

HOME AUTOMATION USING IOT

A PROJECT REPORT

Submitted by

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In partial fulfilment for the award of the degree

Of

BACHELOR OF ENGINEERING

IN

MECHATRONICS ENGINEERING

KUMARAGURU COLLEGE OF TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this project report “**HOME AUTOMATION USING IOT**” is bonafide work of **SRITHAR.P, SAI ADITYA.S, HARISANKAR.M.N, and JAGESH KANNAN.K** who carried out the project work under my supervision.



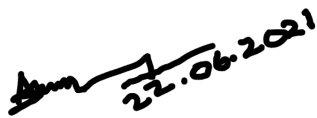
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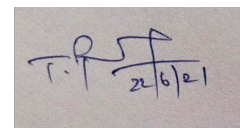


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INTERNAL EXAMINAR



EXTERNAL EXAMIAR

ABSTRACT

This project is about finding a solution mainly for the elderly people and physically challenged people to make more convenient and more reliable in operating the home appliances. Mobile communication technology is playing a major role of automation. This project is basically on reliable home control for switching ON and OFF the appliances remotely using Smart phone application. While using this technology the system improves the living standard at home, reduces human effort, energy efficient and ease of access and thus make a smart home. The proposed system consist of Bluetooth module, NodeMCU, 4channel relay module. This module controls the home appliances with a very ease of installation and it is user friendly.

Keywords: NodeMCU, Android, Blynk.

ACKNOWLEDGEMENT

We sincerely thank our respected principal **Dr. D. SARAVANAN** for giving us the opportunity to put use our knowledge in the subject. The main project is dedicated to those who brought out as shining stars to complete this project. We are highly indebted to our beloved HOD, **Dr.M. SARAVANAN MOHAN**, Kumaraguru College of Technology, for blessing us and providing the necessary resources in successful completion of the project. We would like to extend our sincere thanks to the coordinator of the project **Prof.A.RAMKUMAR** for organising the project. We express immense gratitude to our beloved guide **Professor. J.SIVAGURU** for his valuable suggestions and guidance to carry out this project. We also proudly thank the faculty members of our department for offering their valuable information to complete this project. We also thank those who have helped us directly and indirectly. Last but not least, we cherish our parents who have been with us all the way during the project.

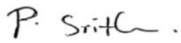

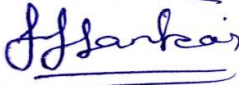
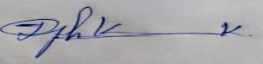
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NOMENCLATURE

ABBREVIATION:

IOT INTERNET OF THINGS

LINUX LOVABLE INTELLECT NOT USING XP

CHAPTER-1

INTRODUCTION

In our Current era, Home automation is become more beneficial because of its safety and security. Nowadays, home automation became more advance and precise to operate all the home appliances. Home automation system become energy efficient and highly approachable smart home technique. It involves basic features to maintain the user satisfaction and comfort. This proposed system is a precise combination of Android smart phone and embedded system which include NodeMCU, Wi-Fi module, Bluetooth module and Relay circuit. In this paper, we used a wireless technology to operate the device. An android application is installed in a mobile device i.e. android smart phone and it has inbuilt switch interface of all the appliances separately in it. Through which all the respective devices can be control and monitor individually. The Wi-Fi module receives the command from mobile phone and passes to relay circuit. As per the given signal from the user, the relay circuit switched ON/OFF the respective devices. The main purpose of using Wi-Fi wireless technology is to provide a greater extent to range and better feasibility.

LITERATURE REVIEW

- R. Piyare refers to wireless lifestyle which gives us relief from “cable chaos”. To control the electronic appliances through the mobile phone and Arduino is more efficient than the using of electric switches because it makes the system cost effective and long lasting to use.
- An automated home can be a very simple grouping of controls, or it can be heavily automated where any appliance that is plugged into electrical power is remotely controlled. Costs mainly include equipment, components, furniture, and custom installation.
- Home automation is designed to introduce convenience and efficiency to a home. People living with physical handicaps may rely on the features of a home automation system to accomplish tasks that might otherwise be difficult or impossible.
- Most of the automation works using the online but in this project it can be used offline as well.
- In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication.

1.1 HOMEAUTOMATION

Automation is the process of automatically performing everyday functions around the home to save you time, energy, money and at the same time offering improved security.

