

MINI PROJECT REPORT
ON
IOT BASED – HOME AUTOMATION APPLIANCES

MINI PROJECT LAB (KCS-554)

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ABSTRACT

Internet of Things (IoT) is a next generation of Internet. The IoT providing an easy way of life with comforts to human being by managing and interacting remotely control of home appliances. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth. The Home Automation System is a new technology for control remotely by IoT technology infrastructure (sensors, communication devices, microcontroller). The main object of this project is to develop a home automation system with Android operating system using Bluetooth technology.

The home automation system is implemented for decades but due to the costing and budgeting of the project, it remains a niche product for high-end consumers. The Intelligent Home Automation System, security is one of the major factors that does not implement the home automation system. The hectic daily life routine sometimes makes them forgetful to switch off the devices at home.

The house has three main operating modes. In automatic mode, it performs the measurement and executes the control of the variables, regulating itself according to the conditions to which it is exposed. In contrast, the remote mode is achieved using the mobile application that allows user to modify the variables. Finally, in alarm mode it controls the parameters that assure the security of the house when proprietor is away from home.

1.INTRODUCTION

1.1. Origin

1.1.1. History of automation

This project is based in automation technology and more specifically in home automation systems. Automation is the transfer of tasks normally performed by humans to a set of technological elements.

An automated system consists of two parts:

✓ Operation: Part formed by elements that act directly on the machine and make it perform desired operations. These elements are called actuators and some examples are engines, cylinders or photodiodes.

✓ Control: Brain of system, normally constituted by a programmable automaton, able to communicate with all constituents of the operation part.

The inclusion of control in the automation system, allows to decide on the development of a process, manipulating certain variables to get these or other variables to act in the desired way. Although it seems a recent technology and currently is in full development, automation dates back to ancient times.

1.1.2 Home automation applications

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Off-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it. We have come up with a new system called Arduino based home automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone.

Home automation refers to the automatic way to control of house hold appliances, there are various systems used for home automation that is based on different microcontrollers and take different parameters to monitor and control the home appliances. The system providing facility to control of home appliances by IoT sensor and other communication devices efficiently. We can control home appliances by mobile device or laptops or over web anywhere in the world. The system is used for controlling various tube lights, fans, home appliances, electrical motors, air conditioner, air heating systems etc are easily controlled by web or internet enabled devices, All these types of systems becoming more popular due to its less cost of implementation and provides flexible functionality that can be easily configurable by everyone according to their need that's why all the IoT system are in great demand and have a lot of value because helping peoples like the people having disabilities, as they can't walk more much then this system is very useful to them and also for the patient or for the old aged person that remains mostly on the bed or also beneficial for the persons that live alone in their houses.

Figure 1.1

Due to the advancement of wireless technology, there are several different type of connections are introduced such as GSM, WIFI, and BT. Each of the connection has their own unique specifications and applications. Among the four popular wireless connections that often implemented in HAS project, WIFI is being chosen with its suitable capability. The capabilities of WIFI are more than enough to be implemented in the design. Also, most of the current laptop/notebook or Smartphone come with built-in WIFI adapter. It will indirectly reduce the cost of this systems.

1.2. Objectives

The main objective of this project is to design and develop a prototype of a home automation controllable from an Android mobile application. Application must be able to perceive and act and to have various types of operation in order to obtain the purpose for which this technology was

invented: maximizing user's comfort offering an easy way to personalize home. The steps that should be taken to achieve the expected result are the following: 1) Determine the scope of the application and delimit the points that each mode of operation must deal with. 2) Select the components and software. 3) Electronic design. 4) Program the board. 5) Program the mobile application. 6) Build the house model. 7) Place and weld the components in the model. 8) Test and debug the application.



Figure 1.2

1.3 IOT (INTERNET OF THINGS)

IOT as a term has evolved long way as a result of convergence of multiple technologies, machine learning, embedded systems and commodity sensors. IOT is a system of interconnected devices assigned a UIDS, enabling data transfer and control of devices over a network. It reduced the necessity of actual interaction in order to control a device. IOT is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system.

1.3.1. Features of IOT

1.3.1.1 Intelligence

IOT comes with the combination of algorithms and computation, software & hardware that makes it smart. Ambient intelligence in IOT enhances its capabilities which facilitate the things respond in an intelligent way to a particular situation and supports them in carrying out specific tasks. In spite of all the popularity of smart technologies, intelligence in IOT is only concerned as a means of interaction between devices, while user and device interaction are achieved by standard input methods and graphical user interface

1.3.1.2 Connectivity

Connectivity empowers the Internet of Things by bringing together everyday objects. Connectivity of these objects is pivotal because simple object level interactions contribute towards collective intelligence in the IOT network. It enables network accessibility and compatibility in the things. With this connectivity, new market opportunities for the Internet of things can be created by the networking of smart things and applications

1.3.1.3 Sensing

IOT wouldn't be possible without sensors that will detect or measure any changes in the environment to generate data that can report on their status or even interact with the environment. Sensing technologies provide the means to create capabilities that reflect a true awareness of the physical world and the people in it. The sensing information is simply the analog input from the physical world, but it can provide a rich understanding of our complex world

1.3.1.4 Security

IOT devices are naturally vulnerable to security threats. As we gain efficiencies, novel experiences, and other benefits from the IOT, it would be a mistake to forget about security concerns associated with it. There is a high level of transparency and privacy issues with IOT. It is important to secure the endpoints, the networks, and the data that is transferred across all of it means creating a security paradigm.

2.LITERATURE SURVEY

2.1 HISTORICAL REVIEW

2.1.1. “Smart Energy Efficient Home Automation System using IOT”, by Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra.

