PcE

PILLAI COLLEGE OF ENGINEERING

RFID

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We are in the era of digitization, globalization and innovation that great minds once dreamt of. In these times, one has to keep oneself continuously updated and inquisitive in his area of expertise. The academicians specially have to keep pace with the latest state of the art technology so as to import the same knowledge to their students and help them attain success in the future. I am happy that the faculty members of the department of Electronics and Telecommunication have joined their hands to bring out this message. I am pleased to note that the students are chipping in with their might to publish the journals. Contributions from the head of the department and the professors provide a technical edge to the department's professional and technical pursuits. I am extremely pleased with this issue and I took forward to be a part of the journals published in the future that cover all the areas of interest of the department.

With Best Wishes

Dr. R.I.K. Moorthy
Principal

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HOD'S DESK

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Creating facilities for learning is the culture of Pillai College of Engineering.It is an occasion of great pride for the department of Electronics and Telecommunication to bring out this issue of the department journal. I am immensely pleased by the content that gives us insight in the fields of interest of our department. This journal portrays the creative potential and originality of our students and faculty in ample measure.

I am indebted to Dr. K.M.Vasudevan Pillai and Dr.Sandeep Joshi for their inspiration and their guidance. I am also thankfull to all students and faculty of Electeronics and Telecommunications Department for their efforts to make this journal a success. I am sure the journal will inspire the students and faculty to learn and research in their respective fields of interest.

With Best Wishes

Dr. Avinash Vaidya
HOD EXTC

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FOREWORD

Smart Mirror:
Smart Mirror displays weather forecast, date and time, random greetings and much more could be done as it is learning process within itself. This system is voice controlled using Raspberry Pi.

Comparison of the Performance Between a Parasitically Coupled and a Direct Coupled Feed for a Microstrip Antenna Array
It is a antenna fabricated using microstrip techniques on PCB. Between the parasitically covered and direct coupled feed, the performance of former is better.

ZigBee based Secure Wireless Communication Using Advance Encryption Standard
The planned ZigBee based wireless secure wireless communication system using Advanced Encryption Standard provides high security. All the communication between made between two system is encrypted using 128 bits AES encryptions which is highly secure.

High Gain Antennas For Wlan Applications:
It is used to cover long distance applications. It has a gain variation of less than 3db and satisfies the requirements of wireless local area network in frequency range 5.725Ghz to -5.875Ghz.

Solar Photovoltaic Powered Vehicle Using Buck Converter :
The photovoltaic buck converter enhances the power generation and minimizes the cost. The charge generated by solar panels is received and its battery pack is controlled using a Microcontroller , this stored energy is utilized in running the car.

Automated Paralysis Patient Health Care System:
This proposed system works for the paralytic patients by making use of IR blink sensors which helps these patients become independent.

Automation of Air Hockey Table:
Automated air table is smart and secured system. It is efficient system for a different type of competition and enabling single player gaming.

IOT Based Industrial Automation:
IOT is a combination of electronic software, sensors and network connectivity due to which collection and exchange of data becomes possible.

Microcontroller based access to ATM machine using biometric:
Implementing a security system, based on fingerprint identification of every user for save and secure transaction from ATM.

Quadcopter With Night Vision Camera:
Quadcopter is an aerial vehicle which can be driven independently or by pilots on the ground. Unlike helicopters or planes they do not contain fixed wings, instead here lift is created.

CONTENT

Smart Mirror

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Abstract- **Our way of living has advanced a lot. Making efficient use of time has become a major aspect in human life. We present a mirror that assimilates information, offered through an interactive user interface. The system gives basic information, like weather forecast, date, time and also supports different commands which are recognized through speech. It displays data that is retrieved from the web. This system is voiced controlled using Raspberry Pi.**

I. INTRODUCTION

The world is witnessing an astonishing amount of new technology making it difficult to distinguish the boundaries between humans the web and the tangible world. People need to be informed about world and its current affairs whether it is through internet or television. And thus, we present an interactive system, smart mirror which is an attempt of virtual application on real mirror. We start our day with daily routines in front of the mirror and what if you look in the mirror and see something more than yourself?

Smart mirror can be used for customization by the users for heat sensors and camera. A person standing in front of mirror can access his personal information, his appointments while brushing his teeth or washing his hands. A smart mirror is a raspberry pi driven monitor behind a acrylic mirror. The raspberry pi consists of a chip which has a Broadcom system on it. It also includes an ARM compatible central processing unit(CPU) and an on-chip graphics processing unit. A secure digital card(SD) is also used for the purpose of storing the operating system and program memory in either the SDHC or Micro SDHC sizes. A server is installed in the Pi and a web page is created using PHP. The web page displays time, weather widgets, a random greeting to the mirror's reflection as if by magic.

In 2016, a smart mirror model was put forward in which the framework offered services, like the display of personalized weather information, date, time and many more applications.

There are many projects based on the idea of gesture motion using passive infrared sensors where the information is summoned from the internet. The information displayed contains forecast c, calendar SoundCloud and many more

other applications. The system also introduced speech recognized application when a person gave a command [1].

Another existing mirror which is similar to [1] named as Magic Mirror. The smart mirror can interact with person given a human interaction a basis. There are many researches where using camera sensor human emotions can be detected and the mirror responds to the suitable emotion. [3].

The paper is intended to be a software platform that could be used to develop different applications of the smart mirror that the developer can customize according to his needs. In the prototype designed the users could interact with the mirror through external hardware. It uses a server design that allows one to overcome the boundaries of a web browser. The design is extendable with the capability to add on services as per the desired application as decided by the developer. This supports growth in the smart mirror development field.

In recent years' home automation has gone through several changes. Home automation controls many application through voice commands, PIR sensor, camera interaction for facial expressions and recognition. Home automation is huge upcoming industry giving a boost for new technological inventions .an interactive system may have problem with voice commands in public space and so a touch interface module can be used but in smart mirror which is being used in private voice commands prove a better interaction for a person involved in his daily activities in front of mirror.

There have been lot of researches in the field of speech recognition and we have opted it in our planned system. An interactive system is more convenient for people to interact with. Speech recognition is a technique where the system recognizes what the user has spoken and act according to it. The project we put forward contains speech recognition where a set of commands are spoken remotely from a device like a smartphone. To operate the distributed control system, voice-controlled automation can be used. By this there is no interaction of handwork and the interfacing is with spoken words only[8]. The system we put forward takes information from web.

II. SYSTEM ARCHITECHTURE AND COMPONENTS

Living in the 21st century most of the thing we look around is smart. Everyone wants to get rid of the current system and replace it with something new. The function of the planned system is to make a mere mirror into something cooler, i.e. rather than looking ourselves in the mirror it shows something more.

Smart Mirror is a device which uses the services of internet to display weather ,time, date and other widgets.
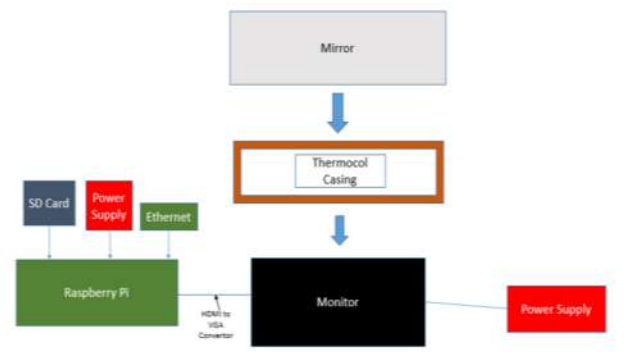
The above block diagram shows the architecture of the planned system. The planned mirror is an LCD panel behind an acrylic mirror, in front of the display device. When the system is not in use, the mirror will act as a normal mirror and when it is in use, the mirror is transparent for the user to see the display. The monitor will then display the time, weather, news feed and other services.

1. COMPONENTS USED
- Raspberry Pi
- LCD Monitor
- Acrylic Mirror
- VGA to HDMI Convertor

Raspberry Pi - The Raspberry Pi is a small debit-card sized single-board computers. Its function is to collect the data from the web and display it on the monitor screen. The version of the Pi used in the proposed project is Raspberry Pi 3 Model B.

Raspberry Pi has:

- Micro SD card slot
- Full HDMI port
- Camera interface
- Display interface
- Ethernet port
- Display interface
- 4 USB ports
- 40 GPIO pins
- Video Core
- Audio jack

Led Monitor- The monitor is the display of the smart mirror. It is placed behind the one-way mirror.

It is connected to the Pi via HDMI to VGA convertor cable.

The Mirror- A normal mirror will not work. A mirror with one side as transparent and other side as reflective is used, the screen will be black in monitor but mirror will still be reflective when monitor is off.

VGA to HDMI- The Pi 3 has a HDMI output providing with connectivity with display devices. However, monitors having HDMI support were a bit expensive, so we chose a smaller screen monitor which has a VGA input. Thus, VGA to HDMI convertor will be used to connecting the monitor and the Raspberry Pi.

SD Card- A microSD card being a storage device is where the Raspbian OS is installed. It is inserted into the microSD slot available in the Pi.

Raspbian OS- Raspbian is a free operating system for the Raspberry Pi which is available on its website. It is available in the form of a disc image file which should be downloaded and burned in the microSD card.

The interface we built on a raspberry pi allows us to use JavaScript language. We are using nodejs for developing tools and applications using JavaScript framework. Nodejs is not a programming language. It is an opensource where developers can use JavaScript framework in runtime environment to create tools and applications. Nodejs allows developing web servers using javascript.it uses the designed API to reduce the complications while writing the server applications [9].

We are using plugins which are accountable for the information displayed. People can write their own plugins to customize their applications to be displayed. Plugins consist of HTML file, CSS file, JavaScript file and a GUI [9].

HTML file: It is hypertext mark-up language used for relating display structure of plugins in its display classes which allows you to structure the element in certain place inside other HTML elements.

CSS: It is a language that describes the style of an HTML document. It contains file for styling of plugins display classes.

JavaScript: It is scripting language. JavaScript files are used for summoning information to control plugins display classes.

GUI: GUI stands for graphical user interface which is used by user by using graphics to interact with applications. It permits user to customize plugin settings.

To explain plugins further easily consider a furnished room as a frame work , although the room is furnished we may need some more things depending on our needs , so you bring new items to suite your requirement these are plugins. It is a software consisting of a group of functions that can be added to the WordPress website. Considering the above

example , API is the interface that defines how you are going to use those items , they basically let you use an item without knowing the internal details. It is set of protocols and routines for building software applications which specifies how the software components should interact.

III. IMPLEMENTATION

The procedure for implementing the Smart Mirror is as follows: -

A. *The Monitor*- For saving the cost of the system we chose a monitor with VGA input.

B. *Mirror*- Smart Mirror is proposed in order to use precious time more efficiently in our day to day life. A two-way mirror is chosen to fulfil our purpose of the system so that it shows more than just our self. Its size is chosen such that it is slightly larger than the monitor chosen.

C. *Casing*- In order to hold the system a frame is required. So, to accomplish this we chose polystyrene framing by taking proper dimensions across the monitor and the mirror.

D. *VGA to HDMI*- Since the monitor chosen does not have a HDMI port we need to use a VGA to HDMI convertor for the convenience that Pi only has a HDMI port.

E. *Installing OS*- Raspbian which is an OS based on Debian Linux is supported for Raspberry Pi and can be downloaded from its website. Its image file is first downloaded and the using Etcher is burned into microSD card and then inserted in the Pi.

F. *Implementing Hardware*- This task requires to just connect all the components at the proper positions as described. The monitor is set behind the mirror and is connected to the raspberry pi via HDMI to VGA cable while the power is plugged to the Raspberry Pi. Then the system boots up.

G. *Installing Dependencies*- Our system which is similar to [1][4] uses Raspberry Pi Model 3B. The OS used in the system is Raspbian which is easily available from their website. It is named Jessie based on Debian OS. The image disc from the site is downloaded and is burned in the memory card using Etcher software. The OS is then booted for the first time and using the terminal the system is upgraded to the latest updates. Now for the interactive display to run the services we need to install an environment to run the JavaScript's file. So we have install Node.js which is an open source java script run time environment which has different modules in it. Node Package Manager called as npm is also installed which is a package manager for JavaScript runtime environment for Node.js. npm also install different modules in the system which help to run the JavaScript [7]. A different directory is first created in the Pi for all the modules and dependencies be at one place. All the .js files are stored in this directory. Before running the smart mirror for the first time we need to first rotate the display of the monitor in a vertical position which is done by editing a config file associated with the display. Then we need to configure the monitor in a way that when the system boots it must not show the raspberry logo and that is directly runs the java scripts from the directory in which they are stored and also the screen saver is turned off.

IV. APPLICATION

Smart Mirror is the emerging concept in this fast-changing IT world. In this fast-moving world time optimization is of main concern. So, with this product the mirror shows more than yourself. Getting up early in the morning and going for your routines we look into the mirror. With this mirror, it will provide with time, calendar, news feeds over the web, social messages and many more stuffs.

It also has following applications: -

- *Smart Dressing* - used in fashion field as a way of smart dressing where people without wearing make-ups and clothes can see how they will look into the mirror.
- *Security* - Based on Facial and Speech recognition used for authentication purpose.
- *Medical* - The skin grafting and all the other skin related problems can be fixed by using smart mirror.
- *Criminal database* - Identifying criminal
- *Home automation* - The mirror helps in controlling the house smart appliances and access many other services.

V. CONCLUSION AND FUTURE SCOPE

The initial goal is to create a smart mirror which displays weather forecast, date and time, random greeting, mp3 player and YouTube and much more could be done as it is a learning process within itself. We could use it for fashion purposes where one could try different dresses and also could put on makeup which is all virtualized on mirror you are standing in front of. It is also being used in medicine purposes where one could have his daily health stats on the mirror. One could check his emails and traffic status in the morning while refreshing. There is already an advancement in the smart mirror where they are making a cross modular platform where it allows you to develop your own module.

With the availability of more new plugins one could add many more functions to the smart mirror like temperature sensor, gesture sensor and light sensor.

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Comparison of the Performance Between a Parasitically Coupled and a Direct Coupled Feed for a Microstrip Antenna Array

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Abstract— **This paper shows the comparison of the feeding techniques of the Microstrip antenna array. This presents the radiation characteristics of two different feeding mechanism that are simulated by the HFSS software and then it will be implemented on hardware. Feeding techniques are mostly responsible for matching between antenna and the feed networks. In this study we review the comparison in between two feeding techniques which provide understanding of the important design parameters like Gain, Bandwidth, VSWR and other important characteristics and effects of feeding on this antenna characteristics. Normally array feed based on microstrip line and parasitically coupled feed both , with similar gain radiate in broadside direction and they have similar bandwidth characteristics.**

Keywords—Broadside array antenna,Microstrip antenna.

