Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 7, June 2021: 14196-14204

Implementation Of Smart Home Automation In Android Application

K. Bala Maheswari [a], M.R.Faridha Banu[b] ,D.Lavenya[c], M.R.Saira Banu [d]

[a] Assistant Professor R.M.K Engineering college
bik.eee@rmkec.ac.in
[b] Assistant Professor St.Joseph's Institute of Technology
faridha.rasool@gmail.com
[c]Assistant Professor GRT Institute of Engineering & Technology
lavenya.d@grt.edu.in
[d]Lecturer College of Computer Science & Information
Systemsbrasool@nu.edu.sa
Department of Electrical and Electronics Engineering

Abstract

In this project we will design a easiest Technology to ON and OFF varies types of electrical load.it is done by using android application and Arduino UNO ATMEGA microcontroller. The main objective of my system is to control the electrical appliances via remote. Remote controlled home automation gives a better solution with android application technology.It is an electric shock prevent technology for human being.Remote operation is done by any Smart- phone/Tablet etc.. In industrial automationview , the technology is applied to large machines or robots it will create a better change in efficiency in terms of Production,energy and time.this system is simple,cheaper and efficient one.

Keywords: ARDUINO UNO, REMOTE CONTROL, GUI, ATMEGA

1. Introduction

We are living in 21st century every technology has the automation.i.e home or industrial plays a important role in human life. In industrial automation view , the technology is applied to large machines or robots it will create a better change in efficiency in terms of Production, energy and time.

Smartphones makes a big revolution in this century.it can be used by multiple purpose. For communication between human to human and human to smart technology. With help of sensors and actuators we can easily communicate with techonolgy without complexity.

Without intervention of human being is called Automation. If any Home automation in your home that is also called as Smart home or smart house. In the Fast growing of Technology, all the houses Are being replaced by smart house without internet it is not possible one. so internet is the important constituent in the world.

Automation the subject to reduce the human work . Benefit of automation is reduces the time of human and also protected from harmful shock. In this system am using ATmega328 microcontroller to dump the coding . Arduino software it is an open source software for develop the coding. Simulation weredone by the Proteus profession software.

To develop the Schematic diagram and testing also done by this software. liquid crystal display were used to display the current status of how many loads are active and inactive. Relay plays a major role in this project . All the loads were controlled by the dc relay.

In this system Aimed to control the Home appliances only.because our motive is to help the specially disabled people and shock protectant in rainy season .

In this system, we describe about household application only. Other way to control the home appliances through GSM technology, but compared with Bluetooth GSM is cost effective one. Sometimes tower problem were occurred that is reson for taking the Bluetooth device. The life of our values also improved with help of this technology.Our main motive are to help to old aged people and protective human from Electric shock,to control the home appliances from remote places. Our major focus is on controlling the home appliances from both indoor and outdoor. The mobile application is created and interfaced with the device to control home appliances through blue tooth and GSM for indoor and outdoor controlling respectively.