This paper presents a step-by-step procedure of a smart home automation controller. It uses IOT to convert home appliances to smart and intelligent devices, with the help of design control. An energy efficient system is designed that accesses the smart home remotely using IOT connectivity. The proposed system mainly requires, Node MCU as the microcontroller unit, IFTTT to interpret voice commands, Adafruit a library that supports MQTT acts as an MQTT broker and Arduino IDE to code the microcontroller. This multimodal system uses Google Assistant along with a web based application to control the smart home. The smart home is implemented with main controller unit that is connected with the 24-hour available Wi-Fi network. To ensure, that the Wi-Fi connection do not turn off, the main controller is programmed to establish automatic connection with the available network and connected to the auto power backup.

2.1.2 “A Low Cost Home Automation System Using Wi-Fi based Wireless Sensor Network Incorporating internet of Things”, by Vikram. N, Harish K.S, Nihaal M.S, Raksha Umesh, Shetty Aashik Ashok Kumar.

This paper illustrates a methodology to provide a low cost Home Automation System (HAS) using Wireless Fidelity (Wi-Fi). This crystallizes the concept of internetworking of smart devices. A WiFi based Wireless Sensor Network (WSN) is designed for the purpose of monitoring and controlling environmental, safety and electrical parameters of a smart interconnected home. The different 11 | P a g e sections of the HAS are; temperature and humidity sensor, gas leakage warning system, fire alarm system, burglar alarm system, rain sensing, switching and regulation of load & voltage and current sensing. The primary requirement of HAS to monitor and control of devices is accomplished using a Smartphone application. The application is developed using Android Studio based on JAVA platform and User Interface of those are exemplified. The primary focus of the paper is to develop a solution cost effective flexible in control of devices and implementing a wide range of sensors to capture various parameters.

2.1.3 “Enhance Smart Home Automation System based on Internet of Things”, by Tushar Churasia and Prashant Kumar Jain.

This paper proposes a system that develops a model to reduce the computation overhead in existing smart home solutions that uses various encryption technologies like AES, ECHD, hybrid, etc. these solutions use intermediate gateway for connecting various sensor devices. The proposed model provides a method for automation with sensor based learning. The system uses temperature sensor for development but other sensors can also be used as per requirement. These smart home devices with sensors can configure themselves autonomously and can operate without human intervention. This work minimizes encryption decryption and focuses on authentication and automation of smart home devices with learning. The system bypasses local gateway mentioned in existing system to provide better security for smart home devices and sensor data and save computation overhead. The real time broker cloud is directly connected with smart home and manages all incoming and outgoing request between users and devices. The main purpose to use real time broker cloud is save time of cryptographic operations.

2.2 Background Research

The process of improving and upgrading the living standard of the house has been raised due to the advanced technology applied in this era society. Home Automation System is implemented for decades but due to the costing and budgeting of the project, it still remains as a niche product for high end consumers. Although the concept of smart home automation has been around for quite a long time, but an actual smart home has only established a short time. The invention of home appliances such as a television with a remote control which is a simple home automation system was patented in 1893 . Other than that, more home appliances have been invented since that. In early 2000, the popularity of smart home automation began to increase due to different of technology started to arise. Smart home automation turns into a more affordable choice and therefore a viable or available technology for consumers. With the uprising of the prestige of smart home, home networking, domestic technologies and other gadgets began to emerge on store shelves Today's smart home automation are more emphasize about smart living, living greener and security. Our smart home is sustainable and it ensures that our home is not utilizing unnecessary energy. In addition, the smart home also can prevent any intruders by alerting us with alarm or send any signal to us through smartphone related application. The current trend in smart home automation includes automated lights, remotely mobile control, remote video surveillance and receiving notifications of mobile, email and text .

3.PROBLEM STATEMENT

Nowadays, people with the hectic daily life routine sometimes makes them forgetful to switch off the devices at home. As a human being we can't run from the clumsiness attitude plus with our packed daily routine life that sometimes makes ourself such in hurry situation that sometimes makes us forgot to switch off the lamps. It will causes the electricity bill rose sharply. Besides, it is one of the electricity wastage that will lead the earth to became an unhealthy ones. Besides, the elderly and the handicapped user faced problem to manually access control of light and fan instead of automation process.

4. METHODOLOGY

4.1 INTRODUCTION

In this project is more focusing about home appliances. A step by step procedure is done so that the project can be completed in time. This include circuit design and design mechanical part.

4.2 PROJECT DESIGN AND OVERVIEW

. As mention in previous chapter, the design home controller with NODEMCU as the main controller. The design of the controller circuit using NODEMCU is realize using Proteus Software to try run the circuit.