The automation is performed by a central controller. This can be either a standalone unit or a piece of software on a PC. Both options have their advantages.

1.2 FUNCTIONS

Send signals to switch lights and appliances on or off. Open and close contacts to operate high and low voltage devices. Schedule and initiate events, such as watering the garden Issue and accept infra-red commands Interface with other systems, i.e. X 10, telephone, computer, heating etc.

Home automation is anything that gives you remote or automatic control of things in & around the home. The systems that you can control include: Lighting, Appliances, Heating and cooling, Security and monitoring systems, Entertainment (home audio and video), Communications (telephones and intercoms, internet), Lawn sprinklers, Curtain movements, Pool filter pump, Spa heater, Filtration unit, Gate/garage door motor, Shade motor control, Roof sprinklers, Electric strikes, Keyless entry etc.

This central controller can be accessed and controlled through interfaces like keypad, wired or wireless touch-screens (with/without video), universal remotes, mobile devices. Home automation provides a more convenient & elegant atmosphere for the family to compliment and match the lifestyle. Everyone in the family experiences the comfort of automation with added convenience through integrated control of scheduled common lifestyle

activities performed every day. An automated home can provide security, temperature, lighting, and audio control for comfort, convenience, and safety. It creates reliable and coordinated controls to operate home devices automatically for simplifying operations.

Home automation saves your time and effort by controlling you home automatically for performing routine functions such as watering your grass, or turning off all lights, setting the thermostat to economy mode, control scheduled appliances operation and arming the security system when you retire for the night.

Home automation provides you with the comfort of whole home audio/video integration so that any source could be placed anywhere in a home and still be enjoyed everywhere in a home.

Home automation provides you pro-active home security so that you can look in on your home remotely from anywhere in the world, or that your home will phone you if it finds anything suspicious, or that a fire will alert your home to wake you, shut down the gas and ventilation system, turn on a lighting path for your escape, and automatically phone the fire/police department. In other words it integrates your alarm system with other home systems for a response to intrusion that meets your needs of enhanced Safety.

The term 'home automation' is now acknowledged as covering most I.T., automation, communication and wiring aspects of our homes. Most of these functions can be installed independently of each other, but the real benefits of the automated home are realized when these different aspects communicate with each other. For example, having two PC's networked together in the home, giving both users access to the internet may seem like the forefront of technology, but imagine if they were tied into our house wiring and could turn lights and appliances on and off automatically when we are away from home,

even via the internet. Imagine that the PC was networked into our security system and could display images from our home security cameras onto our computer screen at work. Imagine that your security system was tied into your telephone and could ring your mobile in the event of a burglary, you could even talk to visitors to your door from anywhere in the world.

1.3 OBJECTIVES OF HOME AUTOMATION

Home Automation Saves Money by lowering your monthly utility bills with the remote & scheduled control of lights, appliances, sprinklers and your air conditioning

1. Never walk into a dark home again.
2. Have the porch light automatically turn on when you open the front door after dark. Lighting and audio controls can make a vacant home look and sound occupied.
3. You could set your Omni home control system to automatically call you at work when your child comes home from school and keys in his security code into the security system.
4. Call your home control system over the phone to make changes to your system.
5. Log into your home control system over the Internet via Snap-Link or we blink II and change your temperature settings.
6. Set the temperature setting on your Omni state to automatically turn up when the security system is armed in the morning. It is then automatically turned down one-half hour before you normally get home in order for you to arrive home to a comfortable house.

7. If you are leaving early from work, you can call into your home control system to manually set the temperature to where you want it to be when you get home.

1.4 THE REAL BENEFITS OF HOME AUTOMATION

Most controllers will offer all of the above plus more. When you use controllers connected in the appropriate fashion, you can realize all sorts of benefits, limited primarily by your imagination.

For example:-

When on holiday or working late, have the lights come on automatically and draw the curtains. Set room moods, i.e. one button push to switch off the main light, dim the perimeter lights and switch the surround sound system on ready to play a movie.

At dusk, check that the garage door is closed. Switch on the electric blanket whilst you're sitting on your sofa. The controller can be either standalone or combined into a security system to give additional benefits.

CHAPTER-2

2. PROJECT DESCRIPTION

2.1 BASIC IDEA

Basic idea of Smart Home automation using Cloud services is controlling the home appliances remotely over the internet.