2. Hardware Design

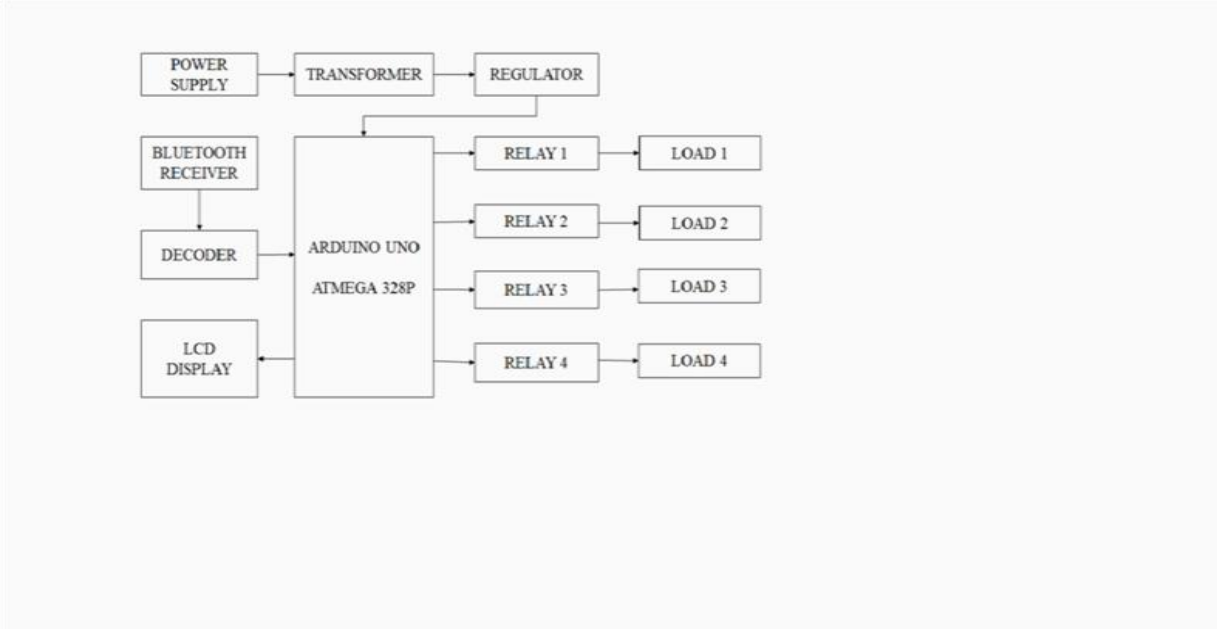

FIG . System Block Diagram

Arduino UNO

Arduino UNO board includes ATmega328 IC(Intergrated circuit)developed by Arduino.cc. The board is Classified with Analog pins, digital pins and power supply pins. Crystal resonator is there is to control the speed of microcontroller. We can powerup the Arduino board by 12v adaptor or external battery.if you want to reboot a Arduino program one reset switch is placed in corner of Arduino board. Lets go for the pin details. Pins can be classified into 3 types are power pin(5v and 3.3v), Analog pins and Digital pins. TX and RX pins are used to sending and receiving the Serial data.

The Uno board is the first in a series of USB-based Arduino boards.Arduino uno to control motors, light, cameras and build a simple robot. 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.

The board is equipped with sets of D/A input/output pins that may be interfaced to various expansion boards and other circuits.

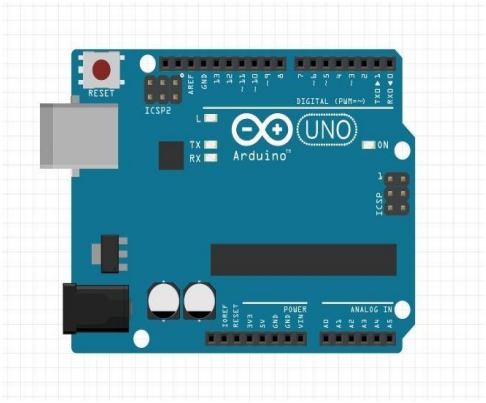

FIG. Arduino UNO

Atmega

The ATmega328 is a dual in package microcontroller created by Atmel in the mega AVR family (later Microchip Technology acquired Atmel in 2016). It has a recreated Harvard architecture 8-bit RISC processor. 10 Bit resolution microcontroller.

Arduino board have three different types of memory FLASH ,RAM and EEPROM. In Flash contains 32kb of memory used to stores the compiled sketch location. RAM contains 2kb of memory it is an volatile that means if the power is off memory of RAM was lost. EEPROM have only 512 bytes of memory no need care about power off issues data will be in EEPROM.