4.3 BLOCK DIAGRAM OF THE PROJECT

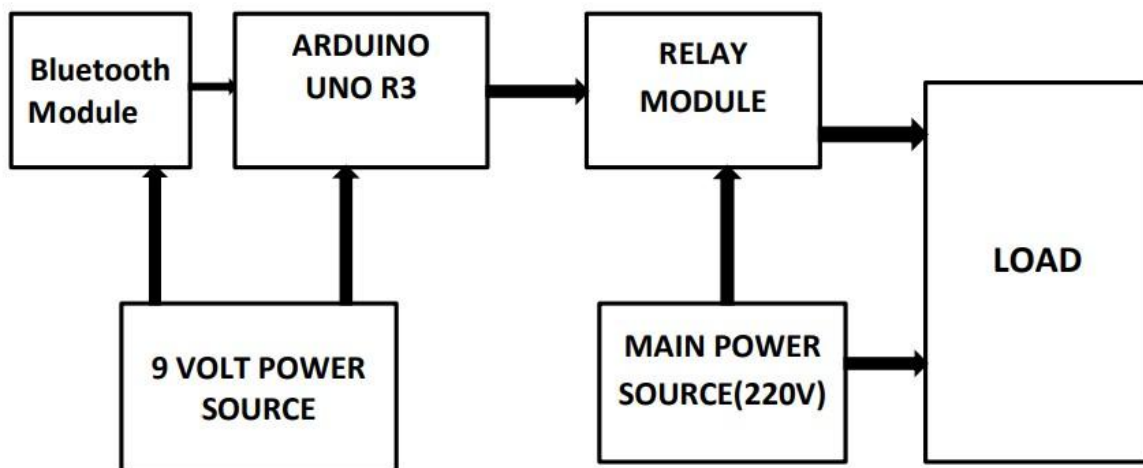


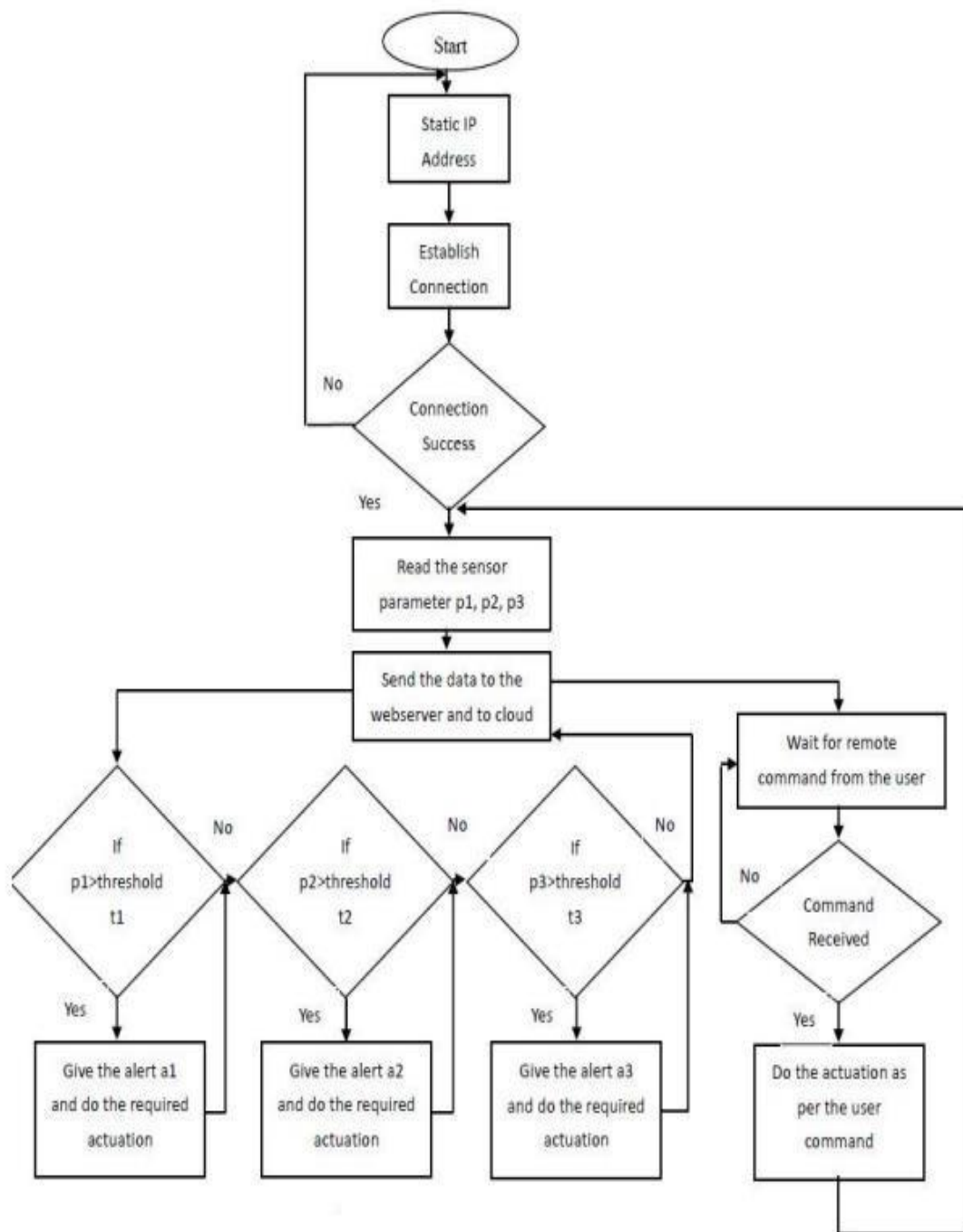
Figure 4.3

4.4. DESIGN CONSIDERATION AND SPECIFICATION

In this project is more focusing about home appliances .A step by step procedure is done so that the project can be completed in time.This include circuit design and design mechanical part.

The proposed model of home automation system contains server, actuators, sensors and microcontrollers. The hind-end server will be setup to controlling, monitoring of the sensor devices. The proposed home automation system will be remotely control by wireless technological communication devices like smart phones, tabs and other wireless devices remotely through Internet. In this proposed home automation system can be control, managed remotely of room temperature, automatic on and off fans, automatic lights on and off, automatic gas leakage detected by sensors, air conditioning system etc. are automatically control and managed by home automation system. The proposed without interacting of human being the home automation system monitor as well as control leakage of gas, fans on & off system, lights on & off system, check and control room temperature and humidity level by IoT related communication devices. The NodeMCU is a brain of this system and executing various processes for home appliances system. NodeMCU connect, communicate with various sensors are gathered real-time information for home automation system. These contains two Node MCU. The NodeMCU (Node Micro Controller Unit) is a open source contains software and hardware that built-up very less expensive system designed on chip known as ESP8266.