Homes of the 21st century will become more and more self-controlled and automated due to the comfort it provides, especially when employed in a private home. A home automation system is a means that allow users to control electric appliances of varying kind.

Many existing, well-established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high. In contrast, Wireless systems can be of great help for automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere.

We will present a Smart Home System (SHS) using ARDUINO UNO ATMEGA328 that employs the integration of cloud networking, wireless communication, energy monitoring, or weather stations, capturing the photo of a person moving around the house and storing it onto the cloud.SHS is to provide the user with remote control of various lights, fans, and appliances

within their home and storing the data in the cloud. The system will automatically change on the basis of sensors' data. This system is designed to be low cost and expandable allowing a variety of devices to be controlled

2.2 CLOUD:

Home automation systems face four main challenges, these are high cost of ownership, inflexibility, poor manageability, and difficulty in achieving security. The main objectives of this research is to design and implement a home automation system using IoT that is capable of controlling and automating most of the house appliances through an easy manageable web interface. The proposed system has a great flexibility by using Wi-Fi technology to interconnect its distributed sensors to home automation server. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration.

2.3 PROPOSED BLOCK DIAGRAM:

The proposed system is a distributed home automation system, consists of server, sensors. Server controls and monitors the various sensors, and can be easily configured to handle more hardware interface module (sensors). The Intel Galileo development board, with built in Wi-Fi card port to which the card is inserted, acts as web server. Automation System can be accessed from the web browser of any local PC in the same LAN using server IP, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server real IP (internet IP). Wi-Fi_33 technology is selected to be the network infrastructure that connects server and the sensors. Wi-Fi_33 is chosen to improve system security (by using secure Wi-Fi connection), and to increase system mobility and scalability.