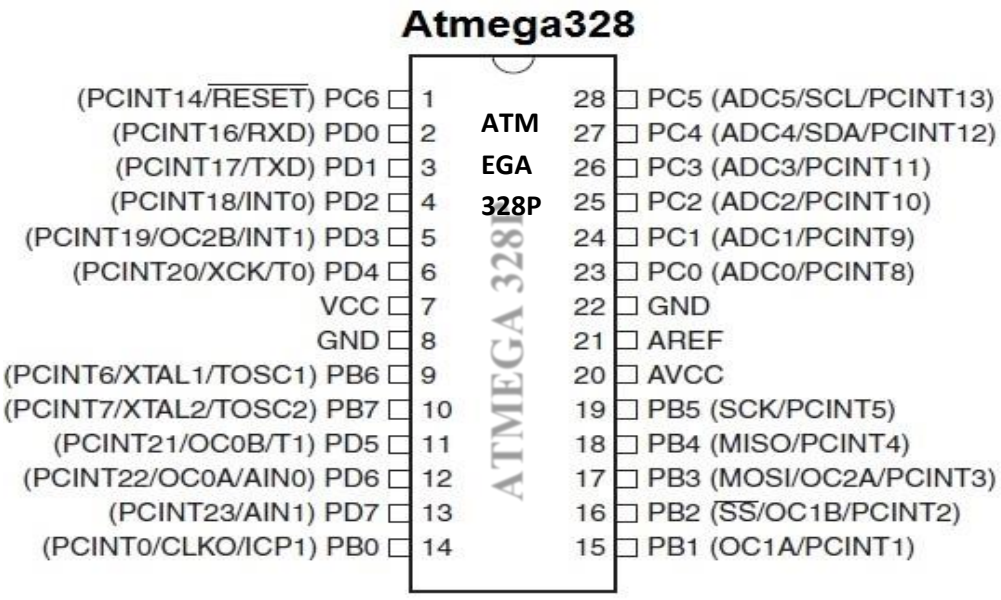

FIG. PIN DIAGRAM

Relay

The relay normally has five connections are Normally close, Normally Opened, Coil 1, Coil 2 and Common. Coil 1 and Coil 2 are the two sides of the electromagnetic coil. When the coil is Energized strong magnetic field were created depend upon magnetic field the new connection is established between Normally closed and Normally opened terminal. Based on magnetic field common terminal is connected between NC and NO. The main advantage of Relay is to isolate the output from input.no electrical connection between input and output.

Bluetooth Module

Bluetooth is an wireless standard to transfer and receive the data wirelessly. Bluetooth essentiallycommunicate between the two devices.Basically Arduino board have not contain the Bluetooth

availability so we need to add a Bluetooth module to the Arduino Board. It is the simplest way to converting the normal Arduino to super Arduino. now the this super Arduino board is possible for sending and receiving data for both sides. this is called bi-directional communication.

HC05 is a industrial standard module transceiver used to sending and receiving the data wirelessly. Easy to connect the HC05 device to any microcontroller module. Bluetooth device were connected via UART(Universal Asynchronous Receiver Transmitter) communication.

HC05 having 6 pins(state, Rx, Tx, ground,Vcc and enable) RX pin is connected to transmitter of Arduino and TX pin is connected to Receiver pin of Arduino . Ground pin is connected to ground pin of our Arduino. VCC pin is connected to 5v pin of Arduino . Rest of the two pin we are not bother that cannot affect the communication.

FIG. Bluetooth Module

I2C BUS

I²C (Inter-Integrated Circuit), pronounced I-squared-C. it is wired communication only two wires required for to communicate 128 devices with 7 bit addressing and also upto 1024 devices with 10 bit addressing. I²C communication is very popular and used in electronic devices. Two wires are called serial clock(SCL) and Serial data (SDA).SCL is clock signal line is used to synchronized the clock signal generated by master device. SDA line is used to carry the data.

Role of I2C in this system is to reduce the pin connection between the Arduino and LCD display.

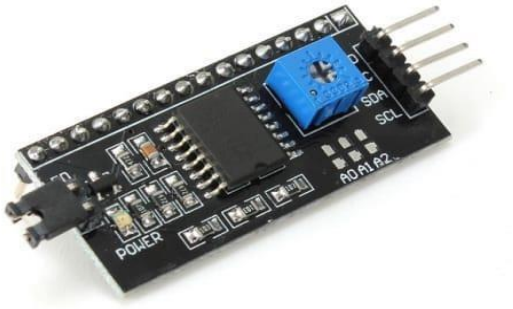

FIG. I2C BUS

Lcd Display

A liquid-crystal display (LCD) is classified into two types one is character lcd another one is graphical lcd. Graphical were used in mobile phones TV screens. Character type Lcd are used to displaying the characters, numbers and some custom characters. We are going to use character type LCD. These LCD having small controller for controlling the LCD display. With help of I2C bus Arduino controller and LCD controller to

communicate each other.Various number of sizes available in character LCD. We are going to select 16x2 LCD that is enough for our system.

