This project centers around establishment of fast chargingstations in the power system, a contextual study of the IEEE 33- bus system. This project shows the optimal allocation of electric vehicle fast charging stations using two methods: PSO(particle swarm optimisation) electric vehicle fast charging stations.*
Index Terms-Charging Station, Electric Vehicles, Load Buses, Power System

I. INTRODUCTION

With the intention of improving air quality and medicalissues, the transportation sector is supporting a huge number of measures to expand electric vehicle adoption. The 5Cs of EVs are Clean, Convenient, Connected, Clever, and Cost-effective. Electricity is an effective method to run the vehicles when contrasted with the burning of fuels. The hype of EVs has put on a tremendous burden on the deployment of the charging station facility on the transportation sector. On a general point, the utilization of EVs as compared with the ICE vehicles, by an enormous segment of users, is as yet less because of the coming factor of "range anxiety".

The charging station and advanced battery technologies are two of the viewpoints that influence the widespread of EVs inthe transportation sector. The installation of proper charging station infrastructures in public areas is required to overcomethe range anxiety factor and encourage the use of EVs for long-range drives. The study in purposes the Markov chain and queuing model to determine state space and the load characteristics of fast charging stations, respectively. Also, an optimal sizing and siting of fast charging stations ought to be done to reduce the overall charging station development cost, grid loss, and EVs energy loss. Our project studies the placement of EV charging station in urban areas considering the protection device upgrade and regulation costfactors resulting from the large integration of EVs. Our projectuses a genetic algorithm with an improved version of particleswarm optimization to determine the proper siting of station in India. The arbitrary charging of EVs by the fast charging stations causes the fluctuation of grid power and the variation of regulated frequency, which poses a significant threat to the stability of the network system. Also, the development of fast battery charging mode possessesa severe impact on the grid system, such as power loss, voltage instability, overloading of distribution side components, aswell as economic losses of the distribution network.

This project centers around establishment of fast charging stations in the power system, a contextual study of the IEEE 33- bus system. This project shows the optimal allocation of electric vehicle fast charging stations using two methods: PSO(particle swarm optimisation) electric vehicle.

II. OBJECTIVE

This Project centers around establishment of fast charging stations in the power system.
The optimal planning of charging infrastructure to establish efficient charging location by considering the Power losses, Active power and Reactive power in distributed system.
This project centers on optimization techniques.
PSO(Particle Swarm Optimization)

III. LITERATURE *SURVEY*

This paper presents the optimal planning of charging infrastructure to establish efficient charging location by considering the Power losses, voltage and economic consideration in distributed system. The locations of Electric Vehicle Charging Station considering the network performance parameter are objectives in proposed multi-objective function.

SO is used for minimization of cost by minimizing the power losses, minimization of voltage deviation and maximizing the reliability of the system. Also calculated the Station cost (SIC), which is fixed as per the land area requirement as well as the electrical equipment like connector, transformer etc.

The increasing EV load penetration in an electric power sector can cause for the generation-demand imbalance, real power loss increment, poor voltage profile, and consequently voltage stability margin decrement. To mitigate the impact of increasing EV load penetration on radial distribution systems(RDS),it is essential to integrate EV Charging Stations(CSs) at appropriate locations.

In this paper, a novel approach for allocating the EV-CSs with multiple features in EDS. In addition to the AC/DC Level-2 EV-CSs suitable for both BEVs and PHEVs, different EV models (Chevrolet VOLT, CHANG AN YIDONG, Tesla Model X and BMW i3) are taken into account while designing the CS with multiple CPs. The multi-objective function is formulated for achieving the minimum real power losses, improved voltage profile and enhanced voltage stability.

this research work proposes additional distributed generators (DGs) at optimal locations to reduce the impact of EVCS on the system by incorporating it. The proposed methodology is validated with two standard unbalanced IEEE test cases such as IEEE 19 bus and IEEE 25bus URDS

In this paper, a study is attempted to analyze the effect of adding EVCS into IEEE URDS using branch incidence matrix-based load flow. But, during the charging of EVs, URDS draws extra power from the grid which increases the line/branch losses

This paper shows the sitting of charging stations in four different test cases with power ratings of SMW, 25MW, SOMW, and lOOMW onto the load bus lines without violating the voltage magnitude limit (0.95-to-1.05) and the line ratings. Newton's Raphson method is used for power flow calculation and to maintain the integrity of the network system.

The paper introduces how many number of EV Charging stations of various power limits can be placed into the system without violating the voltage magnitude limit and line ratings, a case study IEEE 33-bus system, in four different test cases. The Newton – Raphson method was utilized to ascertain the power flow and to determine voltage magnitude at each bus.

This paper addresses an application of Teaching-Learning-Based Optimization method for the optimal allocation of Distributed Generations (DGs) in radial distribution systems.The TLBO, when applied to real distribution systems, becomes computationally demanding. An IS is suggested to enhance the accuracy and convergence of all population-based meta-heuristic optimization techniques.

IV. PARICLE SWARM OPTIMIZATION

Particle Swarm Optimization (PSO), a population-based technique for stochastic search in a multidimensional space, has so far been employed successfully for solving a variety of optimization problems including many multifaceted problems, where other popular methods like steepest descent, gradient descent, conjugate gradient, Newton method, etc. do not give satisfactory results. Herein, we propose a modified PSO algorithm for unbiased global minima search by integrating with density functional theory which turns out to be superior to the other evolutionary methods such as simulated annealing, basin hopping and genetic algorithm.