I INTRODUCTION

Microstrip antenna [3] can be normally defined as antenna which is fabricated using microstrip techniques on a printed circuit board.It is mostly consist of the multiple patches in two dimensional array.In wireless communication system [1]most widely used antenna is microstrip antenna.Microstrip antenna is widely used because of their advantages like easy fabrication,low cost , lightweight,low profile and many advantages.It consists of a dielectric substrate with a relative permittivity and permeability and is sandwiched in between a ground plane and metallic patch.Foil microstrip line is used to connect antenna with both transmitter and receiver [3].In radio link system for commercial or military use we require a antenna

with light weight,small size and low production cost hence we use microstrip antenna[2]. The power from the transmitter is distributed to the antenna elements by using feed networks and it also excites an array in dominant broadside pattern. Hence for feeding the antenna array[2] some approaches used multilayer structure. An individual microstrip antenna consist of a patch and has a various shape on the surface of the PCB board[3].They are mostly used at a microwave frequencies.The T-Junction and Quarter wave transformer increases the complexity of traditional feeds and also increases the fabrication cost. A quarter-wave transformer[5] is a component that can be inserted between the load and the transmission line in order to match load impedance to transmission line characteristic impedance.In the study,our aim is to calculate the parameter such as gain, efficiency, return loss, Input impedance, radiation pattern etc. by using both feeding techniques.Four element broadside array antenna can be designed by T-Junction and Quarter wave transformer [9]. A metal ground plane and a partially reflective surface (PRS) forms the cavity which is fed by a thin 2x2 array of microstrip patch antenna. An optimized PRS structure[8] is used to achieve bandwidth enhancement.

II DIRECT FED ARRAY

In telecommunication or electronics,Antenna feed is the component which feeds radio waves to the antenna structure and receiving antenna collects radio waves which it receives and convert it into electric current and is transmitted to the receiver[3].And one of the method of antenna feed is direct fed array. Typically direct fed array use T-Junction and Quarter wave transformer for four

element microstrip array.But it increases the fabrication cost.In the study,the comparison in between the parasitically coupled feed and direct coupled feed are define and also it effects on the various characteristic parameter of an antenna. Throughout this communication it defines a direct feed array as shown in below fig.[1]. In this, the two elements at the bottom are fed in opposite direction to the elements at the top, phase delay is present in center part of the antenna.The impedance of it is 50 Ω and it maximize the gain along the broadside direction [9].It is operated in 5.2 GHz to 5.5 GHz.

chart shows the dimensions of the direct feed array. The structure of parasitically coupled four element microstrip patch is shown in figure(2).This is known as "Parasitically coupled array". The substrate chosen has a thickness of 1.57 mm and a dielectric constant of 2.2. The microstrip line is thicker and also uses more space therefore parasitically coupled feed is more advantageous than that of the direct coupled feed.

Fig.(1) Direct array radiating in broadside direction.
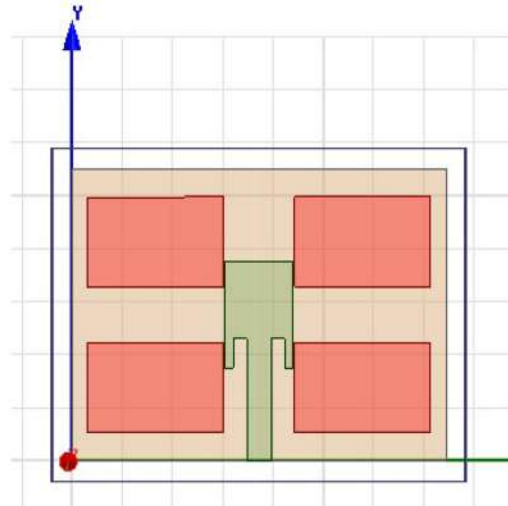
Fig(2) Proposed parasitically fed array

As the above figure shows the proposed parasitically fed array configuration which more advantageous than that of the direct coupled feed.

IV.   PERFORMANCE

III.   PARASITICALLY FED ARRAY

In the comparison of the of the radiating elements feed networks consume a large space in an antenna.Hence in the study, we use parasitically coupled feed to simplify the fabrication and also the design.The patch element in the design are excited through the capacitive gap which is not connected to the microstrip feed.Normally for parasitically coupled array[7] we consider a radiation in the broadside direction. The goal of this is that to investigate that whether this new design having any potential than that of the traditional fed structure that uses T-Junction and Quarter Wave Transformers. In this the proposed parasitically coupled is compared with direct coupled.Above

DIMENSION FOR THE DIRECT FEED ARRAY:

Parameter	Value	Parameter	Value
P_w	29.02	l_f	25.00
p_l	17.60	l_1	12.39
s	09.00	l_2	17.06
x_0	10.86	l_3	06.47
w_f	08.21	l_4	09.84
w_1	10.40	l_5	20.86
w_2	09.06	l_6	10.00

S11:

Impedence(Re):
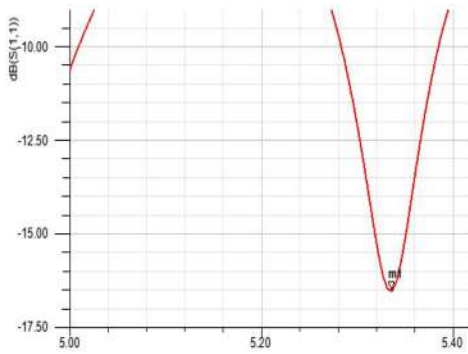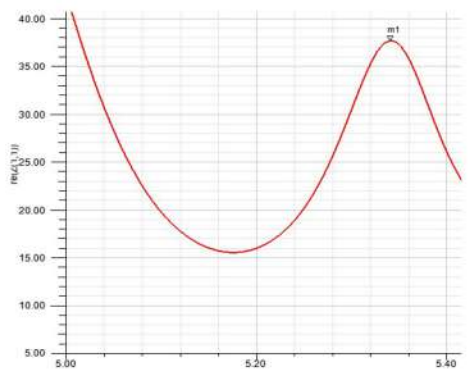
Impedence(Im):
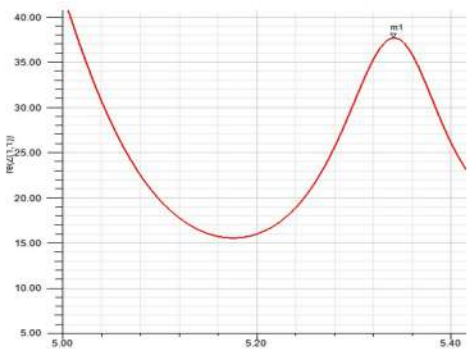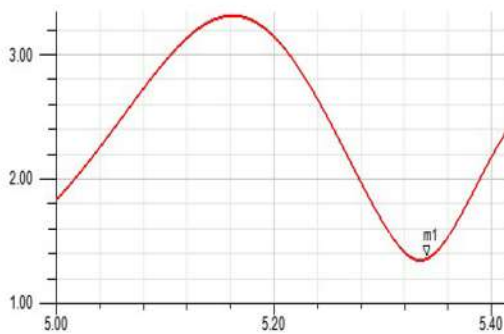
VSWR:

DIMENSION FOR THE PARASITIC FEED ARRAY:

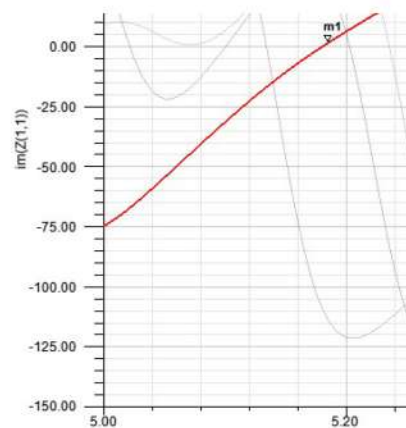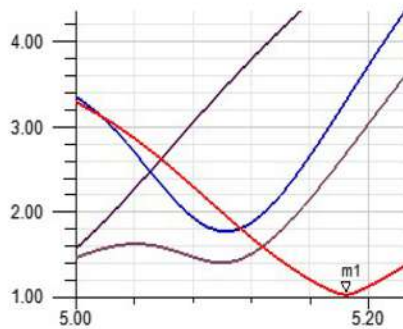| Parameter	Value	Parameter	Value
pw	27.00	Px	10.17
pl	16.93	Py	05.50
cx	13.64	Fx	04.89
cy	20..01	Fy	17.50

S11:

Impedence(Re):
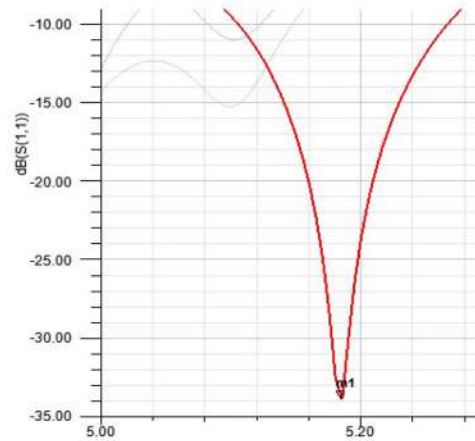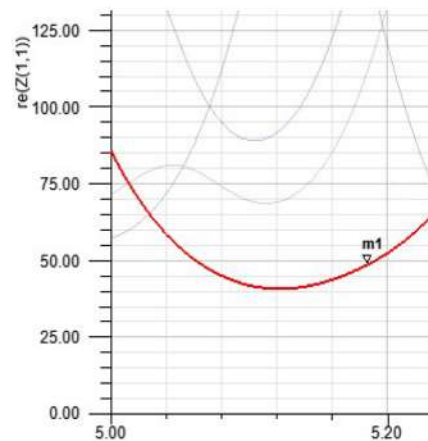
Impedence(Im):

VSWR:

V COMPARISON

A. Reflection Coefficient :-

Reflection coefficient is the parameter of an antenna that shows how much electromagnetic wave is reflected due to an impedance discontinuity [3].Reflection coefficient means a S11 parameter of antenna.S11 parameter of parasitically coupled is better than that of the direct coupled feed.

B. Impedance:

Antenna impedance is the parameter which relates voltage to current at the antenna input.

C.VSWR:

VSWR stands for the voltage standing wave ratio.

The power source transmits frequency power through a transmission line into load [3]. The voltage standing wave ratio of direct coupled is better than that of the parasitically coupled array feed.

D. Gain

The term antenna gain describes how much power is transmitted in the direction of peak radiation to that of an isotropic source[10]. The parasitically coupled array gain is slightly higher than the gain of direct coupled array.

E. Radiation pattern

It gives th amount of power that is radiated by antenna.   Radiation of the antenna is in all the direction. By analyzing the radiation pattern[3] we can see that how antenna is radiates in all direction.Radiation pattern of backlobe should as minimum as possible.

F. Mutual Coupling

Mutual coupling of an antenna describes the energy that is absorbed by one antenna receiver when another antenna is operating nearby[10].

G. Efficiency

The efficiency of an antenna is defined as the ratio of the power delivered to the antenna relative to the power radiated from an antenna[10]. An antenna with high efficiency has most of its power present at the antennas input which is radiated away.

H. Size

The size of parasitically coupled array is smaller than that[6] of the direct coupled array.

I.Bandwidth

Bandwidth gives the range of frequencies over which the antenna can properly radiate or receive energy[10].A parasitically coupled array has higher bandwidth as compared to the direct coupled array.

J. Number of Layers

Number of layers are same in both direct coupled feed and parasitically coupled feed

VI . ANTENNA DESIGN AND OPTIMIZATION

In this paper, we have shown a software framework for the optimizing the design of microstrip antenna. Antenna Optimization aims at creating advanced and complex electromagnetic devices that must be competitive in terms of cost effctiveness, serviceability and Performance. This process involves selecton of appropriate objective functions,design variables ,parameter and constraints.The optimization framework implements a simulated annealing algorithm that is used identify the design by performing design space exploration.The microstrip patch array is widely used is widely used for electromagnetic optimization.In this energy fed directly fed to four antenna elements through the centre patch which eliminates complex feed network with T-Junction .The merit of these then only define when width of its is more thicker and consumes more space. In the design there are parameters are consider for design

and also using their formulas and for designing the antenna we require this formulas which are as follows:-

A. *Calculation of width is given by,*

$$w = \frac{c}{2f_0\sqrt{\frac{(\varepsilon_r + 1)}{2}}}$$

B. *Calculation of the Effective Dielectric Constant.*

$$\varepsilon_{eff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}\left[1 + 12\frac{h}{W}\right]^{-\frac{1}{2}}$$

C. *Calculation of the Effective length*

$$L_{eff} = \frac{c}{2f_0\sqrt{\varepsilon_{eff}}}$$

D. *Calculation of the length extension ΔL*

$$\Delta L = 0.412h\frac{(\varepsilon_{eff} + 0.3)\left(\frac{W}{h} + 0.264\right)}{(\varepsilon_{eff} - 0.258)\left(\frac{W}{h} + 0.8\right)}$$

E. *Calculation of actual length of the patch*

$$L = L_{eff} - 2\,\Delta L6$$

f_0 = Resonant Frequency.
W = Width of the Patch.
L = Length of the Patch.
ε_r = Relative Permittivity.

Resonant frequency is which is capable of exciting a resonance maximum in a given body or a system. The relative permittivity of the material is its permittivity which expressed as a ratio relative to the permittivity of the vacuum. Permittivity is a material property that affects the coulomb.

VII. CONCLUSION

This study compares the two possible feeding mechanisms for a four element microstrip single layer patch array. The first mechanism was using direct coupled feed and second was using the parasitically coupled feed. where direct coupled feed uses T-Junction and Quarter wave length transformer it increases the fabrication cost as well as complexity. Hence the cost point of view parasitically coupled feed is better than that of the direct coupled feed. And other parameters comparison is based on their characteristics.

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ZigBee based Secure Wireless Communication Using Advance Encryption Standard

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Abstract- **Wireless communication needs to be secured properly, or else it could be easily be hacked. The planned ZigBee-based secured wireless communication system using AES provides high security. All the communication made between two systems is encrypted using 128 bit AES encryption which is highly secure. The received encrypted data can only be decrypted using the authorized key. Two-way communication is possible through this system where you can receive and transmit at the same time.**

Keywords- Advanced encryption standard (AES), Data transmission, Decryption, Encryption, Global System for mobile.

I. INTRODUCTION

In today's age of internet, data security is the primary concern. So it is necessary to have a secure communication channel in which the message should only be received by intended receiver and not to any other third party. To ensure this, the messages send should be sent through an encrypted channel. This project is basically based on how two systems communicate with each other with the help of 128 bit AES (Advanced encryption standard). For authentication and alerting, in this project, there is use of RFID (Radio frequency identification) along with GSM (global system for mobile). ZigBee modules will be used for wireless channel between the transmitter and receiver.