Fig. Lcd Display

3. Working

In this system remotely we are accessing the all the electrical appliances via android application with help of Bluetooth module. First have to pair the Smart phone Bluetooth to HC05 bluetooth module.when the HC05 module start blinging means it is ready to pair with another Bluetooth device. In our android app having the load options by clicking the whatever load you want that will be ON with help of Relay. in this system am using four types ofelecrtical appliances in smart home.So four relays also used to control the four loads. LCD shows the current status of four loads. The main aim of this smart home is to helping aged people and also prevent the electrical shock from human being.

The circuit detailsof oursystem is explained below.

- HC05 having 6 pins(state, Rx, Tx, ground, Vcc and enable) . State and enable pin we are not bother about that and also cannot affect the communication. .
- RX pin is connected to transmitter of Arduino and TX pin is connected to Receiver pin of Arduino
- When connecting TX of Arduino to RX of Bluetooth , make the connection safely because that pin can tolerate only 3.3V.

But the voltage from TX of Arduino will be 5V. So, a voltage divider network consisting of 10K and 20K resistors.

- Simple home automation project using Arduino UNO, Bluetooth module and a smartphone.
- The aim of this project is to control different home appliances using a smartphone.

4. Circuit Diagram

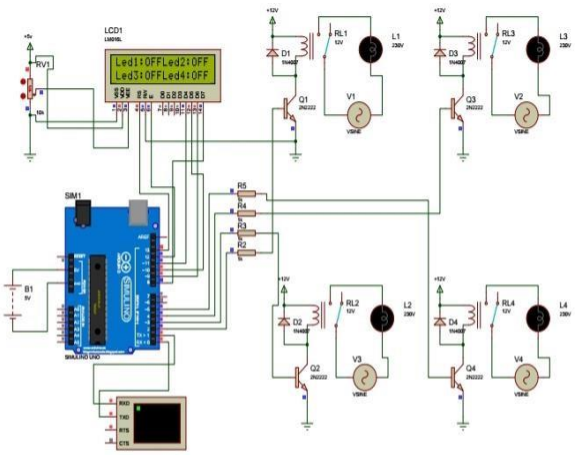

Fig. Circuit diagram

The hardware part having three main components Android application , Arduino and blue tooth module. Software parts having Arduino ATMEGA(open source software) and proteus profession 8 software. In software circuit design instead of Bluetooth device am using virtual terminal is used for sending and receiving the data.Because proteus software does not contain the Bluetooth library. it will have the automation for a certain distance with this problem we can overcome a proposed system. The relay , LCD , transistor can be accessed easily with inbuilt library features.

5. Relay Operation

The Relay normally has five connections are Normally close, Normally Opened, Coil 1 , Coil 2 and Common. Coil 1 and Coil 2 are the two sides of the electromagnetic coil . Armature plays a important role for in Relay working. if the relay is in off state mean coil not energized armature connected to Normally closed terminal. the Relay is ON state means the coil is energized Armature move towards to the normally opened and common terminal. When the coil is Energized strong magnetic field were created depend upon magnetic field the new connection is established between Normally closed and Normally opened terminal. Based on magnetic field common terminal is connected between NC andNO.