The present PSO code combines evolutionary algorithm with a variational optimization technique through interfacing of PSO with the Gaussian software, where the latter is used for single point energy calculation in each iteration step of PSO. Pure carbon and carbon containing systems have been of

great interest for several decades due to their important role in the evolution of life as well as wide applications in various research fields. Our study shows how arbitrary and randomly generated small C_n clusters (n = 3–6, 10) can be transformed into the corresponding global minimum structure. The detailed results signify that the proposed technique is quite promising in finding the best global solution for small population size clusters.

The goal of an optimization problem is to determine a variable represented by a vector X= [x1x2x3…xn] that minimizes or maximizes depending on the proposed optimization formulation of the function f(X). The variable vector X is known as position vector; this vector represents a variable model, and it is n dimensions vector, where n represents the number of variables that may be determined in a problem, that is, the latitude and the longitude in the problem of determining a point to land by a flock. On the other hand, the function f(X) is called fitness function or objective function, which is a function that may assess how good or bad a position X is, that is, how good a certain landing points a bird thinks it is after this animal finds it, and such evaluation in this case is performed through several survival criteria.

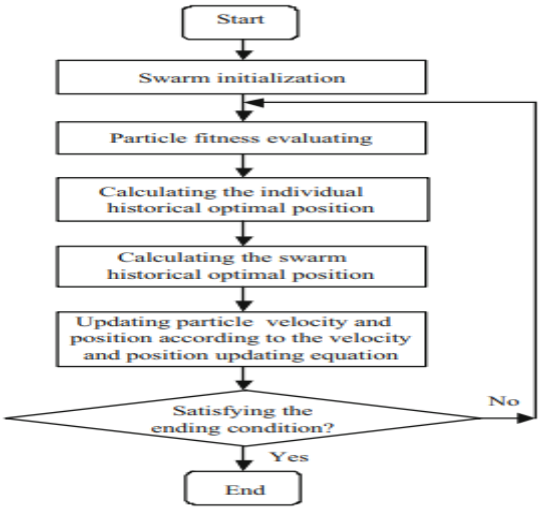

Fig. 1-*Flowchart of the particle swarm optimization algorithm*

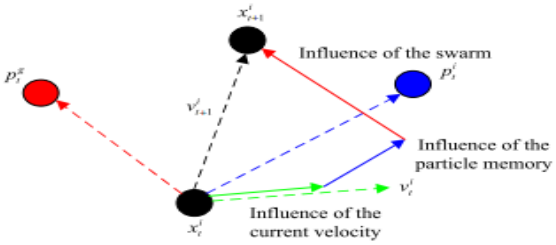

FIG 2-*Iteration scheme of the particle*

V. ALGORITHM

PSO *(*PARTICLE SWARM OPTIMIZATION*)*

PSO Algorithm for EV FCS Allocation optimization
STEP 1:- *Read input data of IEEE 33 bus System.*
STEP 2:- *Run power flow and evaluation all the system parameter without EV FCS Station.*
STEP 3:-*Updating of some parameter in the test*
STEP 4:-*Initialization of the EV FCS location of the entire four zone.*
STEP 5:-*Run power flow and evaluate all the system parameters.*
STEP 6:-*Evaluating initial fitness function using multi-objective function*
STEP 7:-*Compute local best and global best.*
STEP 8:-*Update swarm velocity and swarm position.*
STEP 9:-*Update EV FCS Station location based on the swarm and updated system data.*
STEP 10:-*Calculate fitness using multi objective function.*
STEP 11:-*Compute and update local best and global best.*
STEP 12:- *Check for maximum iteration limit or converging criteria if exceed move next step else go to*
STEP 13:- *Print the EV FCS Station location*

VI. RESULTS & DISCUSSIONS

1) USING PSO TECHNIQUE:

RESULT =

parameters	RESULT_BASE	RESULT_ONE_EV	RESULT_TWO_EV	RESULT_THREE_EV	RESULT_FOUR_EV
'Total System Active Power Loss'	'202.6771'	'209.8513'	'219.5515'	'262.6148'	'315.6094'
'Total System Reactive Power Loss'	'135.141'	'139.6335'	'145.0538'	'178.3922'	'207.7429'
'optimal EV location'	'-'	'19'	'2 19'	'19 20 2'	'3 20 19 2'
'EV size '	'-'	'1000'	'1000 1300'	'1000 1300 1700'	'1000 1300 1700 2000'
'ENS'	'0.010252'	'0.012252'	'0.014852'	'0.018252'	'0.022252'
'Reliability '	'0.72405'	'0.74016'	'0.75309'	'0.76343'	'0.77096'
'Reliability %'	'72.4051'	'74.0159'	'75.3092'	'76.3428'	'77.0957'

- **ACTIVE POWER LOSS**

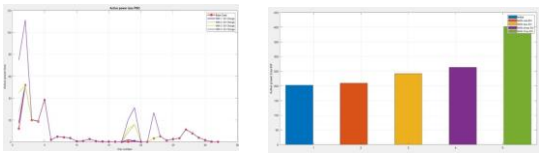

FIG 4.1. Active power loss using PSO

FIG 4.1 shows the System Active power loss using PSO technique, fig 4.1 is the graph for active power loss(in KW) versus EV FCS number. From the bar graph we can see the varying active power loss with the inclusion of number of EV FCS.