A. ZigBee Modem

ZigBee is based on the IEEE 802.15.4 standard for wireless personal networks. ZigBee are used in wireless sensor network for controlling and monitoring applications. The IEEE 802.15 standard is used to make a low cost, low power consuming network which requires a long battery life. [1] These can be widely deployed for controlling and monitoring applications where it covers few 100 meters. This communication system is comparatively less expensive and simpler than the other proprietary networks such as Bluetooth and Wi-Fi.

Fig.1 ZigBee Modem

To maintain its power efficiency it has a limited transmission distances for up to 10–100 meters line-of-sight, depending on power output and environmental aspects.[2] A mesh network of ZigBee devices can transmit data over long distances by passing data through the immediate neighbouring devices to reach more distant ones. ZigBee are mainly used in low data rate applications that require really very long battery life. ZigBee networks channels can be secured using 128 bit symmetric encryption keys by enabling this functionality. [3] ZigBee has a defined rate of 250 Kbit/s, best suited for intermittent data transmissions from a sensor or input device.

The development of ZigBee technology was started in 1998, but was standardized in 2003, and later revised in 2006. The name refers to the waggle dance of honey bees after their return to the beehive. [1]

As Internet of Things (IoT) is an emerging technology. The demand for wireless sensor networks with low-cost and the ability of unattended monitoring of a wide range of environments. Their importance is seen in the recent upgrades in the IEEE 802.15.4 standard for the physical and MAC layers and the forthcoming ZigBee standard for the network and application layers. As the research on energy efficiency, data management and information security in sensor networks rapidly progress, we understand the need to compare with the solutions adopted in the standards. Therefore highlights the need for a survey on this field. [4]

B. Radio Frequency Identification Tag (RFID Tag)

RFID tags can be incorporated into cash, clothing, and possessions, or implanted in animals and people. An RFID is a technology that is used to send or receive data with the help of radio waves .earlier barcodes were used for this purpose but because of number of limitations like line of sight and a limited number of users specifically only one barcode can be used by one user RFID solves all the limitations, firstly it does not have line of sight problem and secondly, RFID can be used by multiple no of users .The word tag in RFID tag means labels and cards this technology operates on three frequencies namely ultra high frequencies (UHF), high frequency (HF), low frequency (LF) depending on the type of tag attached to the body or object, most commonly apparel baggages, animals, humans and vehicles.

An RFID technology does not have a risk of power loss since it does not require batteries for its functioning; moreover it can function in adverse environmental conditions like rain, dust, oil etc. RFID system is made up of two main parts,

mainly an antenna, which receives radio frequency (RF) waves. The next important part is an integrated circuit (IC), which is used for processing and storing data, as well as modulating and demodulating the radio waves received/sent by the antenna.

Fig.2 RFID Module

C.GSM SIM300

It is a Tri-band GSM/GPRS module. SIM300 works on frequencies EGSM 900 megahertz, DC 1800 megahertz and PCS 1900 megahertz. Any GSM network operator SIM card can be used with this GSM Modem. It behaves just like a mobile phone with its own unique IMEI number. Applications requiring functions like SMS and remote activation can be developed easily using SIM300.[6] The physical interface to the mobile application is made through a serial port connector that provides all hardware interfaces between the GSM and the system.[7] The keypad and LCD can be interfaced to give us the flexibility to develop customized applications. Using AT commands we can access various functions of the device as per the requirement.
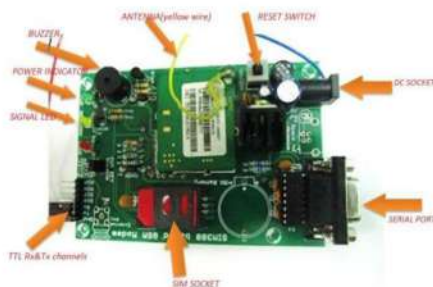

Fig. 3 GSM MODEM

II. RELATED WORK

While going through the work done by other people on this project, we came across a system which works with the help of an Atmega microcontroller system interfaced with ZigBee. This system is attached to an LCD screen which helps to receive the message and send the authorized key. It has an USB keyboard powered by a 12V supply. Once the system is initiated we can enter the data on the system to be transmitted. The character limit is 32 characters. Once the data is transmitted it will ask for the key which is usually 16 characters. When the key is entered, the messages will be received on the other system. If the key is wrong the message will not be decrypted and a garbage value will be displayed and the message will be secured without being transmitted.

Fig. 4 Block Diagram of Related model
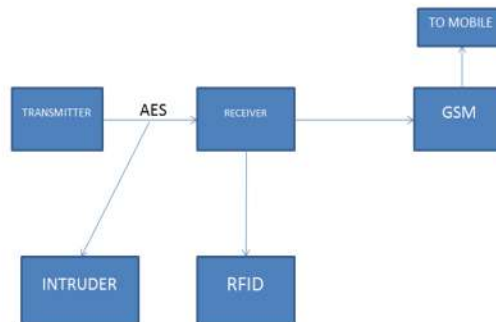
III. PROPOSED WORK

Fig.5 Block Diagram of proposed Model

The project basically involves how the two systems (here one system act as a transmitter and the other system act as a receiver) will communicate with each other with the help of AES. The data transfer during communication between two systems is encrypted using 128 bit AES which is highly secure, the data can be decrypted with correct RFID (Radio-Frequency Identification) card.

If the RFID card is authorized, the code reaches the receiver end. On the other hand, if the RFID card reader fails to recognize the card that means an unauthorized person is trying to access the data, then the user would get an SMS (short service message) on an authenticated SIM card (Subscriber Identity Module) using a GSM Module (Global System for Mobile communication).

IV. DESCRIPTION OF SECURITY TECHNIQUE

AES, or Advanced Encryption Standards, is a cryptographic cipher which is six times faster than triple DES. [9]

Since triple DES was slow and it required small key size it was replaced by DES .DES works on the combination of both substitution and permutation .AES has a input block size of 128 bits and input key size and key size of 128,192,256.

The plain text is converted into cipher text and this is done by transformation rounds
- 10 rounds for 128 bit key
- 12 rounds for 192 bit key
- 14 rounds for 256 bit key

AES operates on a 4×4 column-major order matrix of bytes, termed the state.

For instance, if there are 16 bytes, bo, b1…, b15, these bytes are represented as this matrix:

$$\begin{bmatrix} b_0 & b_4 & b_8 & b_{12} \\ b_1 & b_5 & b_9 & b_{13} \\ b_2 & b_6 & b_{10} & b_{14} \\ b_3 & b_7 & b_{11} & b_{15} \end{bmatrix}$$

It then performs four steps in each round which consists of several steps like substitution step „a row wise permutation step , a column wise mixing step and the addition of round key .the first round does not have mix columns. The process of converting original plaintext using same encryption key is called as decryption process of AES during decryption rounds are reversed.

Detailed description of the algorithm

1. Key Expansions—Rijndael key is used to derive round keys from the cipher key. AES requires a separate 128-bit key block for each round plus one more.
2. Initial Round
    1. Add Round Key—each byte of the state is combined with a block of the round key using bitwise XOR.
3. Rounds
    1. Sub Bytes—According to a lookup table each byte is replaced with another by using a non-linear substitution step.
    2. Shift Rows—It shifts the last three rows to a certain number of steps.
    3. Mix Columns—It mixes combining the four bytes in each column by operating on the columns of the state.
    4. Add Round Key
4. Final Round (no Mix Columns)
    1. Sub Bytes
    2. Shift Rows
    3. Add Round Key.

The state matrix is replaced by $S(a_{i,j})$ with a Sub Byte in the Sub Bytes step, using an 8-bit substitution box each byte of size $a_{i,j}$. This causes non-linearity in the cipher. By multiplicative inverse over GF (2^8) S-box used is derived. It is known to have a good non-linearity property which avoids attacks based on simple algebraic properties. The inverse function is combined to construct S-box. The S-box is also chosen to avoid any fixed points and also any opposite fixed points, i.e., $S(ai,j) \oplus a_{i,j} \neq FF_{16}$. To perform the decryption, the inverse of the affine transformation is required and then find the multiplicative inverse of it.
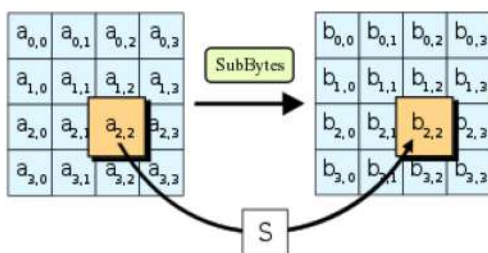

Fig.6 Final Round
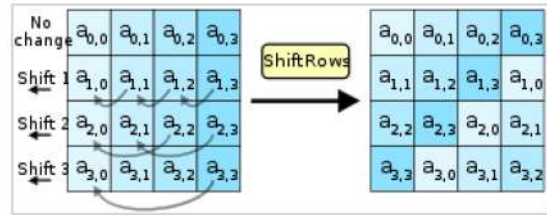
B. The Shift Rows step

Fig.7 The Shift Rows step

The Shift Rows step operates on the rows of the state matrix. The bytes in each row cyclically shifts by a certain offset. The first row is left unchanged. Each byte of the second row is shifted one step to the left. Furthermore, the third and fourth rows are shifted by offsets of two and three respectively. When blocks of sizes 128 bits and 192 bits are used, the shifting pattern remains the same. The row n is shifted left circular by n-1 bytes. In this way, each column of the output state of the Shift Rows step is composed of bytes from each column of the input state. This avoids the columns being separately encrypted.

C. The Mix Columns step

In this step, each column of the state matrix is multiplied with a fixed polynomial c(x). Using an invertible linear transformation the 4 bytes of each column of the state are combined. The Mix Columns function has four bytes as input and outputs, where all four output bytes are affected by each input byte. The Shift Rows and Mix Columns steps provide diffusion in the cipher.
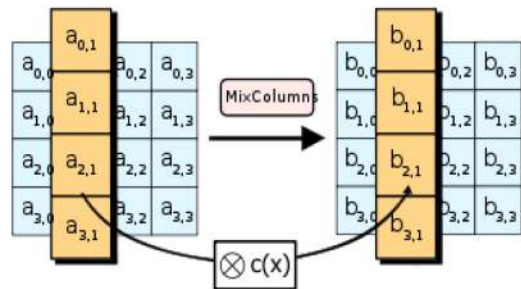

Fig.8 Mix Columns step

This function transforms each column using a fixed matrix by left-multiplying the column which gives new values in the state.

D. The Add Round Key step

In this step, the subkey is merged with the state. For every round, Rijndael key schedule is used a subkey is derived from the main key. The subkey and state is same in size. The subkey is added by using bitwise XOR; we combine each byte of the state with the corresponding byte of the subkey.
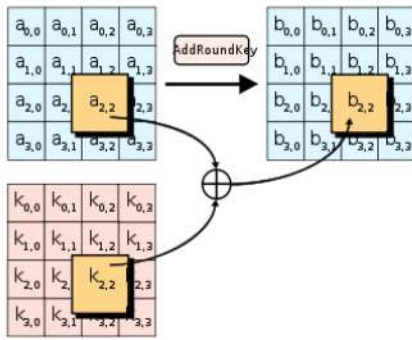
Fig.9 Add round Key step
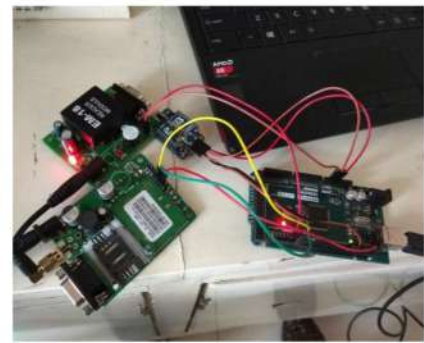
E. Optimization of the cipher

It is possible to speed up the execution in systems using 32-bit or larger words as the cipher by combining the Sub Bytes and Shift Rows steps with the Mix Columns step. Then transform them accordingly into a sequence of table lookups. This requires 4 times 256-entry 32-bit tables which occupies 4096 bytes. Then a round can be performed with 16 table lookup operations and 12 32-bit XOR operations, followed by 4 times 32-bit XOR operations in the Add Round Key step [11]. Alternatively, we can use the table lookup operation can be performed with a single 256-entry 32-bit table and circular rotation operations which occupies only 1024 byte. It is made possible to combine all the above mentioned steps into a single round operation by using the byte-oriented approach [12].

V. AES ANALYSIS

In cryptography, AES encryption is widely used in both hardware and software encryption. Till date, there have been no practical cryptanalytic attacks against AES discovered. AES provides the ability to perform exhaustive key searches and provides flexibility in key length.

AES can provide security only when the algorithm is correctly implemented with an efficient key management.

VI. APPLICATIONS

This project can be used to protect classified information from being eavesdropped by any unauthorized personnel. This is implemented in software and hardware throughout the world to encrypt sensitive data.

The algorithms used before AES was not as advanced as its successor AES has multiple advantages such as faster encryption, high throughput, longer key length. This algorithm can easily be used in software as well as can be used as firewalls and routers.

This project can be used as a portable messenger for army personnel. Apart from this application, this project can provide an additional layer of security for the automation system. It is used to encrypt data access.

VII. RESULT

Portable Station (Remote)

Hardware Configuration:

Fig .10 Portable Station configuration

Message from Portable Station after authorization:

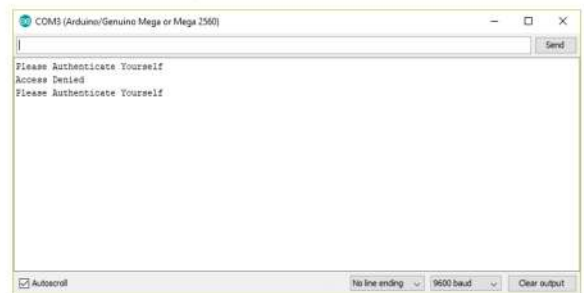Fig.11 Portable Station messenger initialized

When Authorization fails:

Fig. 12 Portable Station console with Denied message

ALERT: An Intrusion has been detected!