6. Simulation

Output 1

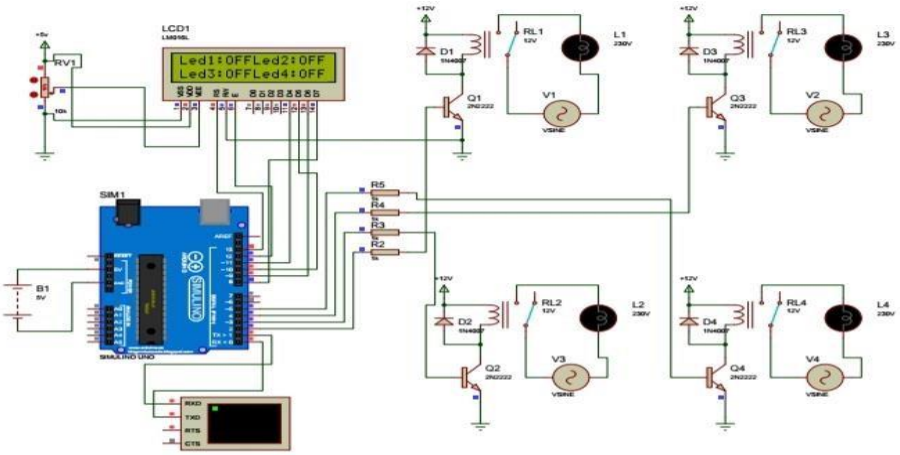

Fig.Output 1

The Above figure shows the initial state condition so all the LED are OFF in condition.

Output 2

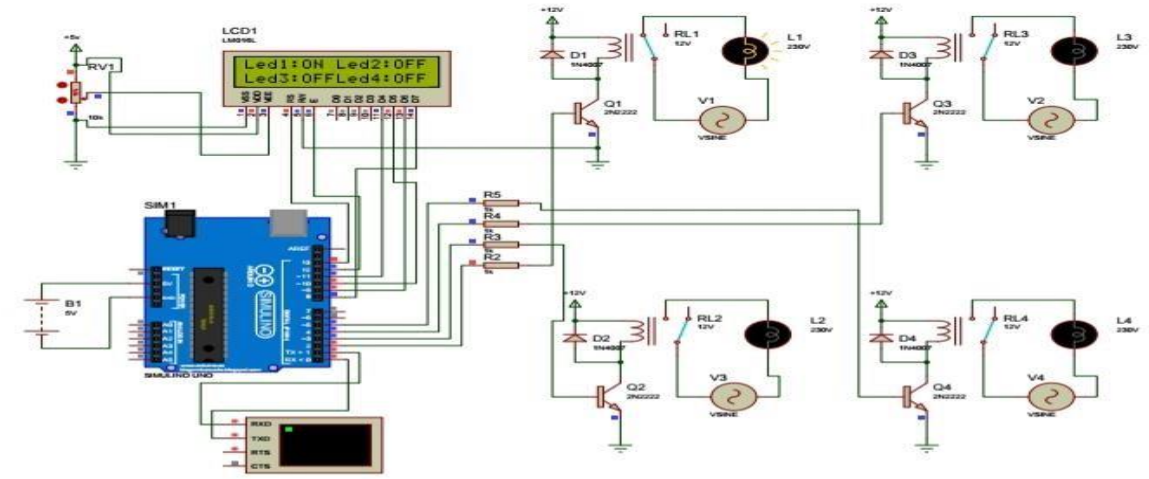

Fig. Output 2

Output 3

If anyone of load option were pressed from the android application Data sending and Receiving between the Bluetooth