- **REACTIVE POWER LOSS**

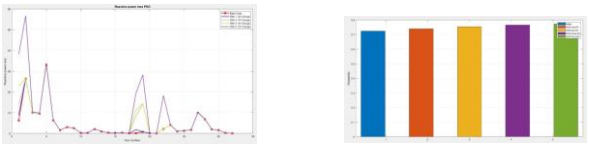

FIG 4.2. Reactive power loss using PSO

FIG 4.2 shows the System Reactive power loss using PSO technique, fig 4.2 is the graph for reactive power loss(in KW) versus EV FCS number. From the bar graph we can see the varying reactive power loss with the inclusion of number of EV FCS.

- **RELIABILITY**

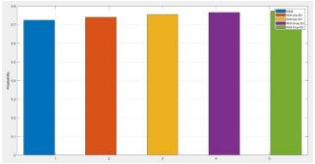

FIG 4.3. Reliability using PSO

FIG 4.3 is the bar graph for reliabilty obtained from the PSO technique, here the initial reliability of the system is seen varying with the inclusion of number of EV FCS on the IEEE 33 busbar.

- *ENS*

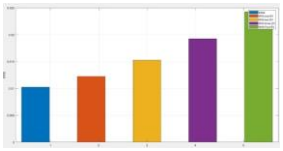

FIG 4.4. ENS using PSO

FIG 4.4 is the bar graph for ENS(Energy Not Supplied) which is one of the reliabilty parameter considered.ENS obtained from the PSO technique is seen varying from initial ENS with the inclusion of number of EV FCS.

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Study On Source Characteristics On HVDC Source Set for Pollution Test

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***Abstract*—**

This paper presents a technique for digital computer simulation of the interaction between a polluted insulator and a high-voltage, direct-current test source. Both uncontrolled and feedback controlled voltage-doubler sources are considered. The polluted insulator is represented by one or more arcs in series with the wet conducting layer. The arc is represented by a simple dynamic equation and an attempt is made in the model to account for thermal phenomena in the unbridged wet layer.

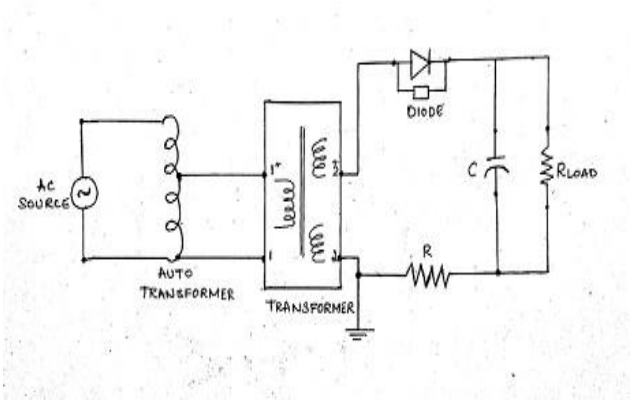
The simulation technique is then used to investigate the effect of the dc source parameters on the error obtained in the insulator flashover voltage. Both the effects of maximum and mean dynamic voltage drops are studied.

Whenever possible the simulation results are compared to experiments and, with view of the complexity of the problem, the agreement is found satisfactory.

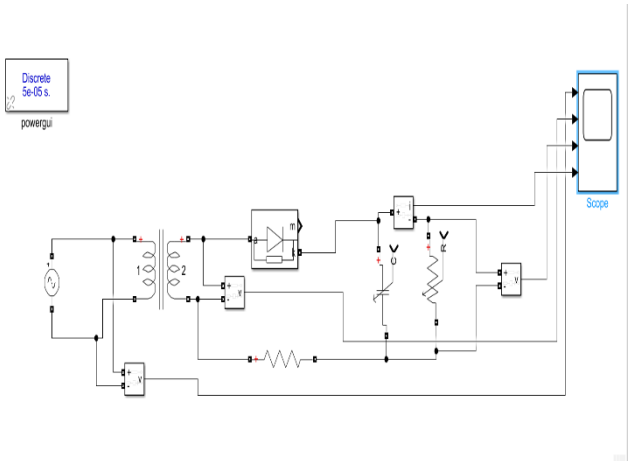
I. INTRODUCTION (*HEADING 1*)

It is generally recognized that flashover of polluted insulators under power frequency operating voltage comprises the basic stages of conducting-layer build-up, dry-band formation, partial arcing, arc elongation and eventual spanning of the whole insulating surface leading to a complete flashover [1,2] . It is moreover accepted that if partial arcs are restricted to a relatively small portion of the insulation leakage path they do not constitute a real danger of flashover. On the other hand if the partial arcs succeed in covering a critical part of the leakage path, flashover will be practically ensured. This critical arcing stage, also associated with critical leakage currents [3], is decisive for the *outcome of a high-voltage pollution test. While during all the stages of pollution flashover there exists an interaction between the test source and the polluted insulator, such interaction becomes particularly important during the critical arcing stage. Since critical leakage currents may reach values in excess of 1 A, depending on pollution severity and insulator design, sources of limited short circuit capacity, normally used for testing conventional air insulation, would result in severe voltage drops. There is ample experimental evidence that sources with limited short-circuit capacity can introduce considerable error in the determination of the withstand voltage of heavily contaminated insulators [4]. Indeed the effect of the source parameters on the insulator flashover voltage was among the factors contributing to the dispersion of test results from different laboratories participating in a recent IEEE study [5].

General Arrangement of HVDC Test source



Simulation Diagram



The requirement of HVDC source for conducting the pollution test on HVDC insulator can be determined by simulation study by varying the parameters of source impedances .Since this takes longer time to experiment in the laboratory, Simulation

Study is the best alternate. In this study ,test source parameters are being studied for HVDC source to be used for pollution studies.