2.4 BLOCK DIAGRAM:

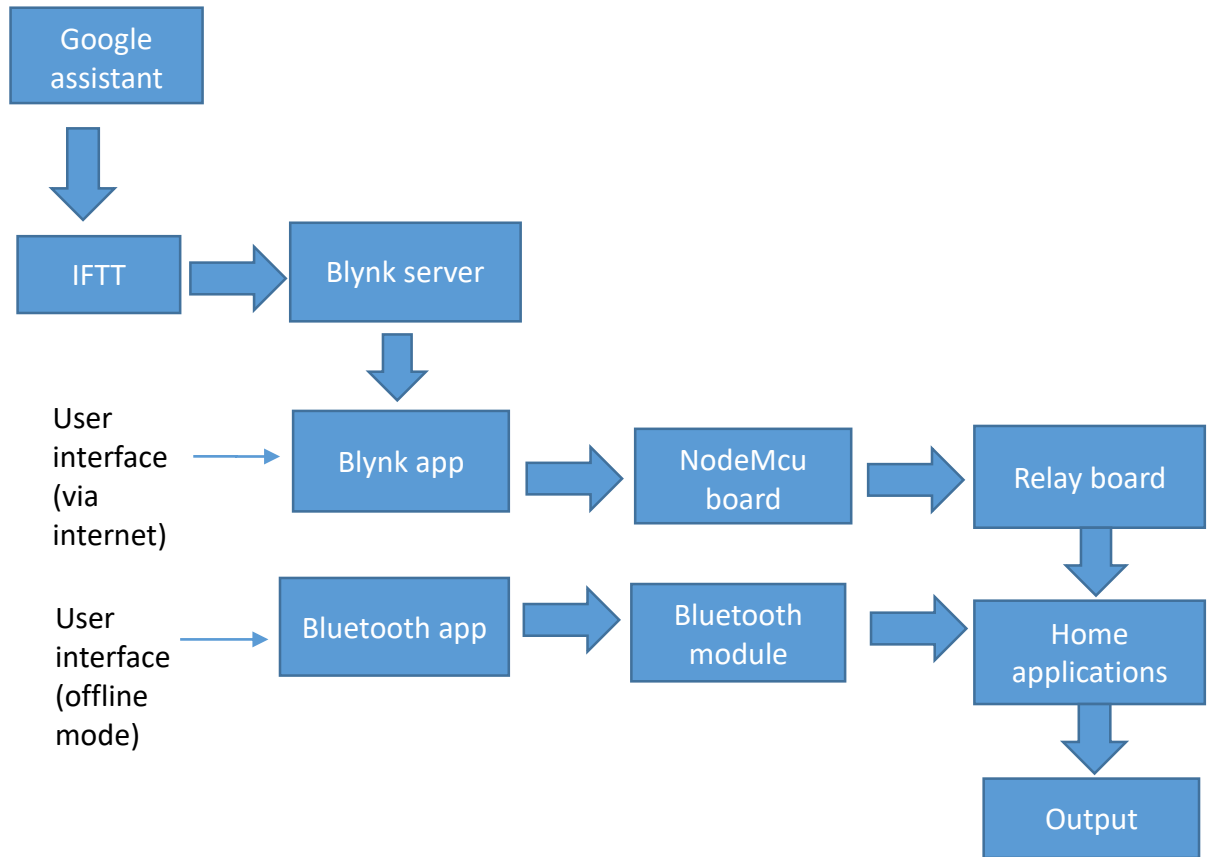


Fig 2.1 BLOCK DIAGRAM

CHAPTER-3

HARDWARE AND CIRCUIT DIAGRAM

3.1 CIRCUIT DIAGRAM:

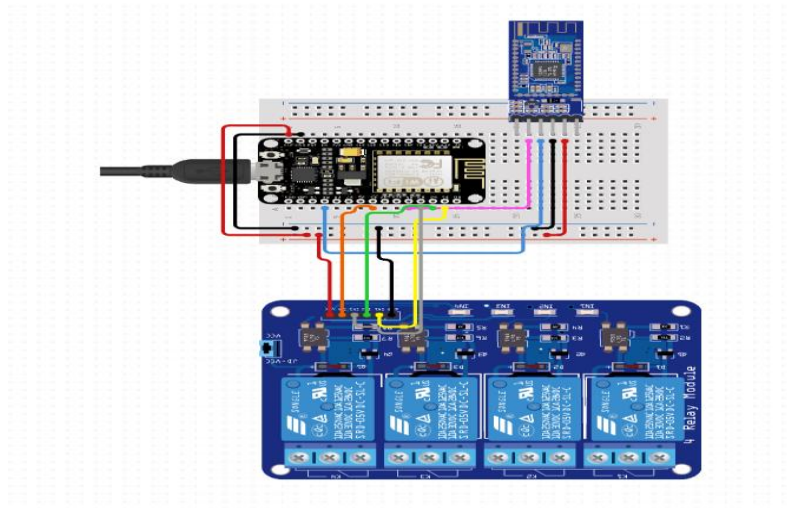


Fig 3.1 – CIRCUIT DIAGRAM

3.2 NODEMCU

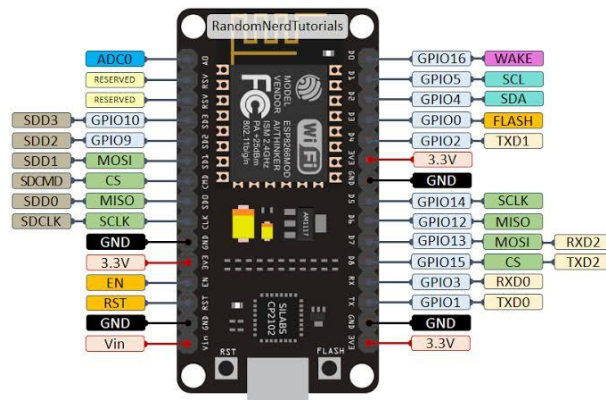


Fig 3.2 NODEMCU PINOUT

NodeMCU is an open source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit). The term "NodeMCU" strictly speaking refers to the firmware rather than the associated development kits.