Fig.13 Intrusion Alert message on registered device

Base station

Hardware Configuration:

Fig.14 Portable Station configuration

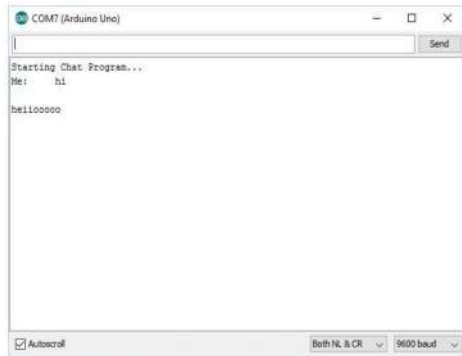*Message from Base Station after connection established:*
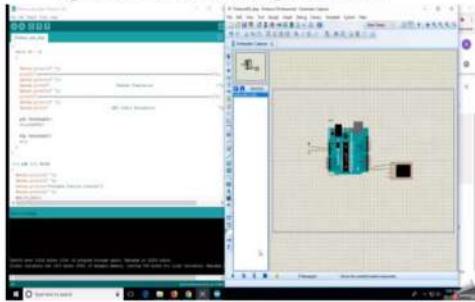

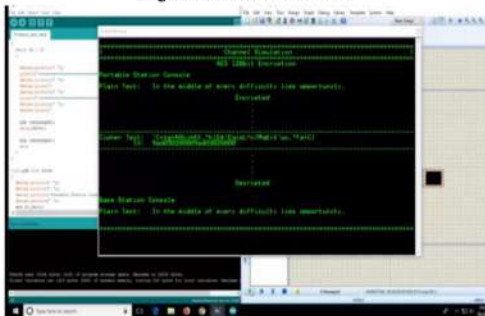Fig.15 Base Station messenger initialized

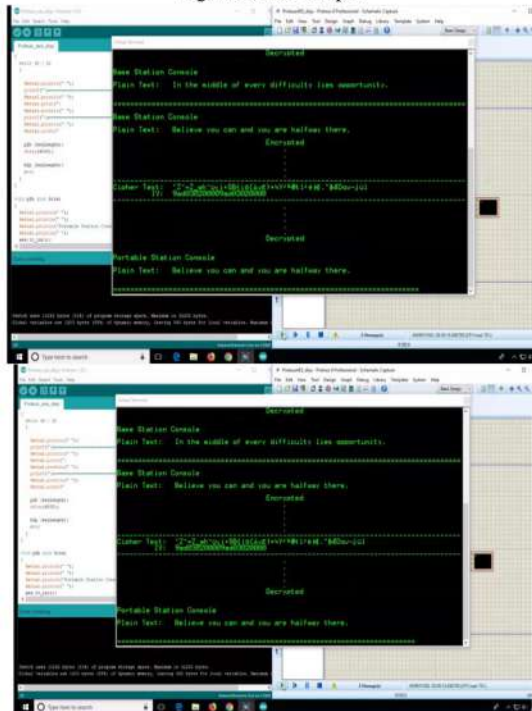Fig.16 Proteus Simulation

Fig.17 Console Output

Fig.18 Console Output

VIII. CONCLUSION

Thus we can conclude the project as the initial goal of creating a system with an encrypted secure channel using AES is achieved for the messages to be transmitted to the appropriate recipient. In this project we learned about Arduino programming and using XCTU for configuring ZigBee. We also learnt how GSM and RFID work. The output at different stages is shown. The application of the project is identified and presented. A comparative study was done based on existing architecture and modified architecture. A better version of a secured system is presented.

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High Gain Antennas For WLAN Applications

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Abstract- **For covering long distance communication applications, high gain antennas are the best. Efficient high gain broadband, directive antenna design is a critical issue in wireless communication system design due to unique requirements of point to point communications. Low cost, efficient and high gain antennas composed of a single feed present an attractive solution for several wireless communication systems. This project describes high gain antenna structures using partially reflecting surface (PRS) layers which can provide more than 10dB gain, less than -20db side lobe level (SLL), less than -20db cross polarization, about 20 db F/B ratio, more than 80 percent antenna efficiency . It will be having gain variation of less than 3db over operating frequency band. This antenna satisfies the requirements of wireless local area network in frequency range 5.725GHz -5.875GHz. The return loss, radiation pattern and critical design parameters are also investigated in detail.**

Keywords- Side lobe level, Partially reflecting surface, Micro strip line feed, Patch antenna

I. INTRODUCTION

A major role has been played by the antenna in the field of wireless communications. The various types of antennas are parabolic reflector antenna, patch antenna, slot antenna. Each antenna has its own properties and applications .Microstrip antennas are widely used in wireless communication applications considering its various advantages being simple in construction, light weight, planar configuration, can be linearly and circularly polarized. But it suffers some disadvantages like having narrow bandwidth and low gain.[1]   With the drastic developments in the field of wireless communication, WLAN has played a vital role in short distance communication and also allowed users to access internet on their portable devices. As it provides high speed data connectivity and communication at a very efficient cost, WLAN has been made available in many standards such as 802.11a,802.11b, and 802.11g. The 802.11 group covers frequencies of 2.4GHz, 3.6 GHz, 4.9 GHz, 5 GHz and 5.9

GHz. Due to its high cost, it is mainly used in business networks. The applications now can be extended to various other places like home buildings, hotels and also portable devices like mobile phones. The design that will be presented by this paper is that of a patch antenna for WLAN applications. The frequency of this proposed design will be 2.4 GHz range. The whole design fits in a dimension of 29.2 x 29.2 x 1.6mm. The paper has been organized in following way: The principle of the antenna and its geometry has been described in SECTION II. The result of the patch is described in SECTION III. The paper has been concluded in SECTION IV. A number of techniques based on Fabry Perot Cavity(FPC), which are gain advancement techniques, have been reported. For a partially reflecting surface, a dielectric placed above ground plane is used. Antenna Gain depends on the reflection coefficient of PRS and radiation characteristics. To overcome the low directivity of MSA, reflecting antenna have been proposed. They are high directivity planner antenna structures with long-range wireless links. In this paper, Using square PPs on superstrate layer, MSA array feed constant high gain and low SLL antenna structures. These are proposed for the 5.725- 5.875 GHz ISM band.

II. SELECTION OF PARAMETERS
A. Selection of substrate

For patch antenna design, selection of substrate material is very important. Selection of substrate depends on thickness, dielectric constant and loss tangent. Thicker substrate provides better efficiency, larger bandwidth but leads to larger element size. In this design substrate is chosen as FR4 with dielectric constant as 4.4 as it is low cost [1]. While under operating conditions, microstrip patch antenna can be used to send onboard parameters of article to the ground. The main aim behind this thesis is the designing and fabrication of a coaxial feed Patch antenna and also to study the effect of antenna dimension length, Width , relative dielectric constant, substrate thickness on the radiation parameters of bandwidth and beam- width.
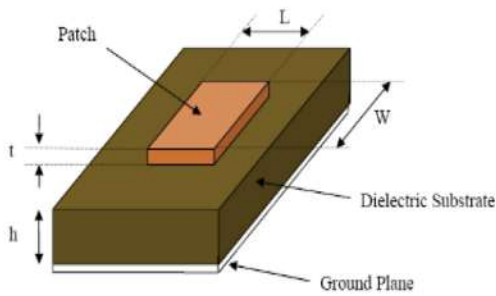
Fig.1. Structure of microstrip patch antenna

B.   Feed Position

End fed or inset fed are the two ways in which a patch can be fed. Studies have unveiled that more enhanced characteristics and perfect impedance matching is provided by inset feed as compared to other feed techniques. The Centre has maximum current and the end has minimum current. The common techniques used to feed Microstrip patch antennas are coaxial feeding or probe feeding. As shown in figure 1.2, the outer conductor is connected is connected to ground plane while the inner conductor of coaxial connector extends through dielectric with the radiating patch soldered to it.
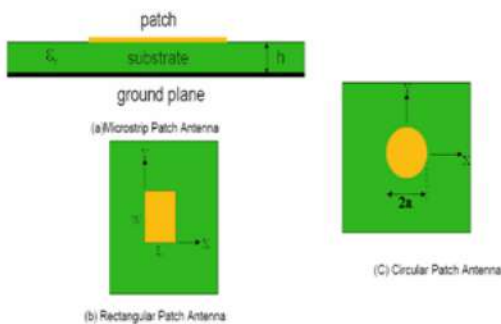

Fig.2. Circular and rectangular patch antennas

C.   Polarization and antenna gain

Most linearly polarized and circularly polarized antennas are the common types of antennas used. Linearly polarized antennas achieve long reading range and high power. Circularly polarized antennas deliver less power when compared to linear antennas [6]. We are looking for high gain so gain is the most important parameter in antenna so required gain which is more than 10db in first stage and 15 or more than 15db is required for well operated high gain antenna.

III. DESIGN PROCEDURE

Fig. 1 displays the geometry of the proposed rectangular feed patch. Ground plane, substrate and patch design are three elements that an antenna design contains. The dielectric constant is 4.4 and loss tangent of 0.001. A FR4 substrate with dimensions 29.2 x 29.2 x 16 mm3 has been used. At the Centre of the patch, the antenna feed is given as a rectangular feed. The calculations of the antenna dimensions are done mathematically.

To determine width, length and height of Antenna :

- Width:-

$$W = \frac{v_0}{2f_r}\sqrt{\frac{2}{\epsilon_r + 1}} \qquad (1)$$

The calculation of the effective dielectric constant is,

$$\varepsilon_{eff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}\left[1 + 12\frac{h}{W}\right]^{-\frac{1}{2}} \qquad (2)$$

- To obtain ΔL:

$$\Delta L = 0.412h\frac{\left(\varepsilon_{reff} + 0.3\right)\left(\frac{W}{h} + 0.264\right)}{\left(\varepsilon_{reff} - 0.258\right)\left(\frac{W}{h} + 0.8\right)} \qquad (3)$$

- length of the patch which is effective :

$$\frac{v_0}{2f_r\sqrt{\epsilon_{reff}}} \qquad (4)$$

Calculation for the length of patch is:

- L= Leff−2ΔL   (5)

- Input specifications: W=30mm

      h=2mm

      L= 27mm

Output specifications :

The presented antenna is an excellent solution for WLAN long distance communication applications. This has been verified by the simulated and measured results.

Simulation	Width	Length	Height	Frequency
1	30	27	2	5Ghz
2	30	19	2	7Ghz
3	34	23	2	5.8Ghz
4	26	23	2	5.6-5.7Ghz
5	30	23	2	5.8Ghz

Table1. variation of frequencies with patch length

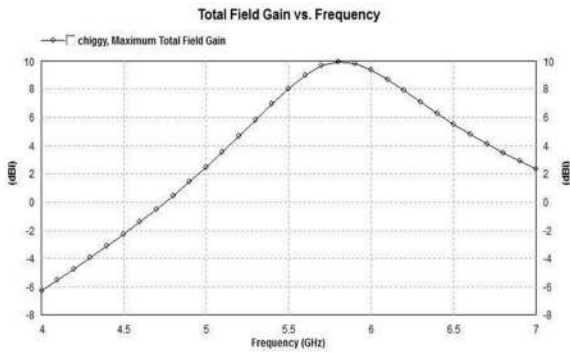Results of simulations based on calculation:-

Gain:- around 10db

Fig.3. Gain versus frequency graph of rectangular patch
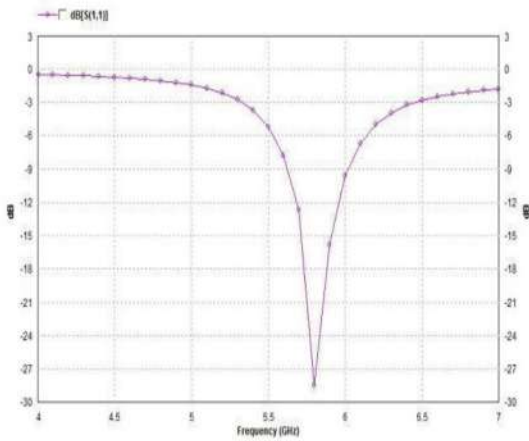
S(1,1) graph :-
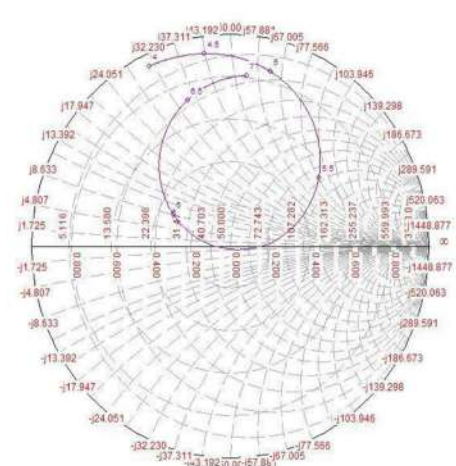

Fig.4. Return loss of rectangular patch

Fig.5. Radiation pattern of rectangular patch

IV. ANALYSIS AND DISCUSSIONS ON PRS LAYER

After simulating the antenna with pre calculated width, height, length and other required parameters we are getting gain approximately 10db, VSWR is less than 2 in needed frequency rage but for high gain antenna we proposed that

15 or more than 15db of gain is required so we need to add PRS layer above the antenna so we can increase the gain of antenna as per our requirements.
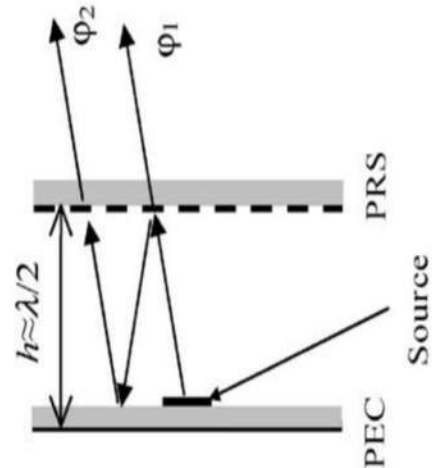

Fig.6. PRS Layer

The PRS layer is a partially reflecting surface which is placed above certain height above the base (normally $\lambda/2$).When the antenna radiates some of the rays are reflected and some of the rays are refracted.
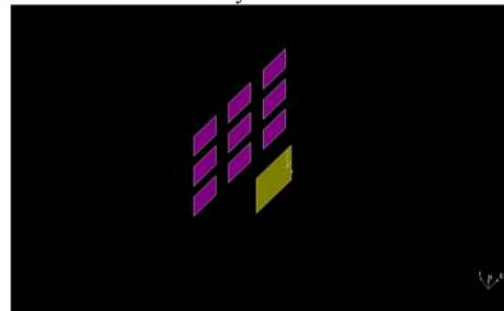

Fig.7. 3D model of 3X3 SPPA after placing PRS layer
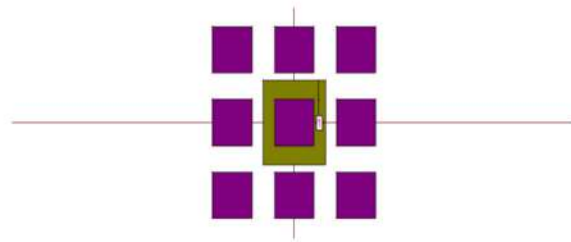