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Capacitor

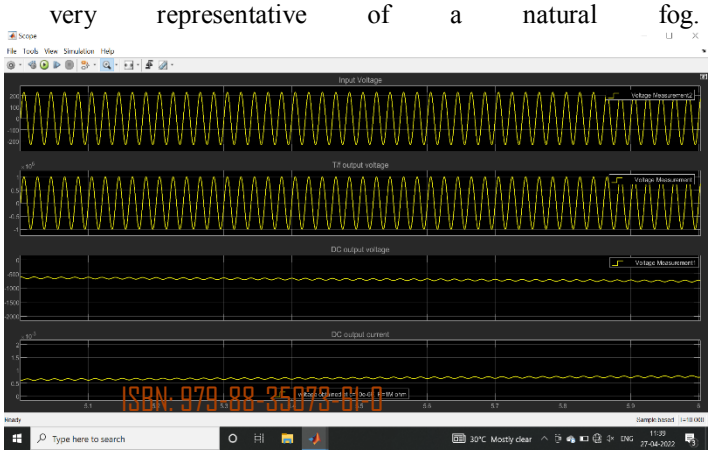
A capacitor is a passive two-terminal electronic component that stores electrical energy in an electric field. The effect of a capacitor is known as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is a component designed to add capacitance to a circuit.
The capacitor used is 220 n F, 2000 Vdc, of 8 Nos connected in parallel which acts as a filter.

Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and
terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms.

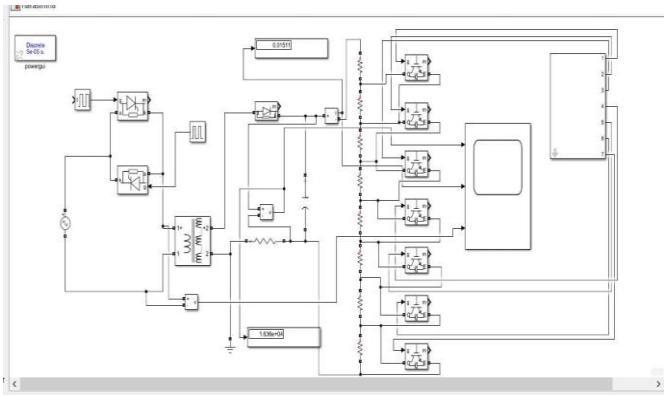
Laboratory Facilities and Testing Methodology

The University of Southern California, (USC) has been engaged in the investigation of insulator flash-over phenomena for a number of years and a HVDC laboratory was constructed for the specific purpose of studying insulator flashovers under contaminated HVDC conditions. The total service area of the laboratory is about 700 square feet plus an auxiliary chemical room for preparing contaminants and artificial coatings. All the high voltage equipment is located
in one electrically isolated room at the rear of the laboratory. There are two 1OOkVA, 34.5kV transformers which are fed by 480 volt through a motor-driven variable transformer rated at 31.5kVA with a 200% overload capability. The dc power supply is made up of a full wave rectifier with smoothing capacitors (80pf at 15kV) and is capable of producing up to 4OkVdc. To ensure the stiffness of the power supply, certainly
one of the main concerns in dc insulation studies, SCR with feedback control is used on the primary side of the ac source voltage. The circuit diagram of the power supply is shown in Figure 1. Under this arrangement, the stiffness of the dc voltage is deemed very satisfactory. During flashover, more than 20 amperes of current have been measured at all voltages.
very representative of a natural fog.



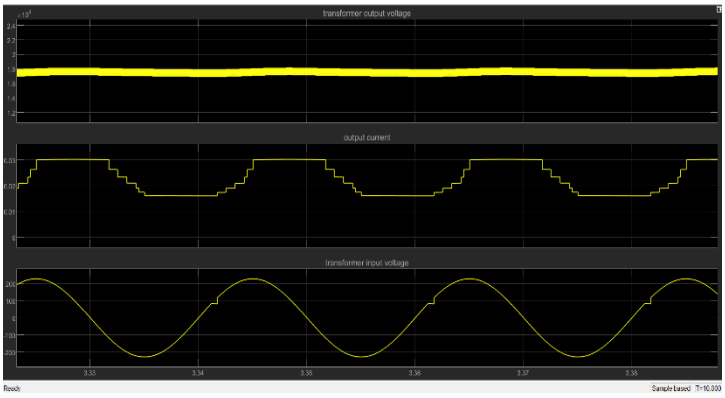
Voltage obtained at a particular value of c =10μf & R =1 MΩ

The above waveforms are:
First waveform indicates the input voltage of 11kV AC given to the primary of the transformer.
Second waveform indicates the transformer output of 100kV AC which is to be rectified to get DC output.
Third waveform gives the output DC voltage for capacitance and resistance values of C=10μF and R=1MΩ.
The last waveform gives the DC current for the indicated value of C and R.