4.5 FLOWCHART OF THE PROJECT

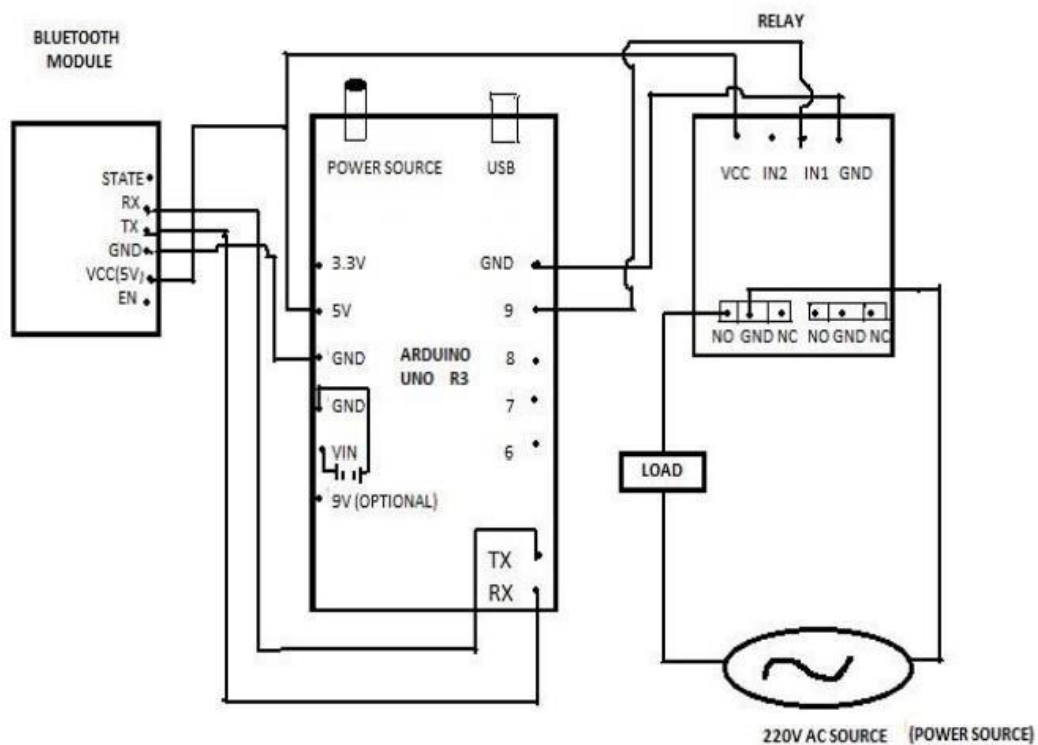


4.5.1 FLOWCHART DESCRIPTION

- A smartphone which should have the android app install in it.
- Bluetooth Receiver module-Our project will be connected to the smart phone using web technology.
-

- Controller or the main processing circuit- In this project, Arduino Uno is a main controlling/processing unit. Also, this project can be develop using PIC18F4550,AVR ATmega32.
- Relays to control devices-We have used 12V single push single throw relays.
- Output devices- For the demo purpose we connected DC devices to relay(12V DC bulbs).

4.6 CIRCUIT DESIGN



4.7 PROJECT SOFTWARE

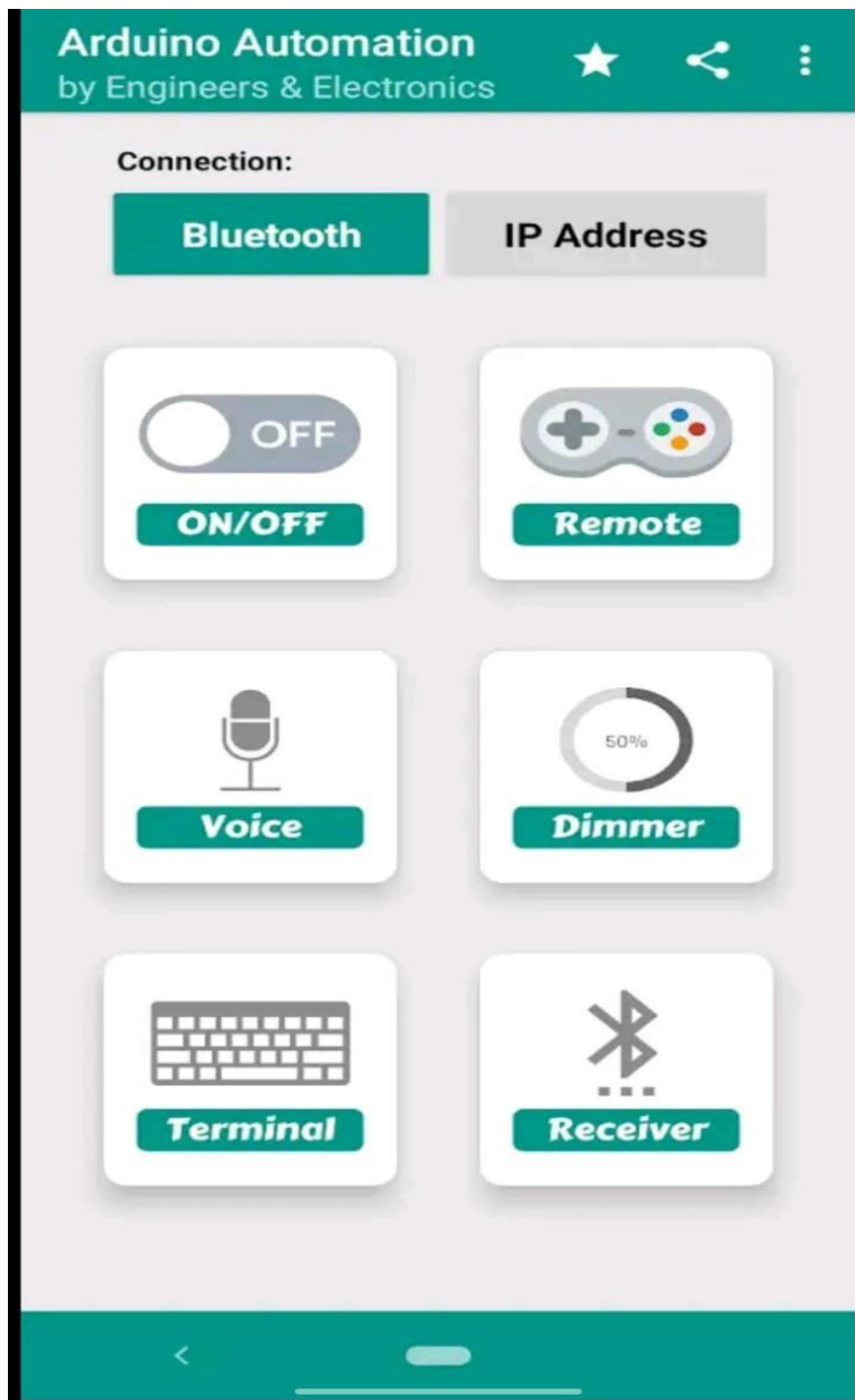
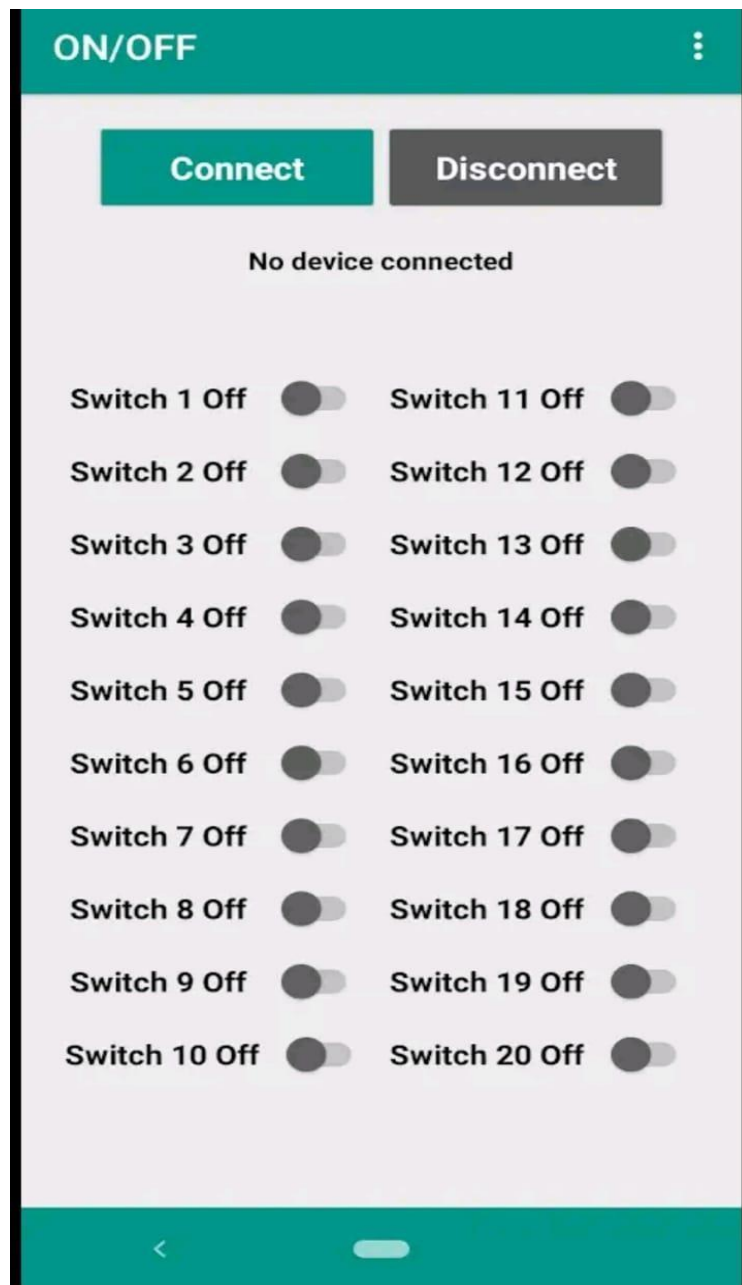