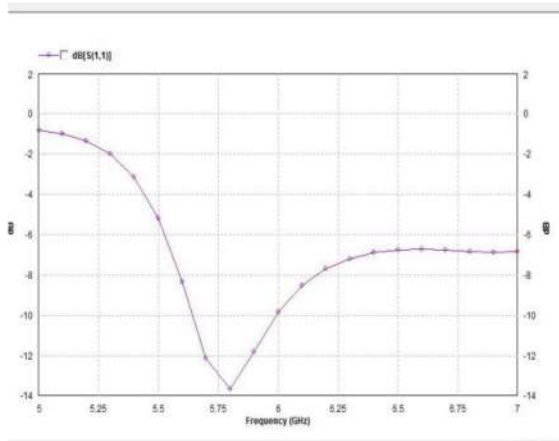Fig.8. 3 X 3 SPPA on a superstrate layer (top view)
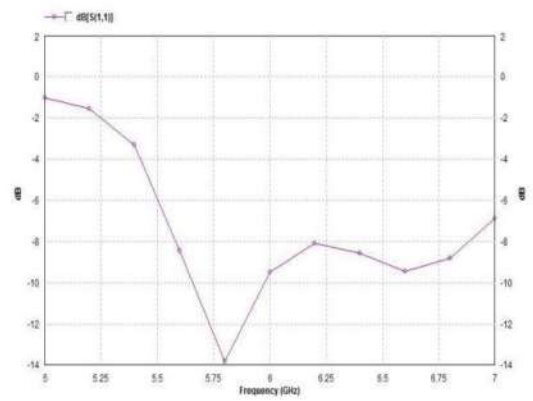
Fig.9. Return loss of 3X3 SPPA
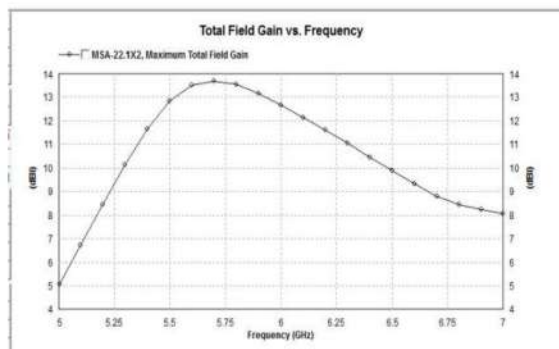

Fig.13. Return loss of 4X4 SPPA

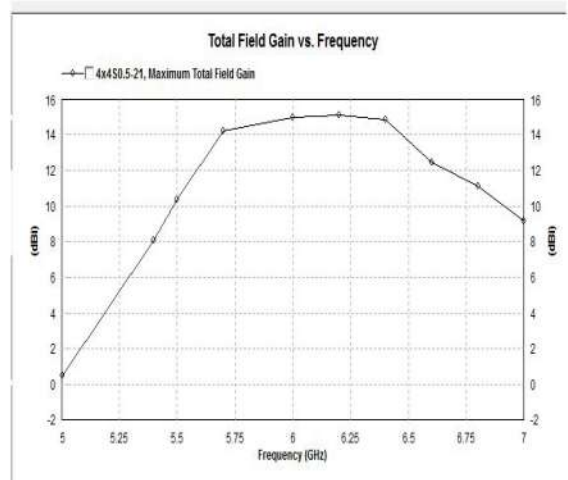Fig.10. Total gain versus frequency graph of 3X3 SPPA
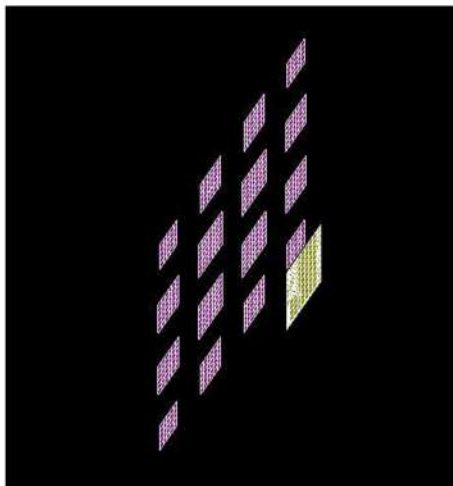

Fig.14. Total gain versus frequency graph of 4X4 SPPA

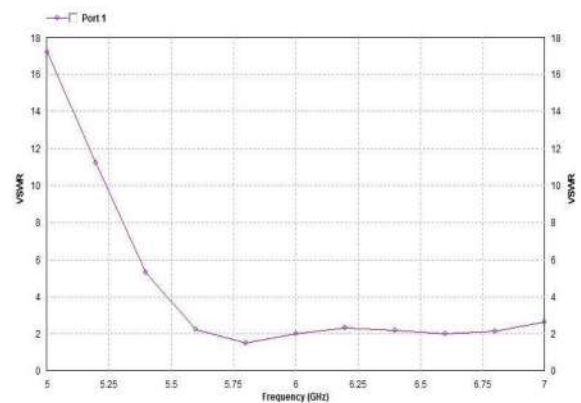Fig.11.3D model of 4X4 SPPA after placing PRS layer
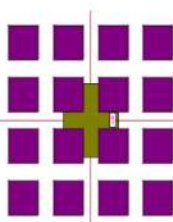

Fig.15. VSWR versus frequency graph of 4X4 SPPA

Fig.12.4X4 SPPA on a superstreet layer

Fig.16. Radiation pattern of 4X4 SPPA

Antenna	Gain	BW	Center Frequency
MSA	4dB	0.66	3GHz
PRS	10dB	0.52	5.8GHz
3x3	13.5dB	0.34	5.8GHz
4x4	14.5dB	0.34	5.75GHz

Table .2. Various parameters of antenna

V. CONCLUSION

For short distance communication, WLAN is a promising technology. The demonstration of a 5.8 GHz patch antenna for WLAN has been done in this technical paper. Zeland IE3D 14.0 software has been used to carry out the optimization of the structures. IE3D is a non-uniform meshing simulator. For wireless application, a parasitic patch array on a superstrate layer and low side lobe level antenna with feed patch array is proposed. Design flexibility is being provided by this structure as the desired gain can be obtained with the use of different square patch arrays.

A uniform gain with more than 10 dB gain variation over the frequency range of 5.725- 5.875 GHz is provided by this structure. The fabrication and testing will be the main focus of the future work. There will also be performance comparison of simulation and fabrication results.

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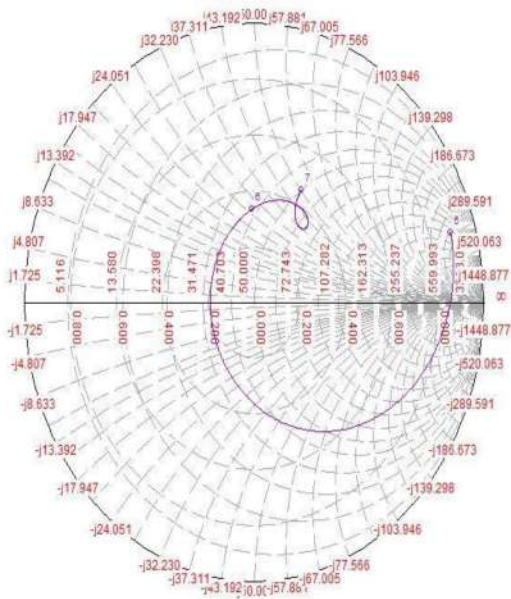
Solar Photo-Voltaic Powered Vehicle Using Buck Converter

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Abstract - The main objective of this paper is to establish the application of stand-alone photovoltaic (PV) system in a vehicle using a buck converter in order in technical and economic aspects in order to enhance the power generation and also minimize the cost. The control of dc-dc converter and it's performance which is suitable for photovoltaic (PV) applications is presented here. A buck converter is used here that extracts complete power from the PV source and feeds into the dc load. The power given to the load is sufficient to drive a vehicle. The buck model and PV module has been designed and simulated using Matlab Simulink software, it is also compared with theoretical predictions.

One of the front runners in the area of renewable energy resources today is solar power. Photovoltaic cells are used to convert solar energy into useful electrical energy. The paper illustrates how the charge generated by an array of solar panels is received and its battery pack is to be controlled using a microcontroller based charge controller in order to ensure efficient storage of charge in a battery pack. The stored energy would be divulged to a DC motor which would run the car [7].

Keywords—Bluetooth Module, Buck Converter, Ideal Switch, Matlab Simulink, PV, Voltage Regulator.

I   INTRODUCTION

Now-a-days, there is an increased demand for natural resources such as fuel, coal, etc. As our world is getting closer, need for transportation has increased, thus increasing the number of motor vehicles. This leads to an increased use for fuels. This is the reason for the depletion for our most important resources like fuel and minerals. This project is designed to build solar and electrical powered car that is completely eco-friendly as it does not emit any harmful gases. The applications of the alternate energy and resources, as well as to build a practical solar photo-voltaic powered vehicle using buck converter to generate the power that could have real world application upon future technological advances. This project is a strong innovative design using local technologies and resources. In this new technology there is no use of petrol and diesel, since natural abundant energy source that is the solar energy is used for the generation of the power.

II   PROPOSED SYSTEM

A. Photo voltaic system

Recent research have dealt with most of the DC/DC converters to find the most compatible type in terms of overall power system efficiency. The block diagram of the PV system is shown in figure.

1. It consists of a photovoltaic generator (PVG), a dc load and a buck dc-dc converter. The power converter ensures the interface of PV array output to the dc load.
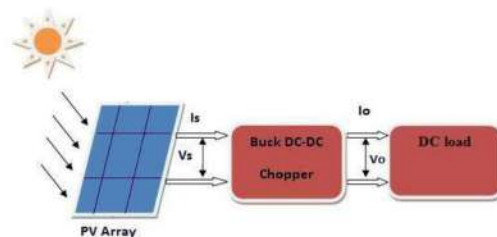
Fig. 1. Existing system Architecture

B. Proposed System Architecture

Sun is responsible for providing most of the energy for the vehicle. Energy from the Sun is captured by the solar panels and is converted into electrical energy. The buck convertor is fed by this electrical energy. The DC to DC buck converter then maintains constant output voltage to 12V. Then the energy is passed to the batteries which are of 12V lead acid maintenance free that get charged and is used to run 12V DC high torque DC series motors. The current is passed to ATMEGA 328 series Arduino controller which is interfaced with the LCD display, Bluetooth module and motor driver IC. LCD display is used to display the battery status and the battery status can also be displayed with the help of Bluetooth. An app known as Basics for Android is used to control the vehicular movements. Through this app, the robotic vehicle can be controlled wirelessly within the range of 20 meters.

Fig. 2. Proposed system Architecture

III IMPLEMENTATION

The implementation of the project is going to be done in two methods:

Hardware model: A prototype model designed with the help of solar panels, buck converter, batteries, and Arduino controller. Embedded C is used for the programming of Arduino. PCB express is used for designing of circuit.

Simulink model: The model will comprise of a simulation of a real size car with the designing of solar panel and DC to DC buck converter and then interfacing together. The model will be done in Matlab 2015.
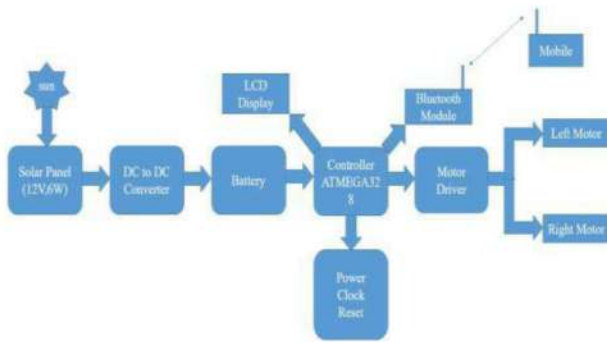
Microcontroller: This ATMEGA-328 integrated chip comprises of 28 pins. It comprises of 6 analog inputs that are shown in the pin diagram. Analog inputs can be represented as PC0 to PC5. These 0analog input pins possess the continuous time signal which acts as an analog input for the system. Further it also comprises of 12 digital inputs. It can be represented as PD1 to PD11 which act as digital input ports based on pulse width modulation (PWM). These PWM sends the signal in the form of discredited form. Both analog and digital input ports can be used for various applications for the input power supply, VCC and GND pins are used. Pins PB6 and PB7 acts as a crystal to generate a clock signal. By using these crystals, we can generate the clock signals and we can use this clock signals for input sources. All the electronic devices are interfaced with micro controller. *Solar panel:* There are different types of solar panels available, namely, monocrystalline silicon, polycrystalline silicon, and Amorphous Silicon thin film modules. Mono crystalline silicon solar panels are one of the most efficient types of solar panels and they have square-shaped cells. These devices have the most silicon content out of all the different panel types, which makes them more expensive to make but conversely they take up quite less relative space. These solar panels are typically used in high reliability applications like telecommunications. Polycrystalline

silicon solar panels use less silicon, which makes them somewhat less efficient. However, the unique design, which features strips of silicon wrapped around rectangular conduit wires, allows them to function more efficiently. Certain circumstantial use of polycrystalline silicon solar panels such as when used on rooftops can yield efficiency as close to as those of monocrystalline silicon solar panels. A single panel of 12V, 6W rating is used and connected to DC to DC buck converter.

Bluetooth Module: HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR 04 External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. This module is interfaced with microcontroller. It is then connected to mobile device wirelessly. It is used to control the vehicle and display the battery status on android app.

LCD display: The solar vehicle is deployed with16x2 LCD. It displays the status of the battery of the vehicle. It is interfaced with microcontroller. The read pin is kept 0 and write is enabled.
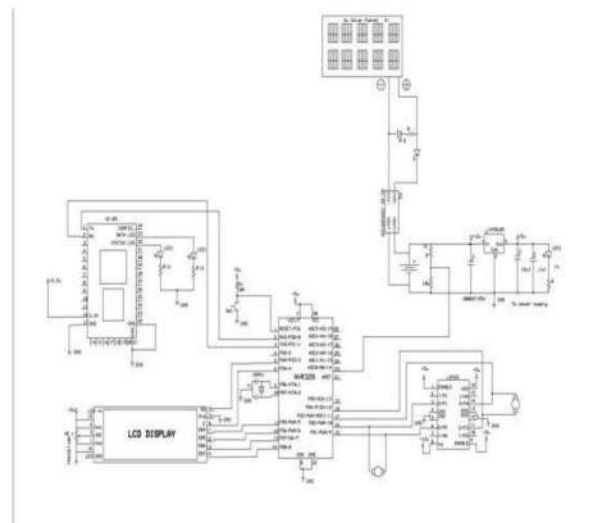
Fig. 3. Circuit Diagram

DC motor: A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition. The commutator switches the current in the rotor and to also be stationary in space. This is how the relative angle between the stator and rotor magnetic flux is maintained near 90 degrees, which generates the maximum torque. DC motors have a rotating armature winding (winding in which a voltage is induced) but non-rotating armature magnetic field and a static field winding (winding that produce the main magnetic flux) or permanent magnet. Different connections of the field and armature winding provide different inherent speed/torque regulation characteristics of variable resistance in the

armature circuit or field circuit allows speed control. The power electronics systems called DC drives are used to control Modern DC motors. The introduction of DC motors to run machinery eliminated the need for local steam or internal combustion engines, and line shaft drive systems. DC motors can operate directly from rechargeable batteries, providing the motive power for the first electric vehicles. Today DC motors are still found in applications as small as toys and disk drives, or in large sizes to operate steel rolling mills and paper machines.