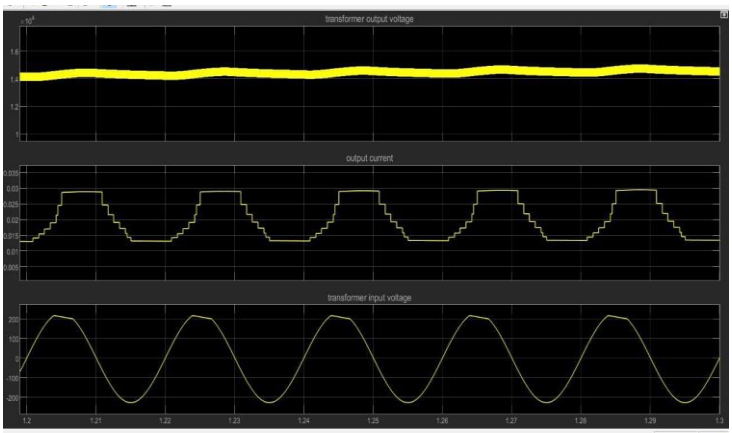


Simulation Circuit for Scintillation

Simulation Result



The waveform for α=30 Degree



The waveform for α=90 Degree

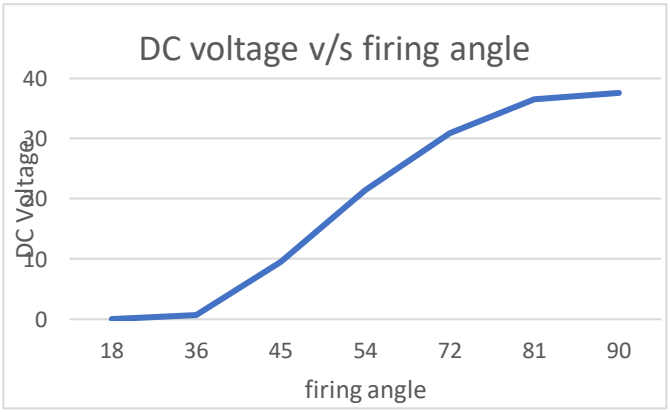
ISBN: 978-93-95979-01-0

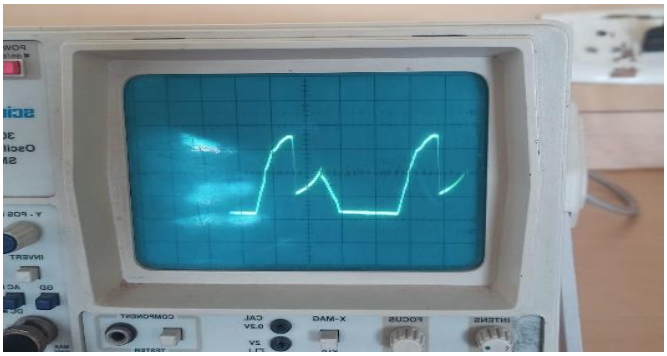
Working Set

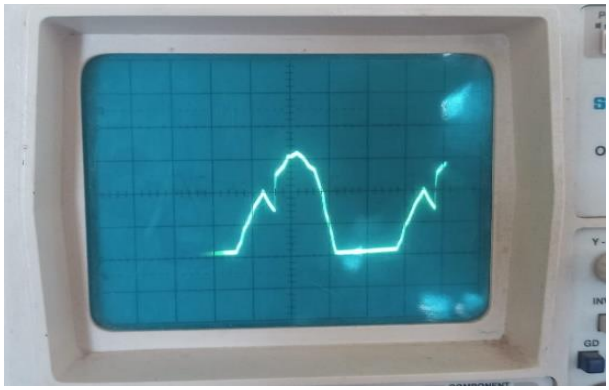
Experiment Result

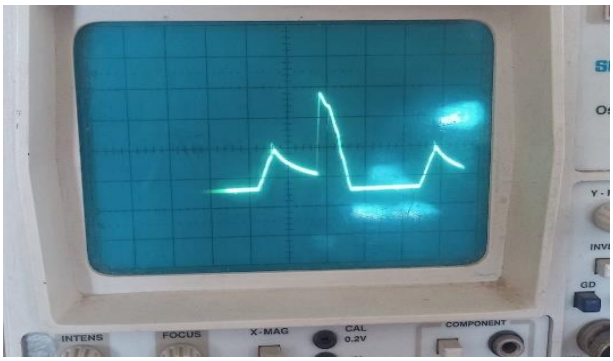
Firing angle	DC Voltage
18	0.025
36	0.7
45	9.5
54	21.4
72	30.92
81	36.5
90	37.6

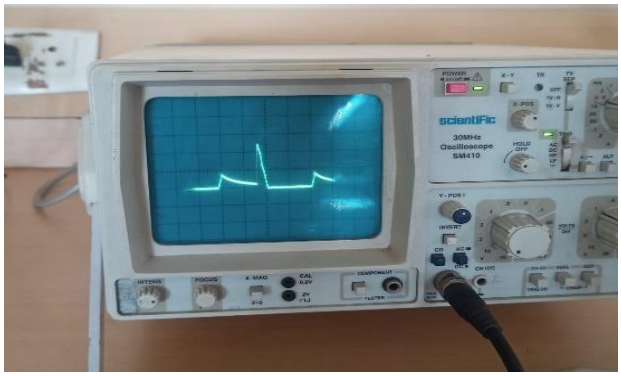
The above table shows the variation in DC Voltage for various firing angles and these values have been plotted to get required result as shown below











Practical wave forms obtained for firing angles of 18,36,45,54 with capacitor

Conclusions

The variation in the output voltage with respect to the various load resistance and smoothing capacitor values were observed. It was theoretically observed that as the A technique was developed for simulation of polluted DC insulator-source interaction. capacitance value increases, the ripple reduces.

The drop in the output voltage can be reduced with the help of the firing circuit by varying the firing angle (α). With the simulation circuit the drop in the HVDC lines can be reduced to an acceptable range.

