# HOME AUTOMATION USING BLUETOOTH WITH IoT

**Mrs. Jeyanthi.K**
**Assistant professor(Sr.G), Dept of Electronics and Communication Engineering**
**KPR Institute of Engineering and Technology,**
**Coimbatore-641407**
**Karthik.S.S[2] ,Gnaneswaran.S[3],**
**Karthick.A[4]**
**Student, Department of ECE,**
**KPR Institute of Engineering and Technology**
sskarthik8050@gmail.com   gnanes08@gmail.com   karthick1194@gmail.com

## ABSTRACT:

With the increase in consumption of energy and population, there is a grave need to conserve energy in every way possible. The inability to access and control the appliances from remote locations is one of the major reasons for energy loss. A web or an android application is used by the users to give instructions to these systems. This system can make use of a host of communication methods such as Wi-Fi, GSM, Bluetooth, ZigBee, Ethernet shield. Different controlling devices and configurations can be found in existing systems. Such systems have been found already in many places for a wide variety of applications. Also this project is mainly implemented for elder and physically challenged peoples who can't able to switch ON/OFF their home appliances.by using this implementation in our home we can reduce the power wastage and also we can save the time.This paper presents a survey of all such systems.

*General terms*:Embedded system,web access,remote access,low cost,android app

*Key words:* power wastage,home appliances,android mobile, Bluetooth, gsm,compact.physically challenged..

# INTRODUCTION:

The aim of the paper is to investigate a cost effective solution that will provide controlling of home appliances remotely and will also enable home security against intrusion in the absence of home owner.

Electronic and Electrical environment with respect to this context is any environment which consists of appliances such as fans, television sets, air conditioners, motors, heater, lighting systems, etc. A remotely accessible environment is an environment in which each appliance can be remotely accessed and controlled using software as an interface, which includes an Android application and a Web application. Such remotely accessible systems are already available in the market, but have a number of drawbacks as well. This paper aims to perform a survey of all the existing such systems and compare the available features.

The paper will also compare and contrast all the systems and look at their various features and disadvantages. A wide variety of options are available for the home automation systems. All of these will be examined at length.

In this project we are going to combine a three wireless technologies together,inorder to provide a easy and compact home automation.

1.Bluetooth.

2.Arduino+Ethernet shield(IoT).

3.GSM(Global system for Mobile communication).

The initial setup of this project is blutooth control through arduino controller. Today, home automation is one of the major applications of Bluetooth technology. Operating over unlicensed, globally available

frequency of 2.4GHz.we can install the android app in our smart phone(Ardudriod)through which we can control our home appliances.range of the Bluetooth is only 10m.suppose we are moved to outside of the home or we unforgettably swithched on the any of our home appliances while moving out of the home, we cant able to control the appliances thorough Bluetooth.so we are going to add a another technology called IoT(Arduino+Ethernet shield)by using this setup and android application we can control the home appliances anywhere in the world.

The next methodology is GSM technology.the GSM module is properly interfaced with Arduino with any SIM.we cant able to control the home appliances while absence of the data network in our smart phone and embedded setup.this is the drawback of the IoT setup.this drawback is overcome by GSM technology by sending sms to control the appliances.

## COMPONENTS USED:

- ➢ Arduino uno
- ➢ Bluetooth module
- ➢ Gsm module
- ➢ Ethernet shield
- ➢ Relay driver circuit
- ➢ Home appliances (fan,lamp,tv)
- ➢ Adapter(+12v)

## METHODOLOGIES

## 1.BLUETOOTH BASED HOME AUTOMATION:

Bluetooth technology is secured and low cost. It makes use of an Arduino Bluetooth board. An interactive android program is used in the cell phone to provide the user interface. The

I/O ports of the Bluetooth board and relays are used for interfacing with the devices which are to be controlled. The Bluetooth is password protected to ensure that the system is secure and not misused by any intruders. The Bluetooth has a range of 10 to 100 meters, 2.4 GHz bandwidth and 3Mbps speed. The android app on the phone is portable. The Bluetooth antenna in our module picks up the packets sent from the cell phone. Subsequently, these packets containing the appliance status commands are pipelined through ATmega168 microcontroller and the designed analogue circuitry according to the definition of each output. Different home appliances are connected to the digital output ports of the Arduino BT board via relays to provide sufficiently high currents and voltage compatibility. For test purposes, 25W, 240V lamps have been used. Figure 2 shows the relay configuration for each device and Figure 3 depicts the Arduino BT board"s communication with the home appliances. Sending commands from software to turnON/OFF a device may not guarantee the successful operation of the device as the device may be defective. To solve this problem, a feedback circuit has been designed and implemented to indicate the device"s actual status after it receives the command (ON/OFF) from the cell phone.Once the command has been sent to turn ON a device, the feedback circuit senses the current and gives an output signal by turning ON a respective led on the switching circuitry indicating that the device is ON. Otherwise, the device is malfunctioning indicating that the command was not executed successfully.