Figure 4.7.1

Arduino IDE is an open-source software program that allows users to write and upload code within a real-time work environment. As this code will thereafter be stored within the cloud, it is often utilised by those who have been searching for an extra level of redundancy. The system is fully compatible with any Arduino software board

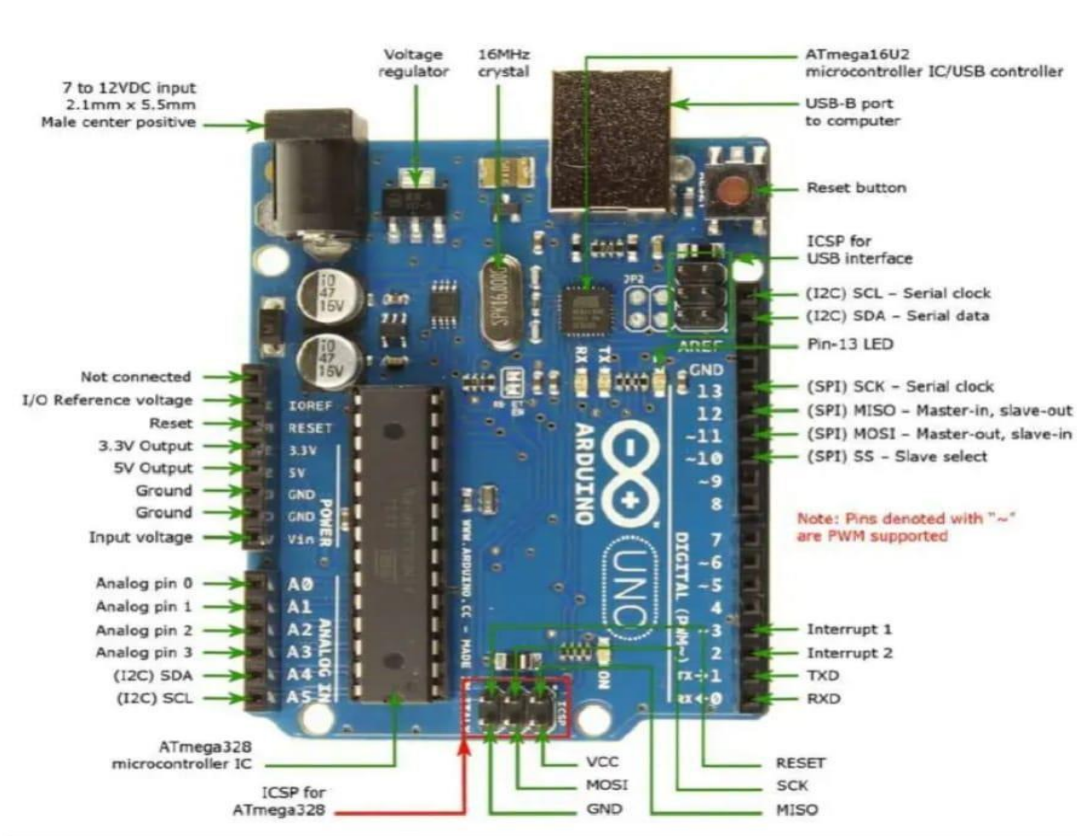


4.8 PROJECT COMPONENTS

- ARDUINO MICROCONTROLLER
- BLUETOOTH MODULE HC05
- JUMPER WIRE
- BREADBOARD
- RELAY
- LED

- REMOTE
- POWER SUPPLY – ADAPTER (12V , 2A)