From the experimental work the voltage drop for different applied voltage was observed, the same was done in simulation from which, it can be concluded that the voltage drop due to scintillations was found to be similar with the simulation results

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Power factor Correction using Bridgeless SEPIC Converter for BLDC Motor

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***Abstract*—Brushless DC electric motors (BLDC motors), Power Factor Correction (PFC), and Single-Ended Primary Inductor Converters (SEPIC) are all discussed. An innovative method for maintaining DC link voltages, as well as a practical solution for driving applications, are described. In general, SEPIC is used in discontinuous conduction mode to achieve power factor correction. This system is simulated in MATLAB, and the valid and true results are displayed. With the SEPIC converter, power factor correction can be achieved.**

Keywords—BLDC motor, SEPIC Converter, DC-DC converter, Power factor correction

I. INTRODUCTION

Improving power quality at AC supply mains to meet international power quality standards has become increasingly important in recent years. D.C. motor drive applications fed by a power factor corrected converter typically have a power factor of more than 0.9 and a THD of less than 5%. Because the non-controlling switching devices are reverse polarised at that time, the supply voltage is lower than the DC link capacitor potential, and the diode bridge rectifier based PFC fed D.C motor drive flows non-sinusoidal current from the supply side; however, it passes more current when the source voltage is greater than the capacitor voltage. As a result, Power Quality problems are more common on ac mains with a low power factor and higher THD[1]. As more and more of these drives are made available under various conditions, these Power quality issues become more meticulous for the sake of utility. Special electrical machines and DC motors were reportedly fed by Zeta, SEPIC, and Cuk converters. Several Luo Converter and BLDC motor drive controllers are well documented. However, recent SEPIC converters fed BLDC motor drive for PFC method have not been reported in these literatures. As a result, the goal of this article is to construct the PI controller using a SEPIC converter to regulate output voltage/speed and improve PFC. The rest of the paper is dedicated to BLDC motors simulation design and operation[1].

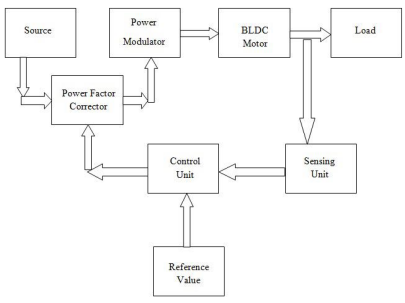

Fig. 1: Basic block diagram of PFC fed BLDC drive

II. LITERATURE SURVEY

A. Brushless DC (BLDC) motors

Brushless Direct Current (BLDC) motors are one of the most popular motor types right now. Appliances, Automotive, Aerospace, Consumer, Medical, Industrial Automation Equipment, and Instrumentation are just a few of the industries that use BLDC motors. It's a synchronous three-phase motor with dc torque–speed characteristics. It has three phase windings on the stator and permanent magnets on the rotor that are both excited by a voltage source inverter (VSI). It uses electronic commutation based on the rotor position as sensed by Hall effect position sensors rather than brushes and commutator assembly. As a result, issues like sparking, brush wear and tear, EMI, and noise interference are no longer a problem in BLDC motors[2][3][4].

In comparison to brushed DC and induction motors, BLDC motors have a number of advantages. Here are a few examples: Improved speed-to-torque characteristics High dynamic response, High accuracy, Long Operating Life, Noiseless Operation, and Higher Speed Ranges are just a few of the benefits.[3][4]

B. Power factor Correction (PFC) Converters

When only a diode bridge rectifier is connected between the drive and the utility, the smoothing capacitor charges and discharges during high line periods, causing high current spikes on the drive side and the same spikes on the utility side. Both the power factor and the overall system performance will suffer as a result of this[2]. As a result, PFC converters are employed. Because the output voltage of the converters must be the same for feeding, VSI Boost, Buck Boost, Zeta and SEPIC are used in this study as PFC converters. Without a power factor corrector, the load appears to be more like a resistive element than a nonlinear one[5][6].

Modern PFC circuits can achieve a power factor that is very close to unity. PFC has the following benefits:

- Better source efficiency
- Overall lower power installation cost
- Lower conducted EMI
- Reduced peak current levels
- Ability to act as a filter for conducted EMI
- Common input filter for paralleled supplies.

C. Operation of SEPIC Converter

The single ended primary inductance converter (SEPIC) is a DC to DC converter that allows the output voltage to be greater than, less than, or equal to the input voltage. Inductors L1 and L2, a single MOSFET (S1), capacitor C1,

diode D, and output capacitor C2 make up the SEPIC converter, as shown in Fig 2[7].