**1.1BLOCK DIAGRAM:**



**Fig 1.1**

**1.2.HARDWARE ARCHITECTURE:**
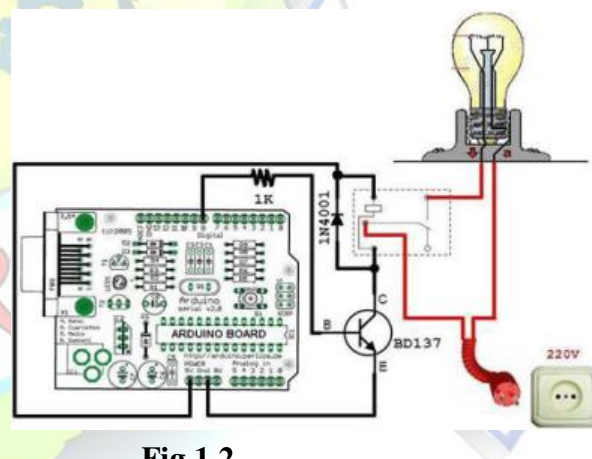**1.2.1DRIVER CONNECTION**



**Fig 1.2**

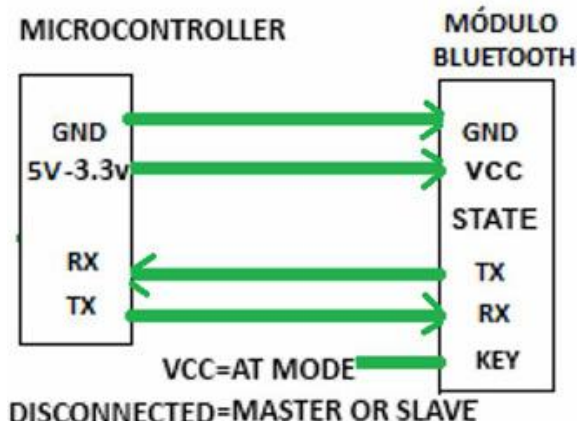**1.2.2BLUETOOTH INTERFACE WITH ARDUINO:**

**Fig 1.3**

## 1.2.3.BLUETOOTH ANDROID APP:



**Fig 1.4**

This android app is designed based on the ports and pins available in the arduino UNO microcontroller board.this app contains arduino digital pins,send data and get data.send data button is used for send a command via Bluetooth to th arduino.depends upon the command received by the Bluetooth module ,the controller then decide whether the device may ON/OFF.different commands are used for control the different home appliances.for example

'A'=lamp1 ON     'a'=lamp1 OFF
'B'=lamp2 ON     'b'=lamp2 OFF

## 1.2.4.DRIVER CIRCUIT FOR CONTROL MORE THEN ONE DEVICE:
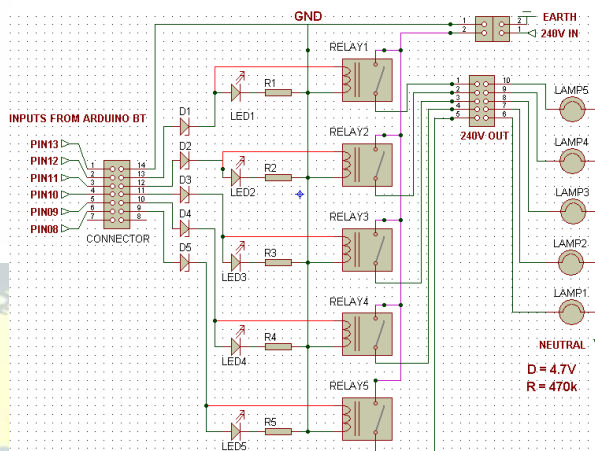


**Fig**

## 2.HOME AUTOMATION WITH INTERNET OF THINGS:
## 2.1.INTRODUCTION:

The Internet of Things (IoTs) can be described as connecting everyday objects like smart-phones, Internet TVs, sensors and actuators to the Internet where the devices are intelligently linked together enabling new forms of communication between things and people, and between things themselves [1]. Now anyone, from anytime and anywhere can have connectivity for anything and it is expected that these connections will extend and create an entirely advanced dynamic network of IoTs. IoTs technology can also be applied to create a new concept and wide development space for smart homes to provide intelligence, comfort and to improve the quality of life.