4.8.1. MICROCONTROLLER (Arduino UNO ATMEGA128p)



Figure

re 4.8.1

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo.

| ARDUINO BOARD | Microcontroller | Input voltage | Operating voltage | Output current | Clock frequency | Flash memory | SRAM | EEPROM | Digital I/O | PWM outputs | Analog inputs |
|---------------|-----------------|---------------|-------------------|----------------|-----------------|--------------|--------|--------|-------------|-------------|---------------|
| DUE | AT91SAM3X8E | 7-12 V | 3,3 V | 130 mA | 84 MHz | 512 KB | 96 KB | | 54 | 12 | 12 |
| LEONARDO | ATmega32u4 | 7-12 V | 5 V | 40 mA | 16 MHz | 32 KB | 2,5 KB | 1 KB | 20 | 7 | 12 |
| MEGA | ATmega2560 | 7-12 V | 5 V | 20 mA | 16 MHz | 256 KB | 8 KB | 4 KB | 54 | 12 | 16 |
| PRO | ATmega328 | 5-12 V | 5 V | 40 mA | 8 MHz | 32 KB | 2 KB | 1 KB | 14 | 6 | 6 |
| UNO | ATmega328P | 7-12 V | 5 V | 20 mA | 16 MHz | 32 KB | 2 KB | 1 KB | 14 | 6 | 6 |

The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards; it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

While the Uno communicates using the original STK500 protocol, it differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

4.8.2. Bluetooth Module Interfacing with Arduino Uno

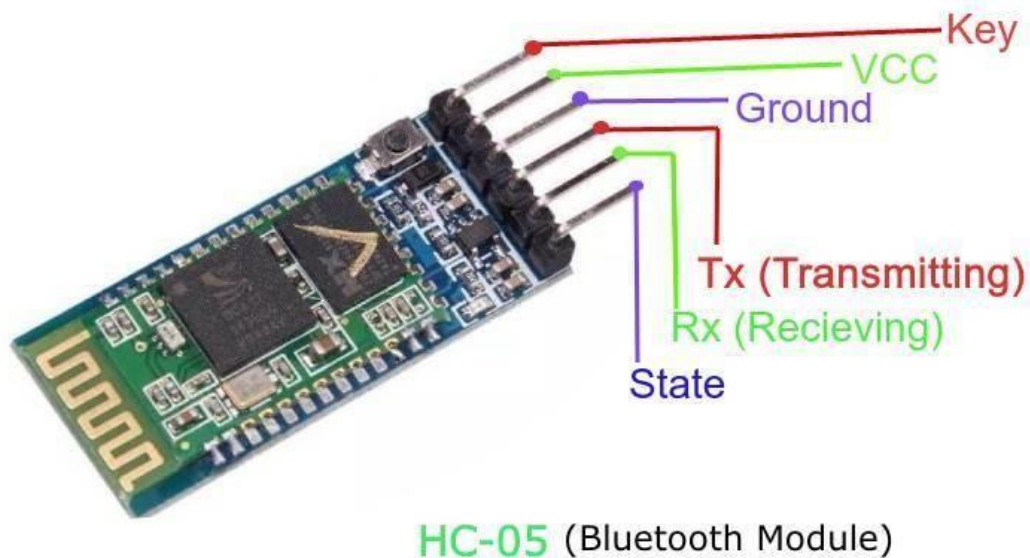


Figure 4.8.2

- HC-05 is a Bluetooth device use for wireless communication with bluetooth enables device (like smartphone) . It communicate with microcontroller using serial communication (USART) .
- Default setting of HC-05 bluetooth module can be changr using certain at commands.
- As HC-05 bluetooth module has 3.3 level for Rx/Tx and microcontroller Decaet
- Volt level , so there is no need shift the transmit voltage level from microcontroller to RX of HC-05 module.

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds.

This module works on 3.3 V. We can connect 5V supply voltage as well since the module has on board 5 to 3.3 V regulator.