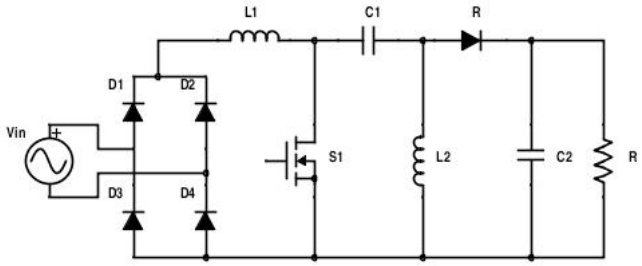

Fig. 2: Basic Diagram of SEPIC circuit

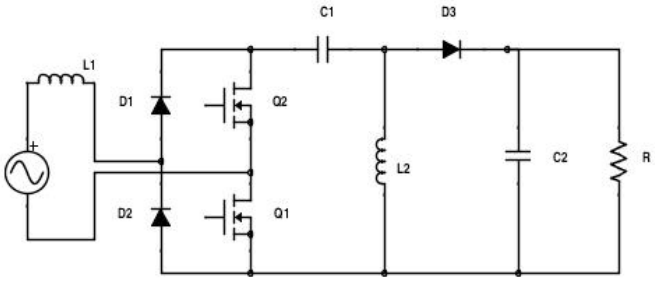

Fig. 3: Basic Diagram of Bridgeless SEPIC circuit

Fig. 3 depicts the basic single-stage Bridgeless SEPIC circuit. Two MOSFET switches replace diode bridge rectifiers in this system, which helps to reduce high conduction losses. The controller circuit, on the other hand, is difficult to implement. Furthermore, the system's size is excessive[7]. Fig. 3 shows the Bridgeless SEPIC circuit diagram.

III. MATLAB/SIMULINK MODEL

The simulations analysis are run in MATLAB software, and the models are listed below.

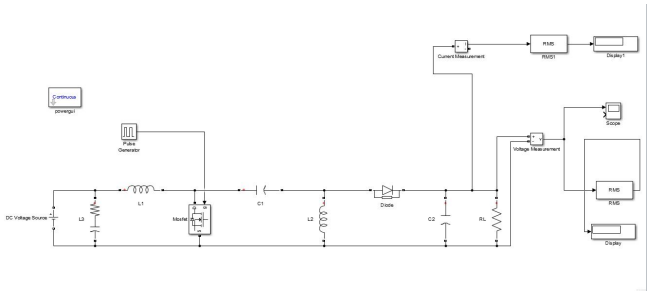

Fig. 4: Simulation Diagram of Basic SEPIC Converter

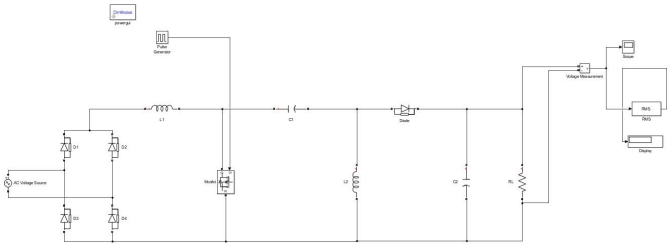

Fig. 5: Simulation Diagram of SEPIC Converter (Bridge)

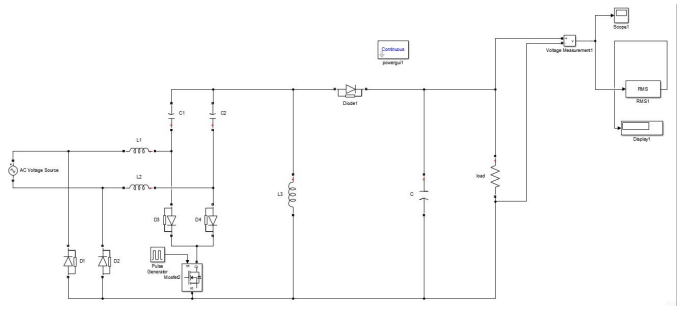

Fig. 6: Simulation Diagram of Bridgeless SEPIC Converter

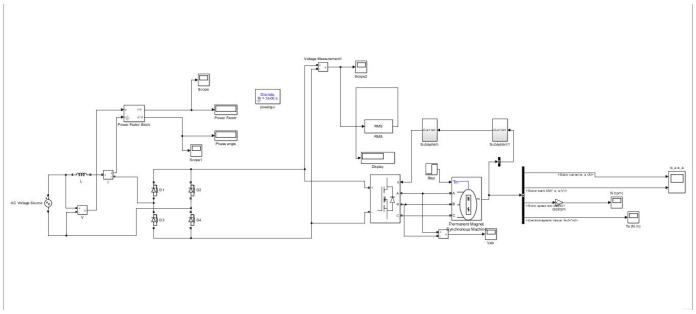

Fig. 7: Simulation Diagram of BLDC Drive without PFC

The simulation diagram for a BLDC drive without a PFC converter is shown in Fig 7.

BLDC drives with different DC-to-DC Converters such as Boost, Buck-Boost, SEPIC as PFC are shown in Fig -8 to 11.