In this paper, we extend our previous work [2] and present a low cost and flexible home

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control and monitoring system using an embedded micro-web server, with IP connectivity for accessing and controlling devices and appliances remotely using Android based Smart phone app. The proposed system does not require a dedicated server PC with respect to similar systems and offers a novel communication protocol to monitor and control the home environment with more than just the switching functionality. We have utilized rest ful based Web services as an interoperable application layer that can be directly integrated into other application domains like e-health care services, utility, distribution, or even vehicular area networks (VAN).

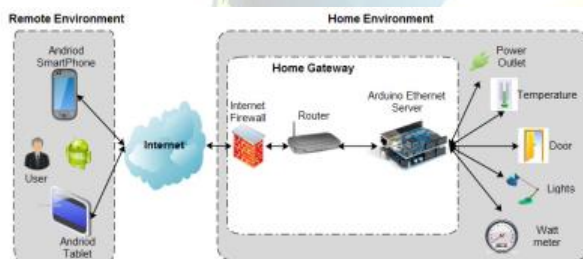## 2.2.PROPOSED SYSTEM AND ARCHITECTURE:



**Fig.2.1**

Home automation or smart homes (also known as domotic) can be described as introduction of technology within the home environment to provide convenience, comfort, security and energy efficiency to its occupants [3]. With the introduction of the Internet of Things, the research and implementation of home automation are getting more popular

According to[2], it is expected that the number of devices connected to the Internet will accumulate from 100.4 million in 2011 to 2.1 billion by the year 2021, growing at a rate of 36% per year. In the year 2011, 80% machine to machine (M2M) connections were made over mobile networks such as 2G and 3G and it is predicted that by 2021, this ratio will increase to 93% since the cost related with M2M over mobile networks are generally cheaper than fixed networks as illustrated in Figure 1. Christo Ananth et al. [9] discussed about an eye blinking sensor. Nowadays heart attack patients are increasing day by day."Though it is tough to save the heart attack patients, we can increase the statistics of saving the life of patients & the life of others whom they are responsible for. The main design of this project is to track the heart attack of patients who are suffering from any attacks during driving and send them a medical need & thereby to stop the vehicle to ensure that the persons along them are safe from accident. Here, an eye blinking sensor is used to sense the blinking of the eye. spO2 sensor checks the pulse rate of the patient. Both are connected to micro controller.If eye blinking gets stopped then the signal is sent to the controller to make an alarm through the buffer. If spO2 sensor senses a variation in pulse or low oxygen content in blood, it may results in heart failure and therefore the controller stops the motor of the vehicle. Then Tarang F4 transmitter is used to send the vehicle number & the mobile number of the patient to a nearest medical station within 25 km for medical aid. The pulse rate monitored via LCD .The Tarang F4 receiver receives the signal and passes through controller and the number gets displayed in the LCD screen and an alarm is produced through a buzzer as soon the signal is received.