4.8.3. BREAD BOARD

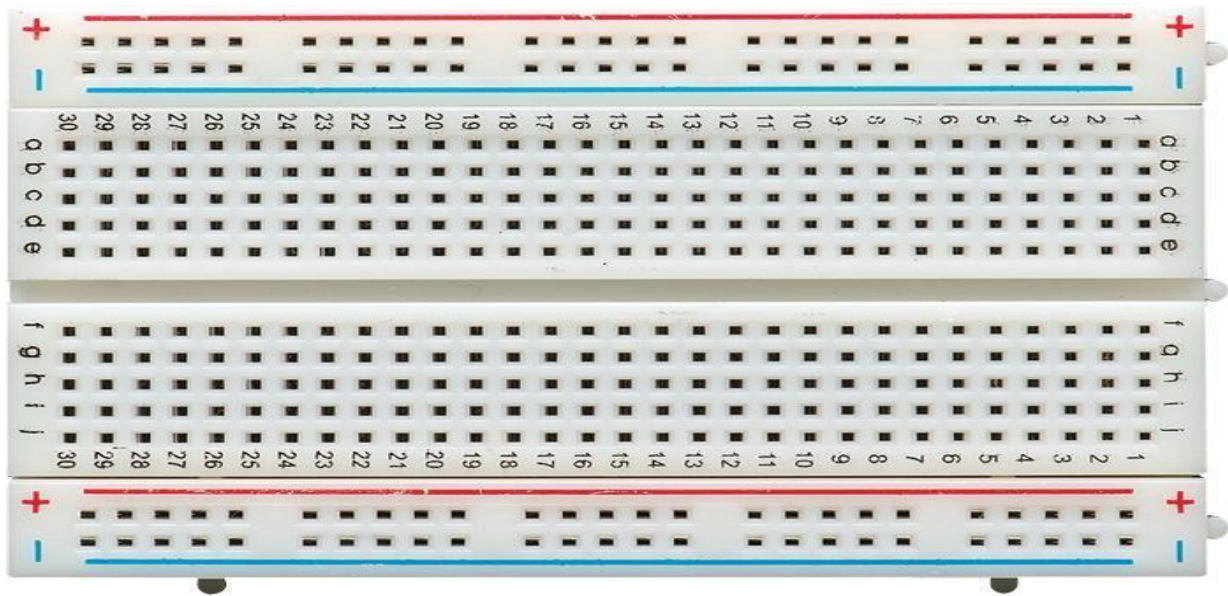


Figure 4.8.3

A breadboard, solderless breadboard, or protoboard is a construction base used to build semipermanent prototypes of electronic circuits. Unlike a perfboard or stripboard, breadboards do not require soldering or destruction of tracks and are hence reusable. For this reason, breadboards are also popular with students and in technological education.

Breadboards have many tiny sockets (called 'holes') arranged on a 0.1" grid. The leads of most components can be pushed straight into the holes. ICs are inserted across the central gap with their notch or dot to the left.

4.8.4. RELAY

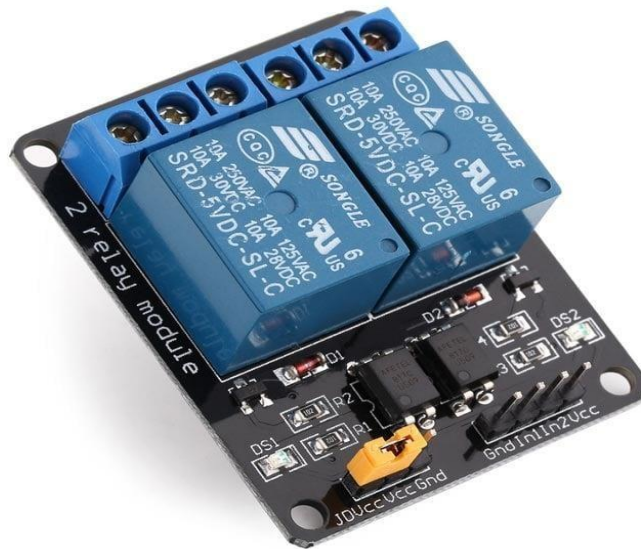


Figure 4.8.4

A relay is a programmable electrical switch, which can be controlled by Arduino or any microcontroller. It is used to programmatically control on/off the devices, which use high voltage and/or high current.

It is a bridge between Arduino and high voltage devices.

Relay has two groups of pins: input (low voltage) group and output (high voltage) group.

Pins in the input group are connected to Arduino, including three pins.

- DC-pins: needs to be connected to GND(0V)
- DC+ pins: needs to be connected to VCC(5V)
- IN pin: receives the control signal from Arduino.

Pins in the output group are connected to the high voltage devices including three pins:-

- COM pin: if the common pin it is used in both normally open mode and normally close mode.
- NO pin: is a normally open pin. It is used in normally open mode.
- NC pin: Normally close pin. It is used in the normally close mode.

5. CODE OF THE PROJECT

```
File Edit Sketch Tools Help
bluetooth_and_remote_controller

#include <IRremote.h>
char val;
int IRpin = 5;
IRrecv irrecv(IRpin);
decode results results;
#define led1 2
#define led2 3
#define led3 4
int L1,L2,L3,POWER;

void setup()
{
  Serial.begin(9600);
  pinMode(led1,OUTPUT);
  pinMode(led2,OUTPUT);
  pinMode(led3,OUTPUT);

  irrecv.enableIRIn(); // Start the receiver
}

void loop()
{
  if (Serial.available())
  {
    val = Serial.read();
    Serial.println(val);
    if(val == 'A')
      digitalWrite(led1,HIGH);
  }
}
```