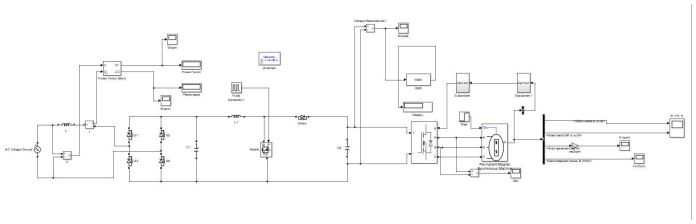

Fig. 8: Simulation Diagram of BLDC Drive with Boost Converter as PFC

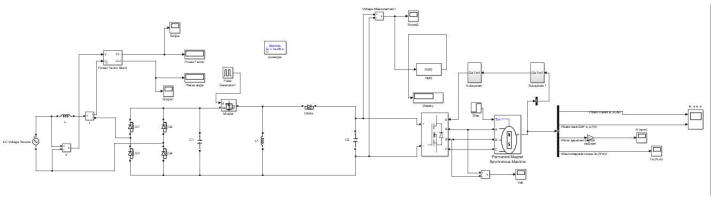

Fig. 9: Simulation Diagram of BLDC Drive with Buck-Boost Converter as PFC

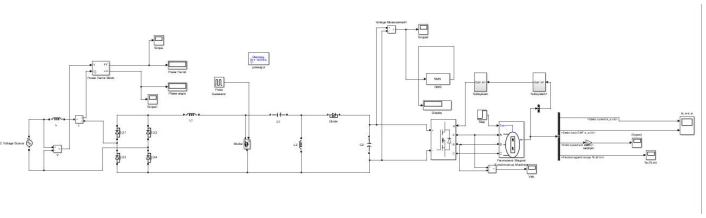

Fig. 10: Simulation Diagram of BLDC Drive with SEPIC Converter as PFC

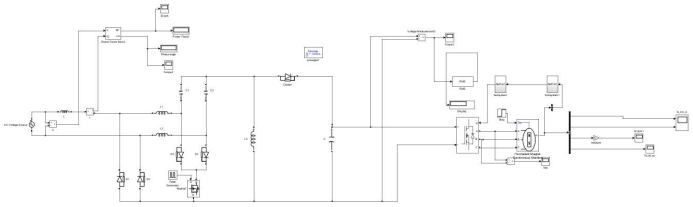

Fig. 11: Simulation Diagram of BLDC Drive with Bridgeless SEPIC Converter as PFC

IV. SIMULATION RESULTS

The simulation of a BLDC motor drive with a SEPIC converter gave the following results.

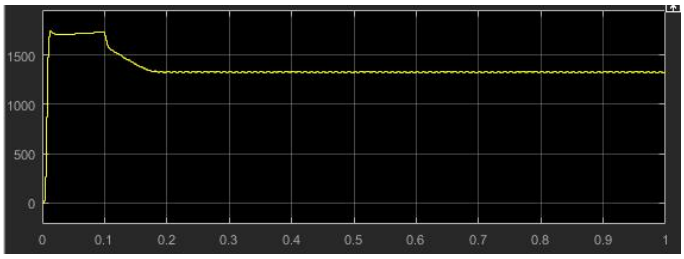

Fig. 12: Speed Curve

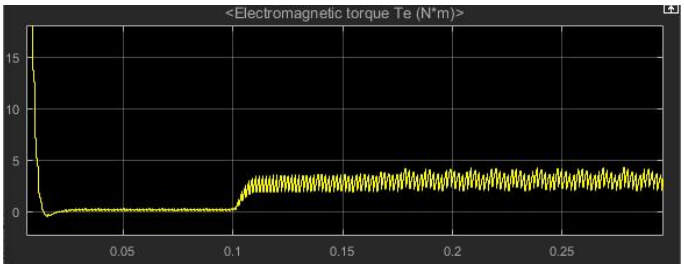

Fig. 12: Torque Characteristic

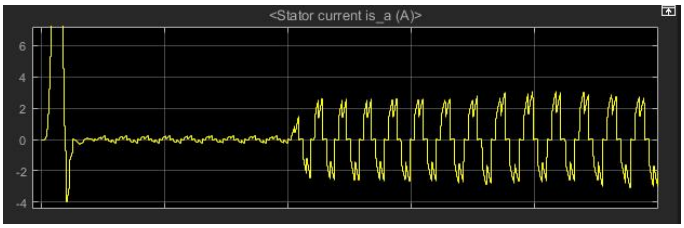

Fig. 13: Stator Current Characteristic

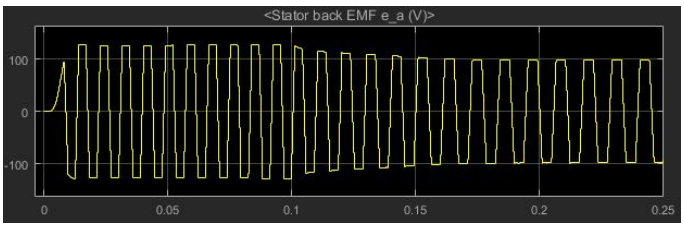

Fig. 14: Stator Back EMF

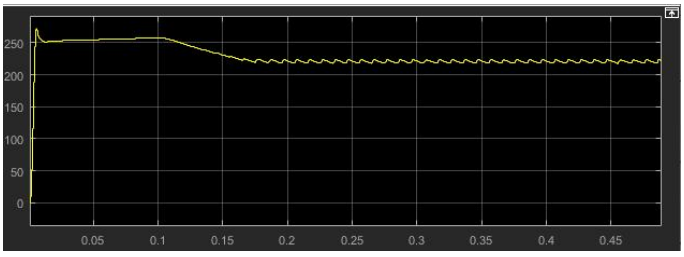

Fig. 14: Output Votage curve of SEPIC Converter

V. COMPARISON

Table 1: Comparison of Power factor for Different Topologies

Converter Topology	**Power Factor**
Boost	0.9581
Buck-Boost	0.9672
SEPIC	0.9757

After the analysis, Table -1 shows the comparison of power factor for various PFC converters.

VI. CONCLUSION

In BLDC motor drives, a comparison of the SEPIC converter and the Boost converter was suggested. In comparison to conventional Boost converters, the SEPIC converter provides the highest efficiency output, improved power factor, reduced torque ripples, and good speed response for BLDC drives, according to the results obtained from the proposed system. Power factor correction techniques can be used in industries, power systems, and even households to stabilize them, resulting in a more stable system and efficiency. Grid parity will be addressed in the future using these resources. This topology can al,so be used in applications that require low losses, high power density, and minimal weight and volume.

VII. REFERENCES

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