3.3 RELAY DIAGRAM

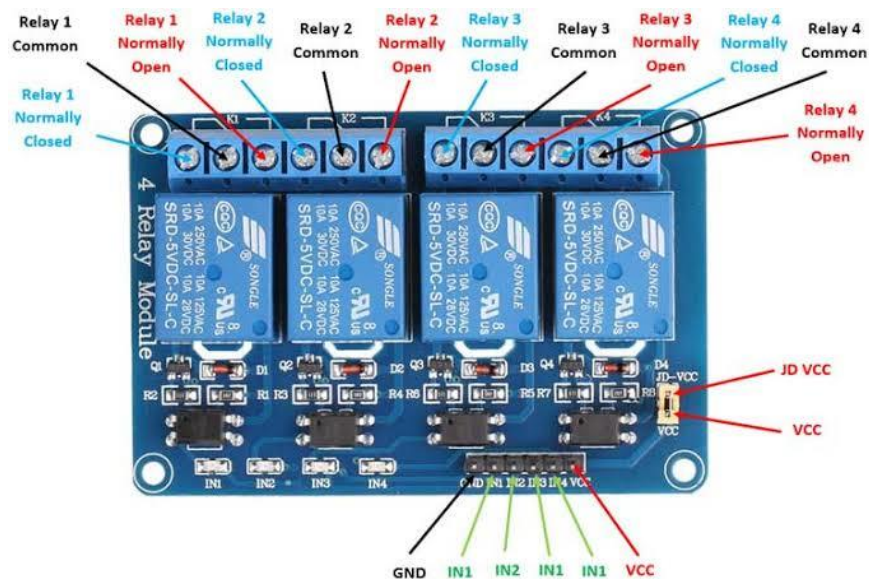


Fig 3.3 RELAY

Relays control one electrical circuit by opening and closing contacts in another circuit. When a relay contact is normally open (NO), there is an open contact when the relay is not energized. In electromechanical relays (EMR), contacts are opened or closed by a magnetic force.

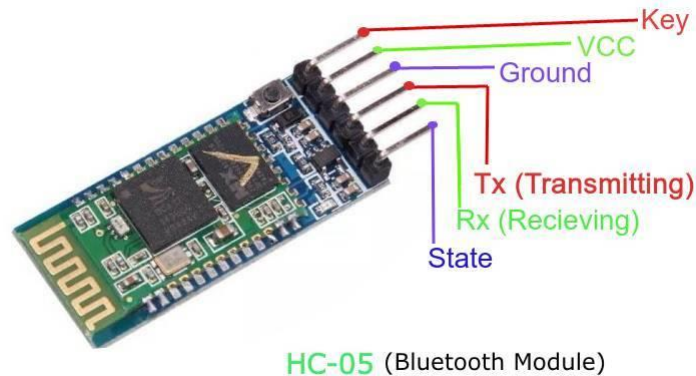


Fig 3.4 BLUETOOTH MODULE

3.4 BLUETOOTH DEVELOPMENT:

3.4.1 MODULE

Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth. It has 6 pins, 1. Key/EN: It is used to bring Bluetooth module in AT commands mode. If Key/EN pin is set to high, then this module will work in command mode.

Enable - This pin is used to set the Data Mode or and AT command mode (set high).

VCC - This is connected to +5V power supply.

Ground - Connected to ground of powering system.

Tx (Transmitter) - This pin transmits the received data Serially.

Rx (Receiver) - Used for broadcasting data serially over Bluetooth.

CHAPTER-4

CREATING CONTROL BUTTONS IN BLUNK APP

4.1 SOFTWARE INTERFACE:

A software interface is created between the microcontroller and the appliances using a Blynk server. This is created for the purpose to work in the offline mode as well. The below image explains the development of Bluetooth module for the project.