Motor driver IC: For interfacing with microcontroller L293D motor driver IC is used. The signals received from the controller are passed to the two separate individual DC motors.

Voltage Regulator: The voltage regulator LM7805 is provided along with the result of buck converter. The voltage regulator maintains the voltage at constant level.

Buck Converter: The step-down dc-dc converter, commonly known as a buck converter, is shown in figure below. The buck converter has buck converter with LC filter block and load block. A single stage LC filter will be used so only one inductor and one capacitor comprises in the circuit. Typical waveforms in the converter are shown in below figure under the assumption that the inductor current is always positive. The state of the converter where the inductor current is never zero for any period of time is called the continuous conduction mode (CCM). It can be seen from the circuit that when the switch S is commanded to the on state, the diode D is reverse-biased. When the switch is off, the diode works to support an uninterrupted current in the inductor. Thus it is studied that the efficiency is maximum of the DC to DC converter for a buck converter.

IV RESULT

The output voltage received at buck converter from solar panel is ranging from 12-18V. The motors of the vehicle which are of 100rpm each were working successfully. The battery status of DC battery of the vehicle was displayed on the LCD mounted on the vehicle successfully. Bluetooth connection was established between the vehicle and android phone with the help of software application successfully. The Solar PV powered vehicle by using buck converter has been proposed here. The effectiveness of the proposed control scheme is being tested. This is a new and innovative application which is fully environmental friendly and is almost pollution less. The vehicle also helps in improving fuel efficiency and reduction in greenhouse gas emission.

Fig. 4. Solar Vehicle

V ACKNOWLEDGMENT

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Automated Paralysis Patient Health Care System

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Abstract- Patients suffering from paralysis have their whole or partial bodies disabled. These paralytic patients can neither speak nor express their demands or wishes. They do not have any brain activity and in such situations, this proposed project comes to the rescue. The noble aim of this project is to study and capture the eye blink detection with IR blink sensor which is used in automation which can help paralyzed patients some of whom even cannot move their hands and any other parts of their body and can only moves eye or eyelid. The proposed system is controlled by human eyes. Therefore paralytic patient can control the household devices by themselves. Also we have added additional sensors to monitor certain health parameters and if suddenly the patient is in distress then a message is sent to doctor or relative of the patient via GSM.

Index Terms - Eye blink, Health monitoring , GSM, Sensors

I INTRODUCTION

Paralysis is the incapacity to move muscles on your own and with purpose. It can either be temporary or permanent. The most common causes are spinal cord injury, multiple sclerosis and stroke. Paralysis can be a significant weakness called paresis or complete loss of movement known as Pleiades. The main cause of paralysis is injury or disease affecting the central nervous system (brain and spinal cord) which means the nerve signals sent to the muscles is interrupted.

Even though, there are innovative proposals for curing paralytic patients but the main motive of this treatment is to make a paralytic person as independent as possible and help them adapt to their life with paralysis. The problem with these types of devices being developed is that they are very costly and huge machines. They are only available in hospitals and are unable to be used at the patient's home or at their convenience. Our aim is to make a device that will retain a patient's motion as well as they will be able to use the device themselves and it must be cheap enough for them to afford without much debt.[1]

According to a survey, nearly 1 in every 5000 people is paralyzed. Fully paralyzed patients require 24 hour support. But in these days, it is not possible to constantly monitor a patient. So they need a person who can take care of the movement of disabled or paralyzed patient and appliances cannot be handled by them. So they need constant help and they cannot work independently.[2]

II PROPOSED SYSTEM

The motive of this is to propose a system that can aid the paralyzed. It is done by using IR based eye blink sensor and long blinks of eye are used to control the appliances efficiently.[3]

The main contribution of this project is the latest techniques are implemented for assisting paralyzed patient. Matlab processing is also used for developing same system but it is not efficient and real time. In this system ARM processor is used and embedded language is used. Matlab or image processing is not used, therefore the system's efficiency and accuracy is more. So here there is no need to use pc for functioning or visualize the waveforms generated by sensor so simple hardware is issued to assist the paralyzed people and smart automation system is built by this [4]. Also in this project constant patient monitoring system is added for helping fully paralyzed people, which consists of various sensors. These sensor values are processed by arm controller and if specific value of body parameter is changed from it's ideal value and goes to danger level then SMS is sent to patient's relative or doctor through GSM. So this system is highly useful for paralyzed people. [5]

Primary Purpose of this system –

The primary purpose of this is to propose a system that can assist the paralyzed. It does by using IR based eye blink sensor. And long blinks of eye are used to control the appliances efficiently. [6]

There are number of techniques –

· There are various applications which can be drive from eye blink detection and these are not limited.

· An efficient, real time blink detection can be used for almost any purpose. It can be used for on/off appliances such as lighting devices, fan, television or a microwave oven.

· It can also be used to send messages or call someone on mobile phone. All this can be done with just a few eye blinks. Number of techniques have been devised for face tracking.

· There are some techniques used for blink detection as well. In some of them software is used i.e. using image processing, and in few hardware is used consisting sensors. [7]

· In hardware based systems normally infrared and magnetic sensors are used .The main advantage of using sensors is that the entire system would be more simple, compact and light weight, though risks are present in this technique this system is very efficient.

· Matlab processing is also used for developing same system but is not efficient and not real time.

· EEG or EOG based techniques are also present in these days but there accuracy is very low also complex circuitry is present with a number of electrodes which are mounted on patient's head. So it is very complex and should not be used for implementing in this type of systems.[8]

III DESCRIPTION

Fig 1. Block Diagram of System

1. ARM-7 module - In our system we are using LPC2148. It acts as the major controller unit of the system. Inputs from various sensors like IR blink sensor, Heart rate are given to this unit on which it process according to the programming and gives output to the relay driver circuit, and to GSM module. It needs 3.3V to drive the ARM7 module.
2. LCD Display- 16X2 characters display is used in system for displaying health parameters which constantly displays body parameters.
3. Blink Sensor - The blink sensor used here is an IR based blink sensor which is for eye blink detection gives an output of 0V (Logic '0') when the eye is open and gives +5V (Logic '1') when the eye is closed. Its o/p is given to digital inputs of ARM processor.
4. Sensors - various sensors are used in this system like heart rate sensors are used for health monitoring of patient which very useful sensors in critical monitoring of patient.

GSM – we have used SIM900 GSM module and if patient is in distress then SMS is given to the doctor, so that with the help of which patients relative can constantly get the activity of the patient.

IV WORKING

This System is divided into two major parts - home automation system and patient monitoring system in which the automation system consists of three major sections namely the blink sensor, ARM controller board, and automation device. The eye blink sensor is an IR based blink sensor. Here only one appliance is controlled. A goggle is developed for the patient for perfect and constant eye blink detection and after that we have developed patient monitoring system in which some sensors like heart rate sensor and temperature sensor is used. We have proposed our project in such a way that when the patient blinks his eye twice within 2 second automation takes place wherein we have included fan for the patient. Another important input is that when the patient blinks his eye more than thrice continuously within 3 second the system informs the doctor or patient's relative that the patient needs help and is in distress through SMS via GSM. We have used these sensors in our project:

1. *Temperature sensor-*
In this system we have used LM35 temperature sensor which is simple three pin sensor which directly calculate temp in Celsius. Amplified output is easily given by this temperature sensor. It is of low cost, it's accuracy and sensitivity is higher than other sensors, it does not needed any calibration or trimming. This is the main advantage of using this integrated sensor.

Fig 2. Temperature Sensor

2. *Heart rate sensor-*
Heart rate sensor can easily developed with using on IR led transmitter and receiver on same side of finger. The pulses and voltage sense by receiver is used for calculating heart rate this is simple tip sensor attached to finger of patient.

Fig 3. Heart rate module

3. *IR Eye Blink Sensor -*

Fig 4. Eye blink sensor

Figure 4 shows IR eye blink sensor pair which we have used in our system which consists of IR transmitter and receiver. It is at least 15mm distance. IR rays reflect fully

when eye is closed and logic '1''is generated and when eye is open IR rays are absorbed by some amount and logic '0' is generated. When logic 1 is generated device is ON.

IV RESULTS

The IR based eye blink sensor is mounted on a goggle which is placed on the paralyzed patient's eyes. The eye blink sensor first measures the eye blink and the depending on the number of eye blinks controls the electrical devices or does patient monitoring and sends GSM message in distress.

Eye blink sensor measure two eye blink in 2 sec and automates devices (fan, light, AC etc.) i.e. ON/OFF. If the patient in distressed IR sensor counts the eye blinks i.e. if patient blinks more than thrice in 3 seconds then the system alerts the patients care taker by sending message through GSM. Along with that it senses the heart beat and temperature of the patient and sends this information as well in the message.

This way it becomes possible for the paralyzed patient to look after themselves in some way.

V CONCLUSION

This IR based home automation system is smart, secured and real time system serves as a reliable and efficient system for paralyzed people for controlling home devices like fan, TV etc. The system is inexpensive, simple and dependable assembly. This system provides the ability to operate devices without anyone's help. This system notifies the patient's relative or doctor when the patient is in some difficulty.

VI FUTURE WORK

In future the system can be made more smart and efficient by making it wireless. It can be made by using Bluetooth and Wi-Fi technology so as to make system efficient and secure as well as easy to handle. Also for constant patient monitoring some indications for security can be added like buzzer or light indicators. Also instead of using GSM we can use ZigBee module to monitor patient's parameters on pc in case of if patient is in hospital. So it becomes useful in hospitals for continuous monitoring of body parameters on doctor's pc or main pc of hospital ward.

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Automation of Air Hockey Table

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Abstract - **The aim of our project is to design and actuate an Automated Robotic Arm to implement it in an Air Hockey Game. Air Hockey is a sport practiced in a table with low friction. Two players competing against each other holding paddles that are used to hit a puck with the objective of getting scores every time the puck enters the opponent's goal. In this particular project, we replace one player with a Robotic Arm which will compete against a human.**

Along with the overall objective, this project came with several functional requirements: By using an analog camera to view the field of play, the system must be able to track the movement of the puck along the table. The system must be able to analyse the puck's trajectory by finding slope of puck trajectory through line equation of two points, and then deduce where the puck will end up and when the paddle must move to hit the puck. Implement game logic so the system will make decisions on where and when to hit the puck. In simple words or in short, we propose an algorithm which enables an air hockey playing robot to quickly adapt itself to new competitive environments against any human.

Keywords – Robotic arm, MATLAB code, Arduino Package, Analog camera, Servo Shield and motors, Air hockey table.

I INTRODUCTION

Air hockey is a game played on a low friction table by two players. It requires a puck, an air-hockey table and two player-held strikers. A typical air hockey table consists of large smooth playing surface, slots in the rail which are present at either ends of table that serve as goals and surrounding rail to prevent the paddles and puck from leaving the table. There is usually a puck return on the ends of table that are behind and below the goals. The tables also have some sort of machinery that produces a cushion of air on the play surface through tiny holes, which increase playing speed and reduce friction. The machinery in some tables is eschewed in favour of a slick table surface, usually plastic, in order to save both manufacturing and maintenance costs. Note that these tables are technically not air hockey tables as there no air involved, but they are still considered to be one due to the basic similarity of game play.

There also exist pucks which generate their own air cushions using battery and fan, but they are commonly marketed as toys since they are prone to breakage. An air

Hockey table has very little friction. Only 8- foot Air Hockey Tables are approved for playing and sanctioned by the USAA (United States Air Hockey Association) and the AHPA (Air Hockey Players Association) for the tournaments.

ADVANTAGES:

It was faster as it had less mass to move.
Less energy was required.

DISADVANTAGE:

The large Coulomb friction of the motors which made it hard to control.

II DESIGN CONCEPTUALISATION

A. Puck & amp: Striker is the primary component in the game. Puck can be any colour small circular disk shaped object. The coding is obtained for red colour here so we have considered red puck. The puck is to be striker by the striker to score a goal. Puck should be friction free and so does the striker. Puck is the free object whereas striker is joined to the robotic arm's end.

B. Arduino and Servo Shield : The Arduino Uno is a micro controller board It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the micro controller; simply connect it to a computer with a USB cable or power it with an AC-to- DC adapter or battery to get started. Here the coordinates obtained from the MATLAB code is processed further. It obtains the required angle of impact and the puck position to the servo motor. Servo Shield is mounted over the Arduino, and it is used to minimize the voltage fluctuations caused by the servo motor.

C. Servo Motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Here position feedback is given by the MATLAB code in the form of coordinates. As these coordinates are processed by the Arduino servo shield then the angle of striking is provided to the servo motor. Motor thus calculates this position and instructs the Robotic Arm to

strike the puck. The Servomotor is also connected to the servo shield so that the voltage fluctuation is minimized for efficient impact.

D. Robotic Arm is placed on the edge of the table exactly at its centre. This is designed by drawing the required arm with its dimensions in solid works software[2]. Then its image is carved in a wooden block and then it is cut into required size by Laser cutting method. The striker is mounted in this Robotic Arm.

E. Analog camera is used to detects area of red colour which are then tracked using a MATLAB code which is passed on to the Robotic Arm enabling it to attack or defend.

III WORKING
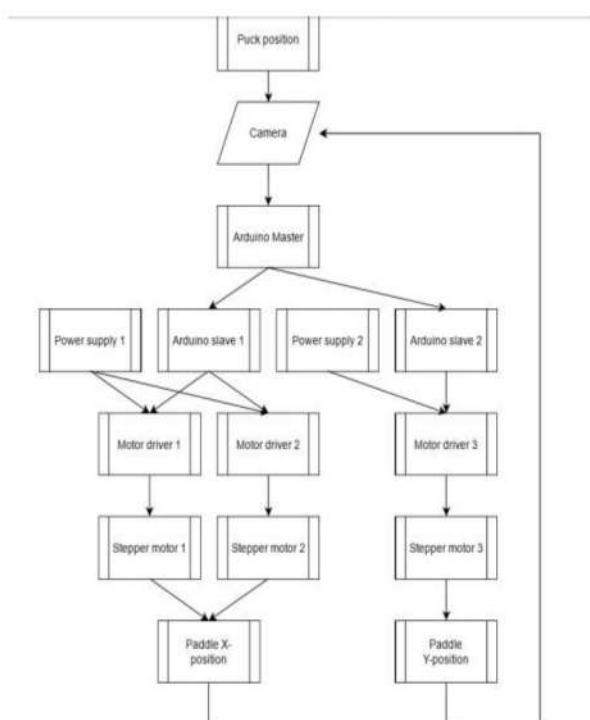
Fig. 1. Overall view of the system

As the opponent attacks by striking the puck, the camera has to capture the image within fractions of seconds and pass this image to the MATLAB code developed. Here the color of puck is sensed. Our code is designed for red color. Now coordinates of the puck has to be calculated immediately by substituting values in the equation thus obtaining position of puck and its arrival time is understood[4]. The Arduino which is linked to the MATLAB gets the information. Arduino servo shield calculates the angle of striking. Servo Motor then positions the puck and commands the Robotic Arm to quickly hit back the puck using striker. Now there are many chances of fluctuation in the position. This is caused by the voltage provided to the servo motor, in such cases the servo shield which is linked to the servo motor minimizes the fluctuation, thus efficiently striking the puck. If the time of arrival is very rapid then the

strikers focuses on only defense and if the time of arrival is more than the Arm focuses on attacking as well. The primary purpose of this is to detect the puck position and locate the target to hit. It does by using servomotor and MATLAB coding. Both has to be functioned simultaneously in very less time for good efficiency of the robo-arm[6].