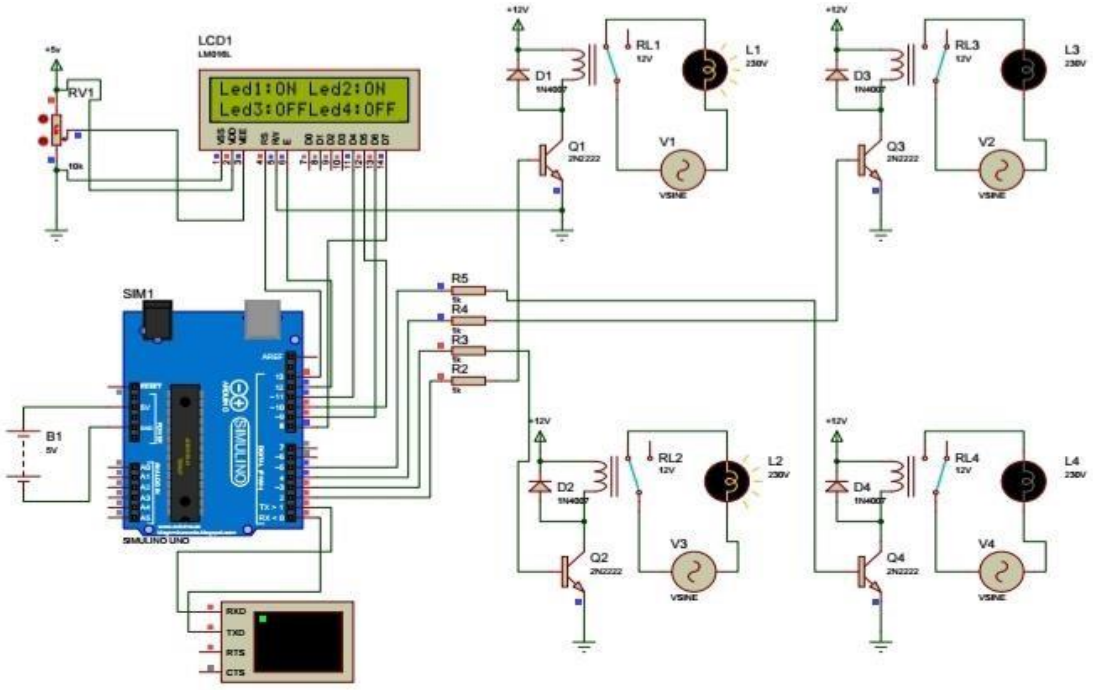

Fig. Output 3

module and Arduino. After compared the data it turned the load 1.similarly other keys and loads are operated .The above circuit show the LED 1 ON condition.

Pressing the Load 2 option from the android application Data sending and Receiving between the Bluetooth module and Arduino. After compared the data it turned the load 2. similarly other keys and loads are operated . The above circuit show the LED 2 ON condition.By switching the alternate loads with help of the Smart Phone

Output 4

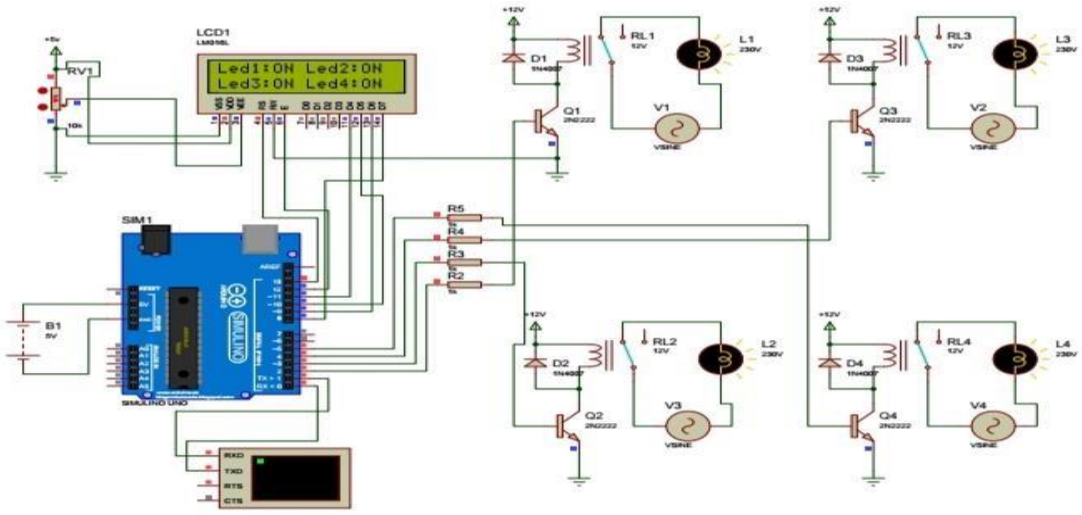

Fig. Outout 4

Pressing the Load 3 option from the android application Data sending and Receiving between the Bluetooth module and Arduino. After compared the data it turned the load 3. similarly other keys and loads are operated . The above circuit show the LED 3 ON condition.. similarly other keys and loads are operated. By switching the alternate loads with help of the Smart Phone.