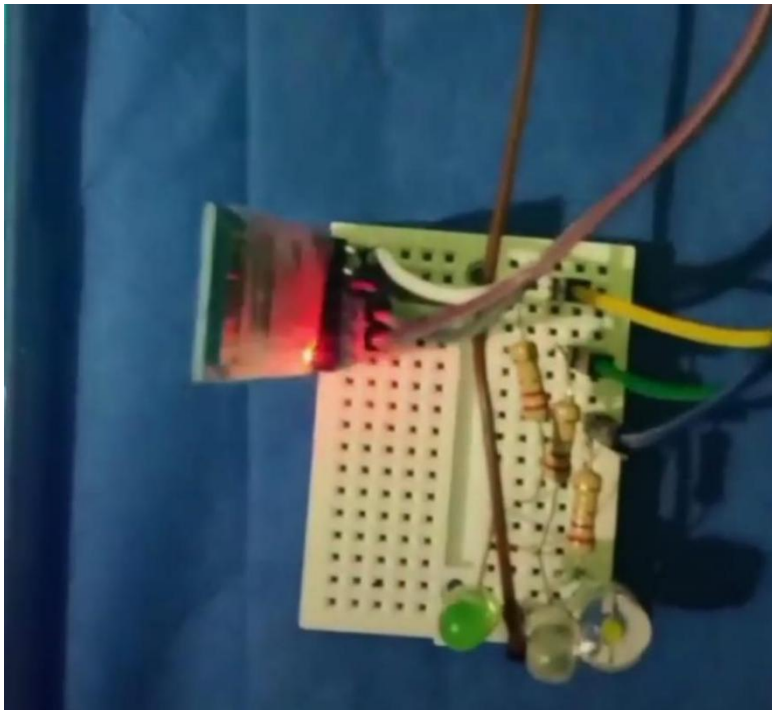
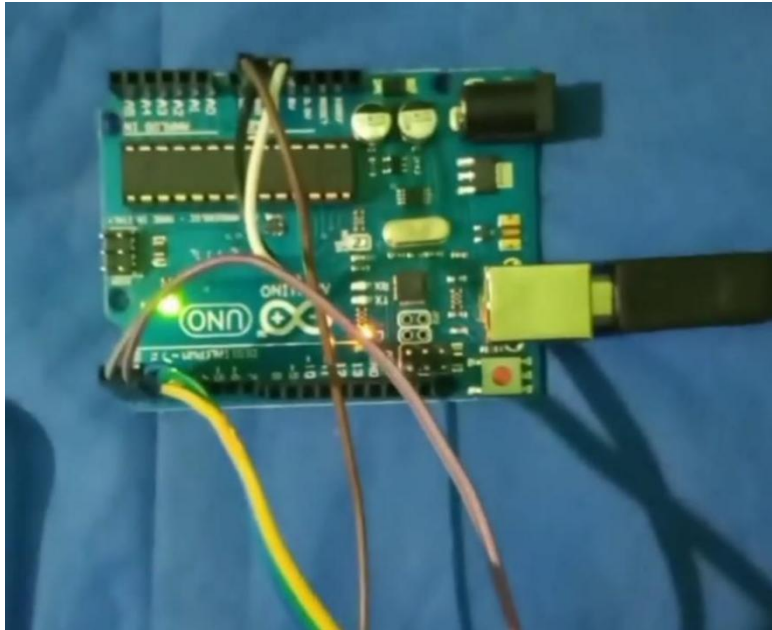
```
bluetooth_and_remote_controller | Arduino 1.8.15
File Edit Sketch Tools Help
bluetooth_and_remote_controller

Serial.begin(9600);
pinMode(led1,OUTPUT);
pinMode(led2,OUTPUT);
pinMode(led3,OUTPUT);

irrecv.enableIRIn(); // Start the receiver

}
void loop()
{
  if (Serial.available())
  {
    val = Serial.read();
    Serial.println(val);
    if(val == 'A')
      digitalWrite(led1,HIGH);
    else if(val == 'a')
      digitalWrite(led1,LOW);
    else if(val == 'B')
      digitalWrite(led2,HIGH);
    else if(val == 'b')
      digitalWrite(led2,LOW);
    else if(val == 'C')
      digitalWrite(led3,HIGH);
    else if(val == 'c')
      digitalWrite(led3,LOW);
  }
  if (irrecv.decode(&results))
}
```


6. SNAPSHOT OF THE PROJECT



7. CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

The system as the name indicates, 'Home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies. The system consists of mainly three components is a BLUETOOTH module, Arduino microcontroller and relay circuits. We hide the complexity of the notions involved in the home automation system by including them into a simple, but comprehensive set of related concepts. This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device's display. This paper proposes a low cost, secure, ubiquitously accessible, auto-configurable, remotely controlled solution. Hence we can conclude that the required goals and objectives of home automation system have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems

7.2 FUTURE SCOPE

Using this system as framework, the system can be expanded to include various other options which could include home security feature like capturing the photo of a person moving around the house and storing it onto the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and stores it. The system can be expanded for energy monitoring, or weather stations. This kind of a system with respective changes can be implemented in the hospitals for disable people or in industries where human invasion is impossible or dangerous, and it can also be implemented for environmental monitoring.

8.. REFERENCES

- 1.Sirsath N. S, Dhole P. S, Mohire N. P, Naik S. C & Ratnaparkhi N.S Department of Computer Engineering, 44, Vidyanagari,Parvati,Pune-411009,India University of Pune, “Home Automation using Cloud Network and Mobile Devices”.
2. Deepali Javale, Mohd. Mohsin, Shreerang Nandanwar “Home Automation and Security System Using Android ADK” in International Journal of Electronics Communication and Computer Technology (IJECCCT) Volume 3 Issue 2 (March 2013).
- 3.Charith Perera, Student Member, IEEE, Arkady Zaslavsky, Member, IEEE, Peter Christen,and DimitriosGeorgakopoulos, Member, IEEE “Context Aware Computing for The Internet of Things: A Survey”. IEEE COMMUNICATIONS SURVEYS & TUTORIAL.
- 4.Charith Perera_y, Arkady Zaslavskyy, Peter Christen_ and Dimitrios Georgakopoulosy Research School of Computer Science, The Australian National University, Canberra, ACT 0200, Australia yCSIRO ICT Center, Canberra, ACT 2601, Australia ” CA4IOT: Context Awareness for Internet of Things”.
- 5.Bill N. Schilit, Norman Adams, and Roy Want, “Context-AwareComputing Applications”.
- 6.Jayavardhana Gubbi, ,Rajkumar Buyya, Slaven Marusic,a Marimuthu Palaniswamia, “Internet of Things (IoT): A Vision, Architectural Elements, and Future Directions”.
- 7.S.P. Pande, Prof. Pravin Sen, “Review On: Home Automation System For Disabled People Using BCI” in IOSR Journal of Computer Science (IOSR-JCE) e- ISSN:2278-0661, p-ISSN: 2278-8727 PP 76-80.

8. Basil Hamed, "Design & Implementation of Smart House Control Using LabVIEW" at International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-1, Issue-6, January 2012.

9. Basma M. Mohammad El-Basioni¹, Sherine M. Abd Elkader² and Mahmoud Abdelmonim Fakhreldin³, "Smart Home Design using Wireless Sensor Network and Biometric Technologies" at Volume 2, Issue 3, March 2013.

10. Inderpreet Kaur, "Microcontroller Based Home Automation System With Security" at IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 1, No. 6, December 2010.