There are number of techniques –

1. By using high end sensors the robotic arm can sense the puck position and deflect it to the target. But sensors are expensive and any damage can make the robo- arm lag.

2. By using laser diodes beneath the table and by using a matrix to read the signals of the LDR's columns and rows then performing some logic to locate the centre of the puck. But drawback is we have to be exactly accurate regarding the laser diode's position, it has to be on the centre of the holes, right below the z-axis.

3. So in our system the analogue camera is assigned to capture the picture of puck immediately after the opponent strikes and pass it to the derived MATLAB code so that colour of the puck is sensed and coordinates are obtained, thus providing suitable angle for servomotor to rotate and hit the puck. The robot should be so accurately designed that it should be as fast as human would play[5].The analog camera once submits the picture to the MATLAB code, the coordinates of the puck are obtained by substituting it in the equation derived then passed on to the servo motor so that the angle of strike is decided. This is done by the arduino and servo shield mount. After the angle is decided then only the robotic arm can hit the puck.

IV CONCLUSION

This Automated Air Hockey table system is smart, secured and real time system serves as a reliable and efficient system for a different type of competition and enabling single player gaming. The system is inexpensive, simple and dependable assembly. This system provides the ability to operate devices without anyone's help and also it monitors the extremes of the Robotic Arm to keep it under control and efficient. The system could also accurately predict the path of the puck after it is struck, because the path is dictated by the system itself. Real physical robotic applications do not benefit from these advantages, however. There are limitations on how quickly servos and motors can react, and how a system predicts its actions would affect the real world, and what those effects actually are don't always match up. The implementation of this project proved to be a wonderful experience in contrasting the different issues associated with autonomous robotic design and implementation as opposed to conventional programming to be implemented exclusively on a computer.

ADVANTAGES :

- Quick response time
- High Accuracy
- Reduces the human activity
- Highly flexible
- Real-time application
- Can both attack and defend

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IOT based Industrial Automation

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Abstract— **This paper focuses on industrial automation using internet of things (IOT). Nowadays due to increase in need for exchange of data, use of IOT is also increasing. IOT is a combination of electronic software, sensors and network connectivity. Due to which collection and exchange of data between the objects is possible. This project will help to monitor and control the industrial applications and corresponding data is generated on mobile application using IOT.**

Keywords: Node MCU, DHT 11, DC motor driver, DC Motor, Servo Motor

I. INTRODUCTION

Nowadays in industries and in domestic applications, the need of automation is increasing. Human efforts are replaced by self-operated systems using automation processes. Due to advancement in internet easy monitoring and control of system is possible. Due to use of Internet, live data monitoring and Security of system is also possible using IOT system.

In this project we are making a bot in which a robotic arm is placed and temperature sensor is placed on bot which shows us the room temperature live on blynk app. The Bot & robotic arm will be control by the blynk app. These will help the employee those working with these industries as they can control this automation from any corner of the world using a concept of IOT.

II. LITERATURE SURVEY

In 1999 members of radio frequency identification development community introduced the concept of internet of things IOT. Due to growth in mobile devices real time communication, cloud computing and data analysis the concept of internet of things became very popular. Physical objects embedded with electronics, software and sensors together make internet of things. This network collects the data from world and share data across internet.

IOT refers to the general idea of everyday objects which are addressable, readable, recognizable, and controllable through the internet. communication medium can be wired or wireless LAN, WAN [2].

The things or objects of real world can be:

- Time of information
- Location
- People
- Condition

These things can easy get integrated in virtual world enabling anytime, anywhere connectivity [1]. Now the system architecture also includes different types of elements which shown in following

1. Sensors

   The sensors gather the information about temperature and humidity at the point of activity. The information is sensed by DHT11 sensor and send to our processor i.e. Node MCU which will send the sensed data to blynk app through Cloud.

2. Communication

   This information from sensors is to be transmitted to cloud-based services for processing. The information transfer is through internet communication network such as Wi-Fi, WAN, LAN. In machine to machine communication system at one end sensors are attached and at other end devices are attached. this delivers information to users.

3. Cloud based capture and consolidation

   Collected information is transmitted by Node MCU to a cloud-based service via internet connected Wi-Fi router. At this stage, information is provided to end user.

4. Delivery of information

   It is a last step of delivery. This actually last step of delivery [2]. The delivery of information typically needs the execution of well-designed and optimized user interface across multiple platforms. The delivered information should run on various operating systems such as iOS, Android, Windows and Linux and so on.

III. BLOCK DIAGRAM

The system consist of Node MCU which use controller. To access the internet network we require the internet connectivity which provided by Node MCU itself. To sense temperature and Humidity with in industries we used the DHT11 sensor. A Blynk application is used for monitoring a live data. The values of sensors are uploaded to Blynk server. Controlling of various devices is also done through this Blynk server. Router is used for providing internet connectivity for system and end users.
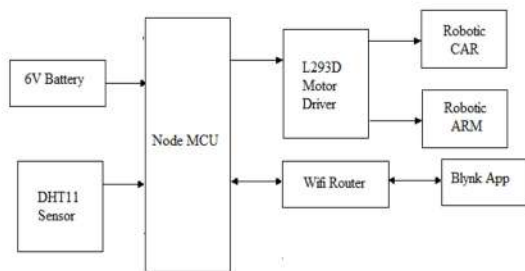
Fig.1. Block Diagram of System

Robotic Arm and Car is driven by L293D motor driver which is connected to Node MCU. We are using an app called Blynk to control the Robotic arm and car and to display the live temperature and humidity data which is sensed by DHT-11.

As a supply we are using a 6V battery which will provide supply to Node MCU, servo and dc motor and a DHT-11 sensor.

IV. WORKING

Initially the Blynk memory is cleared as previous values are not needed after each restart. Then the Blynk app is started and simultaneously the Node MCU is powered and connection is established between Node MCU and access point through which can upload and access the sensor value over internet. The control taken through the user are send by Blynk application and uploaded over the Blynk cloud then from cloud the controller retrieves the data through Node MCU and performs the required action, depending on the control signal provided by the user.
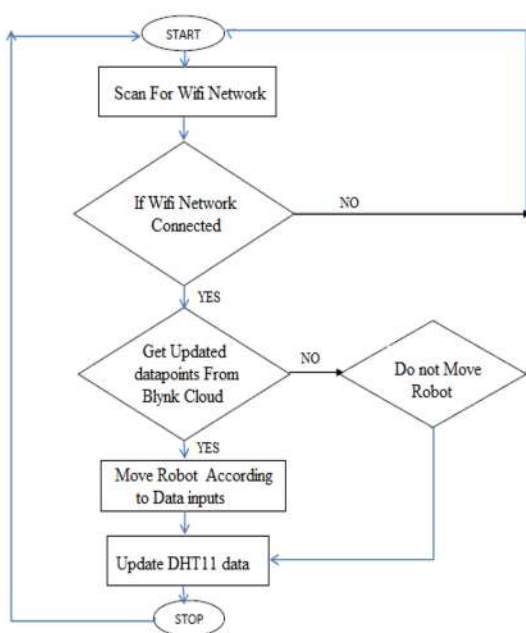
Fig.2. Flow chart

V. HARDWARE COMPONENTS

- NODE MCU

Fig.3. Node MCU

The Node MCU is an open-source firmware and development kit that helps you to Prototype your IOT product within a few Lua script lines [1].

Features:

- Smart
- Low cost
- Open source
- Simple
- Interactive
- Wi-Fi enabled
- Programmable

It reduces redundant work of configuring and manipulating hardware.

- DRIVER IC (L293D)

Fig.4. IC L293D

IC L293D has four input pins, pin 2, pin7 on the left and pin 15, pin10 on the right. Left input pins regulates the rotation of motor connected to left side and right input for motor on the right side. According to input provided to LOGIC 0 or LOGIC 1 [2] input pins the motors are rotated.

- DC Motor

Fig.5. DC motor

The direct current (DC) motor converts the electrical power into mechanical power. Electrical energy is converted to magnetic energy by a permanent magnet. Electrical current flowing in the motor winding produces one field. Permanent magnet assembly produces another field. Torque is produced due to these two fields. Motor is rotated due to this resulting torque. Continuous torque output is produced due to current in the winding. The stationary electromagnetic field of the motor is wire-wound like the armature (called a wound-field motor).

- Servo Motor

Fig.6: Servo motor

Servo motor is lightweight and tiny producing high output power. Servo motors can rotate 180 degrees with 90 in each direction. Servo code, library, hardware is used to control servo motor. Servo motor is provided with three arms and hardware.

- Temperature & Humidity Sensor

Fig.7. DHT-11 Sensor

DHT11 sensor is calibrated in the laboratory. This sensor is extremely accurate on humidity calibration. OTP memory has calibration coefficient stored as a program. These programs are used by the sensors internal signal.

System integration is made quick and easy with the help of single wire interface. Features of DHT 11 are as follow

- Small size
- Low power consumption
- Up to 20m transmission

DHT-11 has 4 pins in a single row.

Specifications

- Supply voltage: 5V
- Humidity: RH ± 5% RH error of ± 2 °C
- Temperature range: 0-50 °C error of ± 2 °C

VI. RESULT

Fig.8. Automation model

Fig.9. Screenshot of output

VII. CONCLUSION

We conclude that by implementing these system, automation of industries is possible.

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Microcontroller based Secured Access to ATM Using Finerprint Scanner (Biometric)

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Abstract- **Inside the paper, Design the Microcontroller based secured access ATM using Fingerprint Scanner. This project provides a unique identity to every user using FINGERPRINT identification technology so as to provide a secured and reliable environment to customers for their banking transactions. In this project we are going provide the at most security since it is taking the FINGERPRINTS as the authentication of our account. This system can be employed for any application with enhanced security because of its unique feature of detecting the fingerprints. Due to its low power requirement and portability it is very convenient. From this project, we hope to build alternative security systems for ATM's.**

Keywords- ATM, Biometric.

I. PREFACE

An Automated Teller Machine (ATM) is a computerized telecommunications device that enables the clients of any financial institution to perform financial transactions like mini statements, balance enquiries, transfers, deposits, withdrawal and fast cash without the need for a cashier, bank teller or human clerk. There are two types of ATMs: first, one is a complex unit, which is used for deposits and money transfer and second is a simple ATM used only for cash withdrawal and to receive a report on account's balance Frequently and popularly, people use the second type of ATM. ATMs are located not only in banks' premises but also in other places where people need cash frequently like airports, shopping malls, railway stations, restaurants and hotels. They are scattered throughout the cities and are thus easily accessible for the clients. Usually to perform a transaction a customer has to use an ATM card which is issued by the respective financial institution and a personal identification number (PIN) is given along with each card for authorization of the customer's account.

This authentication process prevents user's account from unauthorized access. Therefore, every time an un-authorized user obtains a user's password/ PIN, or even if a password is cracked, stolen, or otherwise guessed, the attacker will fail to authenticate to the system without access to the user's verification codes, which only the user can obtain via their own mobile phone or token device.

II. HARDWARE & SOFTWARE SPECIFICATIONS

To begin with the designing of this project, requirement of certain specifications are necessary.

(a) Microcontroller: The high-performance Microchip picoPower 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with 2KB SRAM,read-while-write capabilities, 23 general purpose I/O lines, 1024B EEPROM, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, a byte-oriented 2-wire serial interface, SPI serial port, serial programmable USART, a 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), five software selectable power saving modes and a programmable watchdog timer with internal oscillator. The device operates between 1.8-5.5 volts.

Fig. 1. AVR Atmega328

(b) Fingerprint Scanner: FIM5360 is a standalone digital recognition fingerprint module composed of capacitive sensor and processing board. By adding a high speed CPU and optimized recognition fingerprint algorithm, FIM5360

offers high recognition ability and high speed for identification 1:N operations, and for data uploading and downloading, providing optimal conditions for its application in access control systems. FIM5360 has digital inputs for fingerprint register, identification, partial or total erasing and reset. It offers a comfortable and safety development environment for both online and offline applications.

Fig. 2. Fingerprint module- FIM5360

(c) Motor Driver: In this project, we are using L293D motor driver for controlling motors in autonomous circuit.

Motor driver act as an interface between Arduino and the motors . The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor.

Fig. 3. L293D Motor Driver

III. DESIGN PROCEDURE

(a) System Architecture: There are two main phases in our system i.e. enrollment phase and authentication phase.
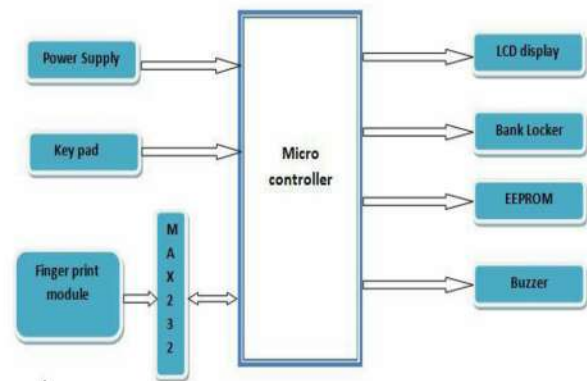
Fig. 4. Block diagram of Microcontroller based secured access to ATM using Fingerprint Scanner

A. Enrollment Phase

Enrollment phase is also known as the registration phase. In this phase an individual registers his fingerprint using the fingerprint scanner and stores it into the database.