## 2.5.MOBILE APPLICATION(BLYNK):

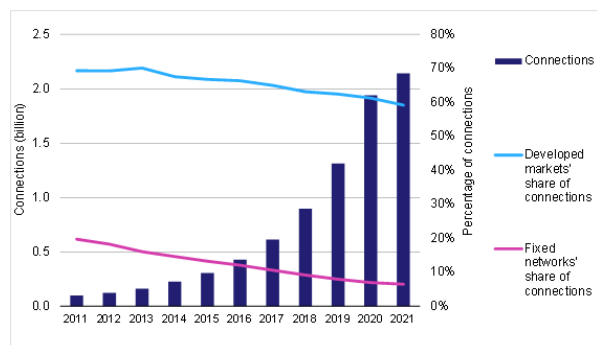### 2.3.M2M DEVICE CONNECTION AND FUTURE PREDICTION



**Fig 2.2**



Fig 2.3

### 2.4.WORKING PRINCIPLE:

Initially arduino Ethernet shield is interfaced with arduino properly.and Ethernet LAN cable is connected with Ethernet shield.in this IoT project we are going to control the home appliances through the android application called "Blynk".this app is available in google playstore.after installing that app in our phone we need to create a individual account by using our mail ID.then we need to create a new project.after creating the project it will generate a unique key,this key will further used in arduino programming to interconnect a mobile app with arduino Ethernet shield.then we want to download the Blynk library in arduino home page.then it is added to the arduino IDE.there are so many programs available in that file,but we need only Ethernet program.after clicking that program,we need to replace the token with that unique key generated by Blynk app.
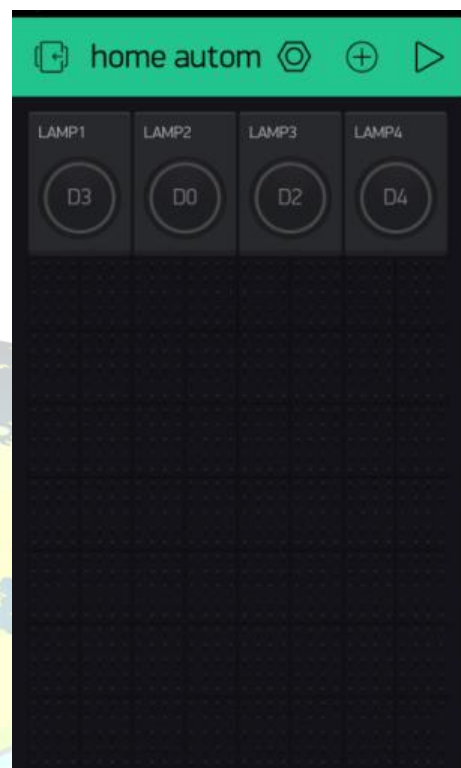
## 3.GSM BASED HOME AUTOMATION:
## 3.1.INTRODUCTION:

GSM is used as a communication medium to help establish connection in places where there may not be proper internet connectivity. The server uses AT commands to communicate with the GSM modem. The mobile interface is developed using J2ME. The server has 4 engines running – the web server, database, main control program and speech recognition program. The system can be controlled using SMS. It can send confirmation messages. Speech processing is done with a dynamic time wrapping algorithm. The voice activation has been tested and found to be too impractical. As a more stable alternative, the voice input can be activated through a wireless unit the user

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carries along in the house. Each application node has four parts – the transmitter, receiver, I/O device and a microcontroller. The main control program in the server takes status information from the devices' transceiver in real time.

The system makes use of a arduino microcontroller for home appliances control [2]. It makes use of GSM for control of the appliances. This is an SMS based system. GSM has been used due to its high availability, coverage and security. The control of home appliances is done primarily through SMS codes. AT commands can be sent through the GSM network and this controls the home devices. Messages are sent by the device to the user through SMS as well. This system can however incur additional costs for the SMS. There is no UI that the user can use to control the device. This system has the drawback of not being able to program the devices. Also SMS depends on the networks and there is a possibility of delayed delivery. The system does not does not have any state information related to the devices and expects the user to keep track of it.

The system is described as an M2M system. It uses GSM for communication. GSM offers options for M2M which include Dual Tone Multi Frequency (DTMF), SMS and General Packet Radio Service (GPRS). This system chooses to use the SMS along with AT (attention) commands. It has a PC as a centre of commands. A GSM dial-up and communication system is embedded in the PC. Visual C++ is used for implementation. The PC decodes the received messages via SMS and performs the commands required. It is a system that can be programmed for the required application as per requirements. The system also has the ability to control mechanical appliances, through sensors that

convert electrical to mechanical signals. However, this system is not designed to provide feedback to the user. The system is PC centric and requires the PC to be on all the time. It cannot be used as a real time control system.
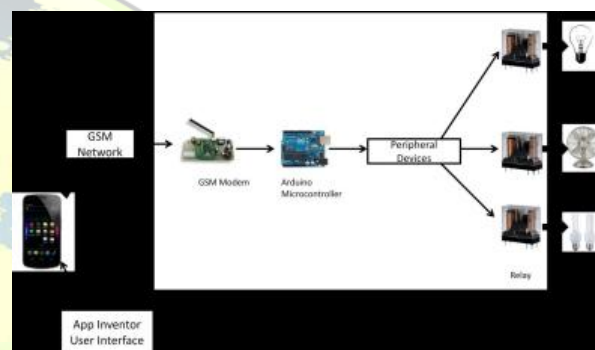
## 3.2.HARDWARE IMPLEMENTATION:



**Fig 3.1**

## 3.3.WORKING PRINCIPLE:

In this setup the GSM module is interfaced with arduino.arduino IDE is used to program the arduino to control the appliances. The AT Commands have been used in this program in order to connect the Arduino and the GSM Module. The following flow chart will be a model for the working of the AT Commands
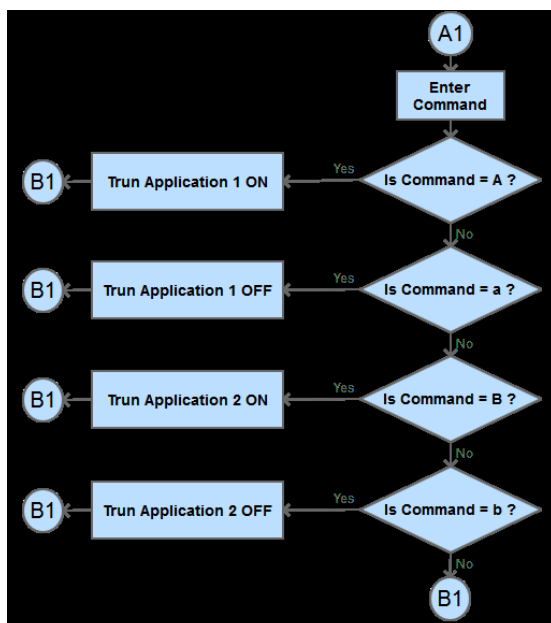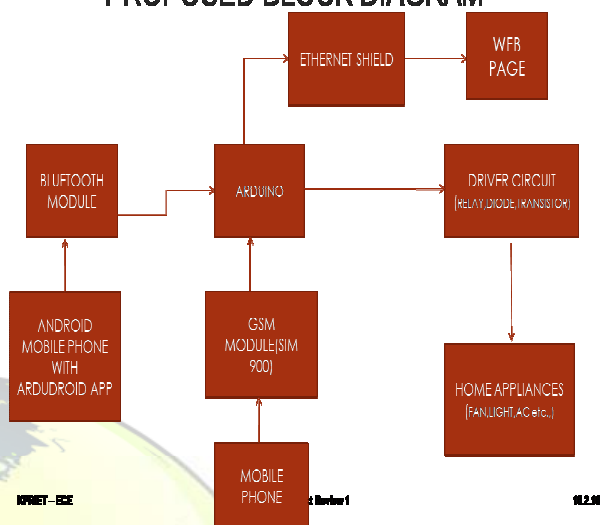
Fig 3.2



**Fig.3.3**

The working process is iniated with the Bluetooth Technology. This Bluetooth can be used to control the home appliances within a shorter range(say 10m). But if the user moves away from the house and still wants to have a control on his home appliances, he can make use of the Ethernet Shield. Data Network is essential at home as well as Ethernet Shield. In case we are not accessible to the Network, we can make use of the GSM technology which requires just a Sms to be sent to control the home appliances.
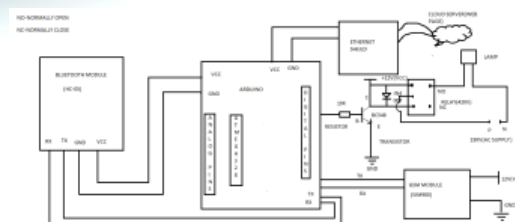
**4.CIRCUIT DIAGRAM:**



**Fig 4.1**
android mobile phone using bluetooth device.(within 10 meters

**3.4.FINAL CONCEPTUAL BLOCK DIAGRAM:**

This block diagram is a combination of three methodologies(Bluetooth, GSM and IoT-Arduino+Ethernet Shield)

**CONCLUSION:**

➢ Home appliances are controlled via

range)

➢ State of the home appliances are periodically updated on web page.by using that page we can control the home appliances via gsm module(any where in the world)

➢ Wastage of power can been reduced.(in normal home appliances around 10-20 units has been wasted per month by unnecessary ON condition.if this project is established in our home,that wastage of power can be reduced))

## APPLICATIONSAND ADVANTAGES:

➢ Home automation – This project can be used to control various Home Appliances(lamps,fans,tv,etc.,)

➢ We can control device from a long distance, thus it gives ease of access.

➢ Faster operation and efficient.

➢ No need to carry separate remote or any other controlling unit.

➢ Wastage of current can been reduced while implementing this project in our home.

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