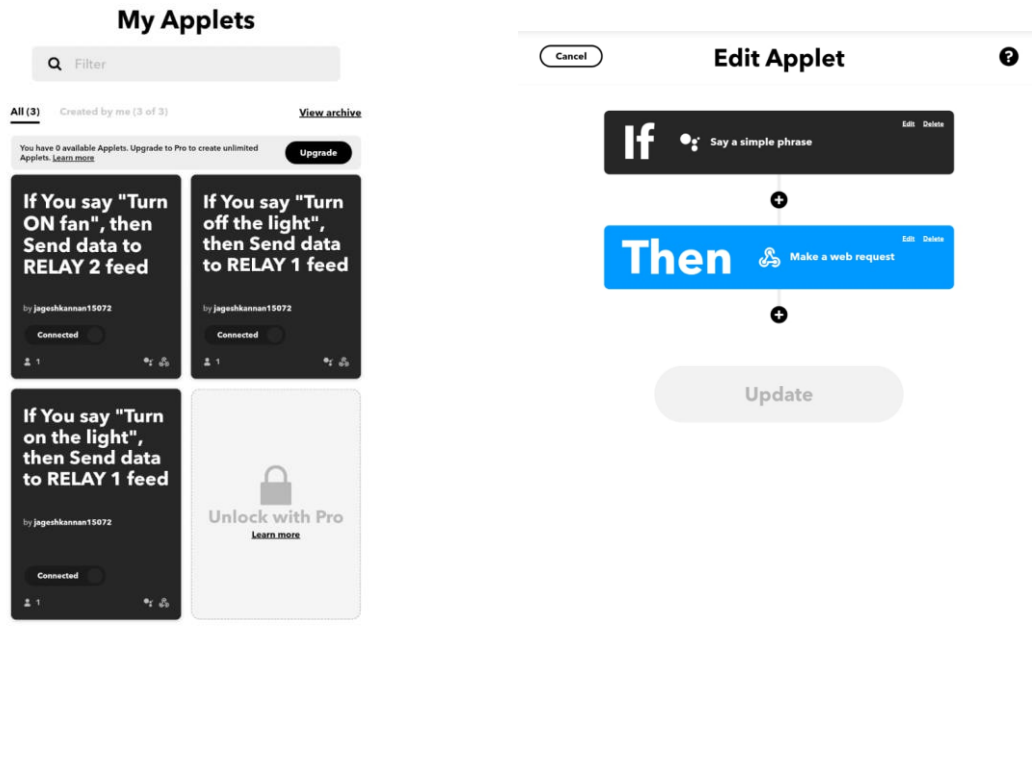



Fig 5.1 - IFTTT

[← Back](#) **Edit trigger fields** [?](#)



Say a simple phrase

What do you want to say?

What's another way to say it? (optional)


And another way? (optional)

What do you want the Assistant to say in response?

Language

Update trigger

[← Back](#) **Edit action fields** [?](#)



Make a web request

URL

Surround any text with <code></code> and <code>></code> to escape the content. [Add ingredient](#)

Method

The method of the request e.g. GET, POST, DELETE.

Content Type

Optional

Body

Surround any text with <code></code> and <code>></code> to escape the content. [Add ingredient](#)