B. Authentication Phase

In authentication phase, an individual is authenticated by matching the test image provided by him with the stored image i.e. it is checked that he is who he claims to be. Detailed working of the subunits is as follows:
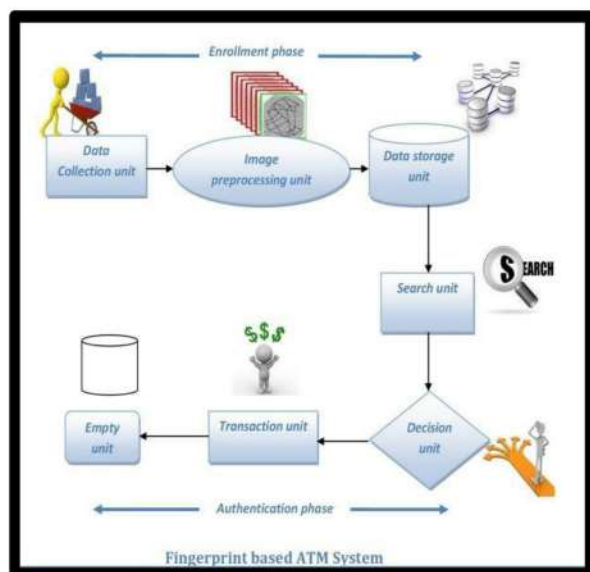
Fig. 5. Fingerprint based ATM (Flowchart)

➢ *Data collection unit:* The most basic and equally important requirement for this stage is that of an optical sensor i.e. r305 optical scanner.
➢ *Image preprocessing unit:* The Scanner takes input of the image then the preprocessing is done on the image in the scanner during the processing time.
➢ *Search unit:* The existing memory is then checked and returns a matching ID if found.

➤ *Decision unit:* The system compares the input image with those stored in the database. The database image is stored after several processes, so it would be easier during transaction.
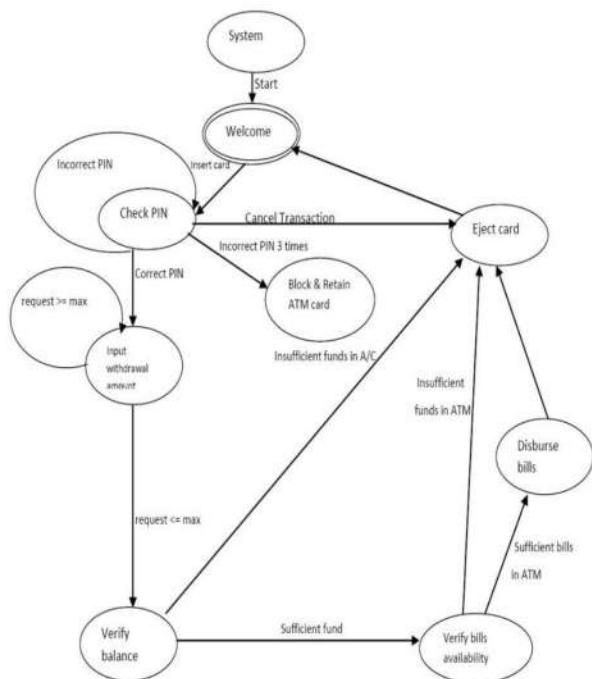
(b) System model:-

Fig. 6. Proposed System model

The intended system is built upon the existing card and PIN-based system and is an enhancement of the existing system. The proposed system is in two modes; the first will apply second level authentication in a scenario where a customer-specified withdrawal limit is attained while the second will improve the security of the ATM by applying second level authentication on the existing ATM process for withdrawal, after entry of correct a Pin.

Figure 5. depicts an instance of withdrawal on the ATM for the proposed system. For the authentication of bank system along with the entry of correct Pin an additional level has been incorporated which requires the customer to enter a valid code which will be sent to the customer's pre-registered mobile device via SMS gateway. If the entered code is correct the customer gets authenticated and is granted access for withdrawal. However, if an incorrect code is entered even though the entered PIN is correct, the authentication process fails and the customer is denied access for withdrawal.

The second mode depicted in Figure 5 is also an instance of withdrawal on the ATM. In this mode the customer gets to choose the second level authentication process as an additional level of authentication for withdrawal in order to guarantee the security of the account owner. With

this mode, a customer-specified withdrawal limit must be attained before the system prompts for entry of a valid code. If a valid code is entered, the authentication process is complete and the customer is granted access for withdrawal and vice versa. If a customer-specified withdrawal limit is not in place, the entry of a valid PIN will be sufficient to authenticate the customer to the system and thereafter grant access for withdrawal. This implies that the second level authentication process would not be applied in such instances.
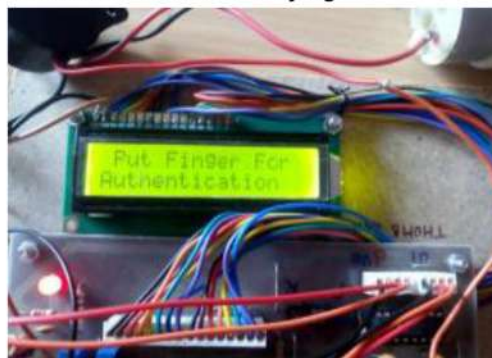
In addition, if the entered PIN is incorrect it would still guarantee maximum protection because the bank card gets blocked and retained by the ATM in such instances.

IV.RESULT

Step 1: Switch on the power supply of board.

Step 2: Indication to scan the finger.

Step 3: Scanning the finger.

Step 4: Enter the Password.

Step 5: Password is matched transaction will proceed.

V. INFERENCE

In this paper,, we have first reviewed the recently proposed security using locker key for banking though they are secured they have some disadvantages. It may provide an incorrect person access to the account. Therefore we are implementing security system based on biometric. This system is secure and inexpensive, it will prove to be a best banking system. Biometric and GSM security provides correct and fast user verification. As biometric cannot be forgotten they are difficult for attackers to forge and for user to repudiate. Fingerprint is a unique identification for everyone. The system has successfully overcome some of the aspects existing with the present technologies, by the use of fingerprint biometric as the authentication technology.

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Quad-Copter With Night Vision Camera

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Abstract- **Quadcopter is an aerial vehicle which can be driven independently or by pilots on the ground. They are called rotor crafts because unlike helicopters or planes they do not contain fixed wings, instead here lift is created with the help of circling narrow-chord airfoils. Drones (unnamed aerial vehicle UAV) are of different types and they have different uses depending upon the configurations. To have the power over the motion of the vehicle it is necessary to vary the revolution rate of one of the motor discs, thereby altering its lift and torque weight characteristics. To complete a required job, quadcopters have different structures according to it. Motors, batteries, electronic speed controllers are the elements that change depending on the power needed and work to be done by the quadcopter. In addition applications like GPS system or cameras or infrared cameras are used in aid to missions like disaster assistance, cultivation, search and rescue, and 3D mapping of the natural features of an area.**

I. INTRODUCTION

In the recent years there has been a substantial growth in the sales of remote controlled airborne devices called Quadcopters. These devices that are operated using a remote have four arms which are made up of propellers in the X formation [1].According to the criterion form two propellers will rotate in the clockwise way and the other two will rotate in the anti- clockwise way, permitting the vehicle to ascend perpendicularly, glide above the air in a selected manner. By adding up four motors and propellers each to a light weight border constructed with a fibreglass substance or carbon fibre which is linked to a remote control transmitter by means of a small control board fixed with a gyroscopic stabilization network and attached to a lithium polymer battery. These crafts are comparatively easy to build [4]. The fast progress in calculating the power, the productiveness of the components like small microprocessors, brushless dc motor and gyroscopic

Accelerometer technology has all led to production of quadcopter designs.

II. SYSTEM MODEL AND PROBLEM DEFINITION.

Frame: In designing a quadcopter's frame we have to take into consideration the weight that has to be borne by the quadcopter along with the weight of all the components itself [2]. To further reduce the weight of the quadcopter perforations can be made to the body of the frame. The quadcopter frame can be made up of several materials including plastic, aluminium, carbon fiber, etc.

Fig. 1. Frame

ESC: Electronic Speed Control is mainly an electronic circuit whose principle is to change the electric motor's swiftness, path and to also to operate as an energetic break.

The ESC circuitry can be a standalone unit that can be plugged into the receivers throttle control channel. Regardless of the type of esc used it construes the control information in a way that changes the switching rate of networks of FET. The quick switching of the transistors is the cause that the motors emit its typical extreme loud whine.

From a partial voltage from an on-board DC power input the brushless esc creates a three phase AC power output.
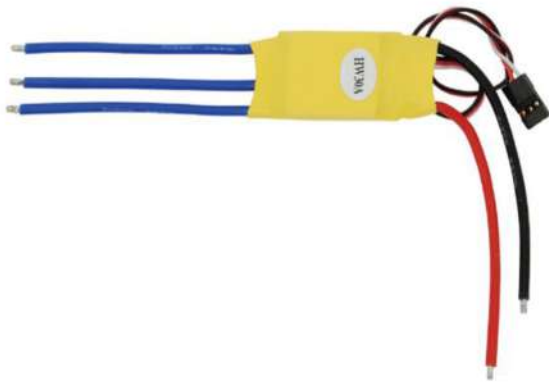
Fig. 2. ESC

In general esc is rated according to utmost current, e.g. 25 ampere. The esc's tends to be heavier if the rating is larger, which is a feature used in balancing the quadcopter.

Esc's are an essential component of modern quadcopter that provides features like high power, high frequency, high resolution three phase AC power to the motors in an tremendously small package. These crafts totally rely on the changeable speed of the motors driving the propellers. This large difference and fine RPM control motor speed is necessary for a quadcopter to take off.

In general quadcopter esc's can rapidly fill in rate compared to the standard 50 Hz signal used in most other RC applications [5]. PWM signals up to 400 Hz can be used in a number of cases and the rate can be amplified even higher by other control options. Low pass filter are software delays that are removed in order to perk up the control latency.

NIGHT VISION CAMERA

A night vision camera is a device that uses night vision to see dim lit areas. Despite popular belief it is not possible to use night vision camera if there is no source of light. Night vision works by amplifying any and all of the light source caught in the camera's scope. The active infrared night vision camera puts together infrared lighting of spectral range 700-1000 nm with cameras sensitive to light [6]. The consequential picture, which appears dark to the viewer, now can see the picture in a monochrome image on a usual display gadget.

III.   PROBLEM DEFENIATION

The main problem that arises in the flight of the quadcopter is the self-levelling of the quadcopter. Due to the problems that arise during self-levelling the quadcopter flips on its self and cannot lift up in the air.

Another problem that arise ifs the difficulty in the esc calibration wherein the four rotors of the copter does not rotate in synchronization.

IV.   FLIGHT CONTROLS.

At the centre of rotation each rotor has its own force and torque that pulls the force in reverse to the vehicle's path of flight. If all the rotors are turning at the same angular velocity, with rotor one and three rotating clockwise and rotor two and four anti-clockwise, the total aerodynamic torque and the angular acceleration about the yaw axis is exactly zero. This is why tail rotor is not necessary on conventional helicopters. By mismatching the balance in aerodynamic torque yaw is induced.
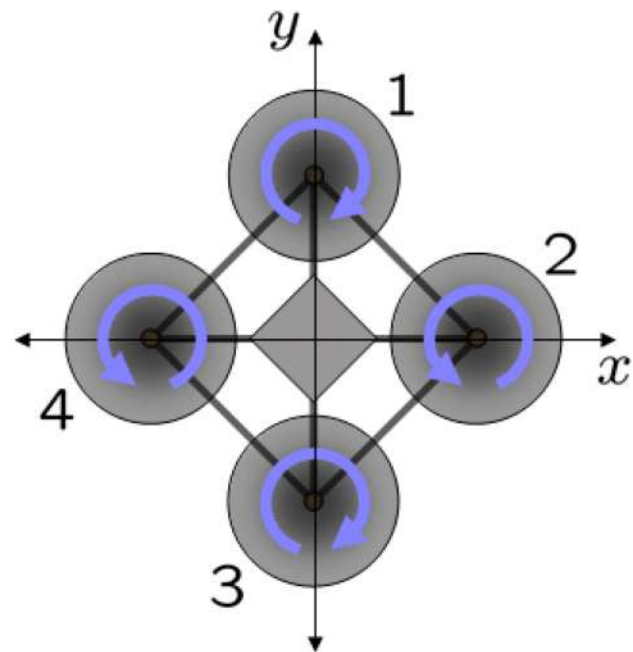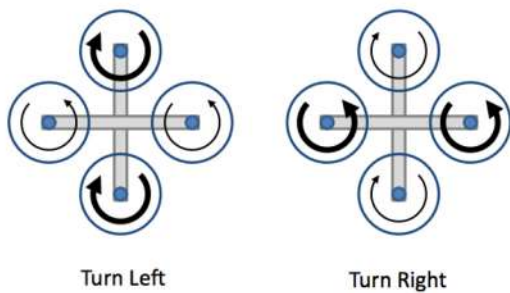

Fig. 3. Motion of Quadcopter

Turn Left   Turn Right

Fig. 4. Motion

V. QUADCOPTER MOVEMENT

In vehicle the motion is operated or controlled by the fixed motor. In rotors the movement is independent. The vehicle can be controlled by depending on the pitch roll and yaw axis of the individual motor.
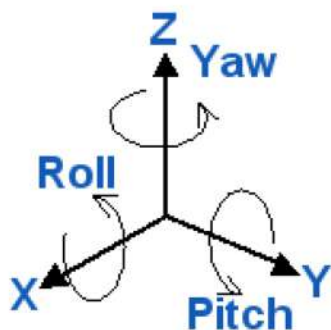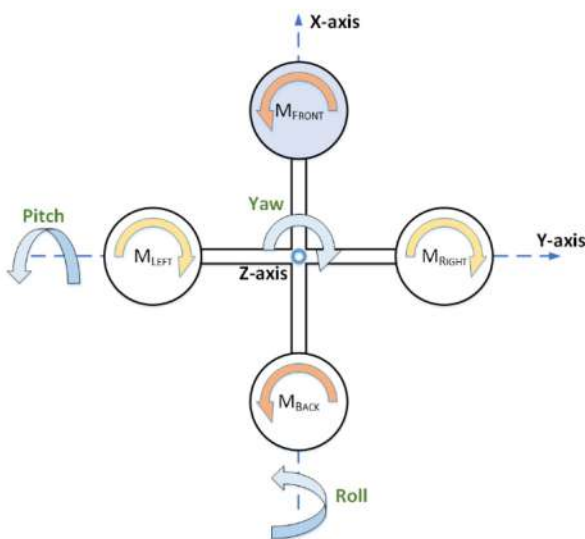

Fig. 5. Axis Motion

Fig. 6. Detailed Axis Motion

By increasing or decreasing the speed of the four motors the lifting and landing activity of the quadcopter can be controlled.

Decreasing and increasing the rear and front rotor speed concurrently will affect the pitch angle of the quadcopter. The forward and rearward motion of the quadcopter is controlled by increasing and decreasing the speed of the back and front rotor.

By varying the yaw angle of the quadcopter the left and right motion can be controlled. Yaw angle can be altered by increasing or decreasing the anti-clockwise rotor speed while decreasing and increasing the clockwise rotor speed.

The balanced position of the quadcopter is achieved by two pairs of rotors rotating with same speed at clockwise and anti-clockwise direction respectively. By two rotors turning in clockwise and anti-clockwise way the entire sum of response torque is zero, hence the quadcopter can hover.

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