Output 5

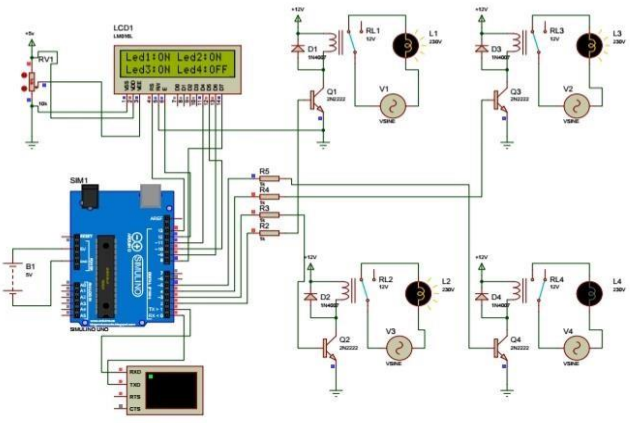

Fig. Output 5

Pressing the Load 4 option from the android application Data sending and Receiving between the Bluetooth module and Arduino. After compared the data it turned the load4. similarly other keys and loads are operated . The above circuit show the LED 3 ON condition.. similarly other keys and loads are operated. By switching the alternate loads with help of the Smart Phone.

7. Conclusion

In the current scenario, the Bluetooth plays a major role in home automation and industrial application. With help of Manual Performance based machines are changingto Automated one with revolution in Internet of things. IOT is a joined network connect all the devices to one network. From the iot technology Bluetooth is an cheapest and efficient technology in current technology. It is wireless technology based on mobile computing technology. Being an open wireless technology standard it is used to send and receive data to connected device.Smartphones makes a big revolution in this century.it can be used by multiple purpose. For communication between human to human and human to smart technology. With help of sensors and actuators we can easily communicate with techonolgy without complexity. In this system Aimed to control the Home appliances only .because our motive is to help the specially disabled people and shock protectant in rainy season.

References

[1] Uday Singh, Prakarsh Singh, Siddharth Wadhwani "Smart home automation and security system using Arduino and IOT" IRJET Trans. IT.,vol 05,issue:02 pp. 2395-0072 Feb2018

[2] E.Rammohana Reddy, K.Sankara" IOT based home automation control system using Raspberry Pi" IJSRCEIT Trans. Computer science.,vol 3,issue:04 pp. 2456-3307 March 2018

[3] M.Madhavi, R.Hemalatha, S.Anusha"Home automation using ATMEGA 328 microcontroller and android application" IRJET Trans. Electronics., vol2,issue:06 pp. 2395-0072 September 2015

[4] Vidya.G, Vipitha.E.P, Hridya.S.G"Brain controlled home automation system" IRJET Trans. Electronics.,vol5,issue:04 pp. 2395-0072 April 2018

[5] D.Anandhavalli, P.Bharathi, S.Mubina"Smart home automation control using Bluetooth and GSM" ISSN Trans. IT, vol2,issue:08 pp.2347-1697 April 2015

[6] B.Murali Krishna, P.Manoji Kumar, N.Sandhiya, V.,Narasimha Nayak "Bluetooth based wireless home automation system using FPGA"JATIT&LLS Trans. Electronics., vol77, issue:03 pp. 19928645 July 2015

[7] Ranga Reddy, Shirisha TadojuJ.Mahesh"Bluetooth remote automation system using android application" IJATIR Trans. IT., vol7, issue:10 pp. 1815-1818 August 2015

[8] MamataKhatu, Neethu Kaimal, Pratik Jadhav "Implentation of Internet of things for home automation"IJRERT Trans. Computer science., vol3, issue:02 pp.2349-4395

[9] S.Sandhiya, G.Bharathi Priya, P.Rammohan"Bluetooth remote home automation system using android application in Arduino UNO" IJATIR Trans. Electronics., vol7, issue:05 pp. 1092-8465 June 2015

[10] Saraswathi, Ajay Kumar, Jaspal Singh, Janak Mohanty, Yatharth Mishra ,"Arduino based home automation system using MQTT protocol incorporating internet ofthings (IOT)" JNCET Trans. Computer science., vol 8,issue:5 pp. 2395-5317 May 2018