Update action

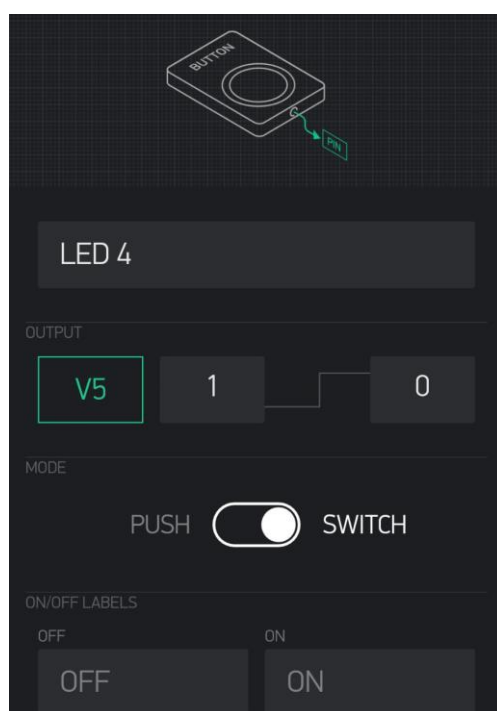
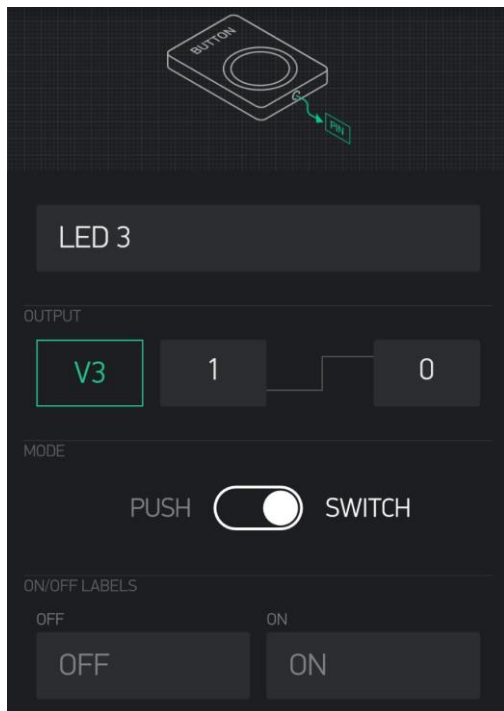
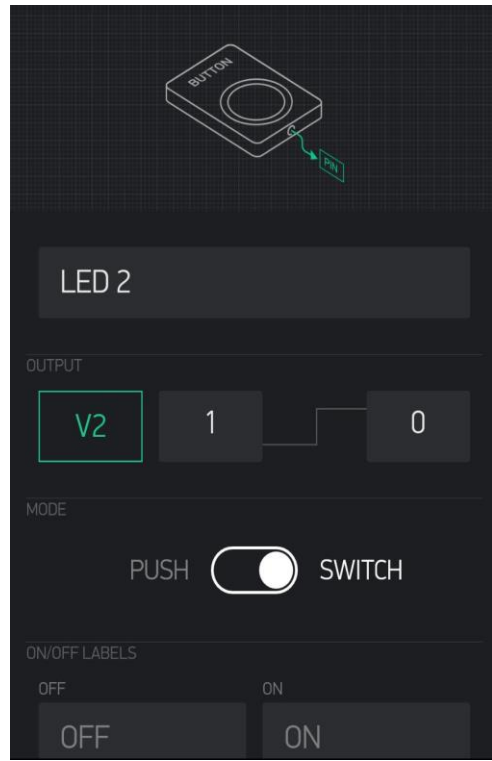
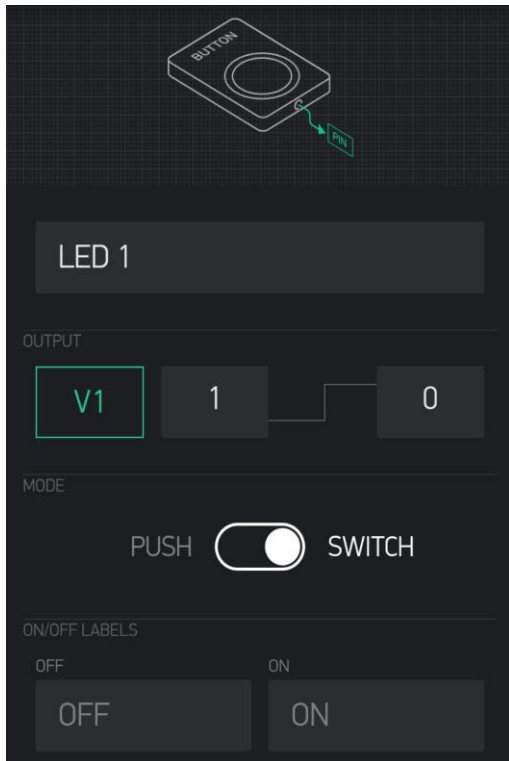


FIG.5.2 BLYNK APP

CHAPTER-5

IMPLEMENTATION OF THE PROJECT

5.1 Introduction

In this project we can control four electrical appliances like light, fan, led, and table fan. These four appliances are been connected to the relay board, this relay board is connected to the microcontroller and the microcontroller acts as a brain of this system. NodeMcu Esp8266 version of the microcontroller has been used in the project and the microcontroller is used to connect to a Wi-Fi channel. Using the internet, NodeMcu can communicate with blynk server (Bluetooth module). The user data's are sent to the blynk server and these data are then sent to the NodeMcu board.

The voice command works by the following methods: The respected voice command are sent to IFFT server and then the IFFT server starts to communicate with the blynk server depending on the kind of command given to it. The blynk server send's the data to the microcontroller to switch "ON" the respective relay and correspondingly for switching "OFF".

When the internet is disconnected then the system goes to offline mode, here the Bluetooth module is used as a data receiver in the absence of internet and it requires a special software for user interface. Using the data from the Bluetooth app the module controls the microcontroller respectively.

Home automation has been around since World War I. A television remote was first patented in 1950 and a remote control device was first used by the Germans in World War I to control motorboats. From there, the evolution of controllers and automation has been growing and still continue to grow to this day.

5.2 Description

A relay consist of three pins, the middle pin is the input pin, and other two pins are normally closed and normally open connections that are connected depending upon the requirement.

5.2.1 Methodology

When the relay is powered by receiving a signal from the microcontroller, the relay input pin contact to the other pin which closes the circuit and thus switch “ON” the appliances. The four appliance that have been connected consist of two supply pins phase and neutral one of the two pins are connected to the appliances directly and the other supply is connected to the appliances through these relay so once the relay is powered on the circuit then the circuit gets closed and thus the appliances get powered.

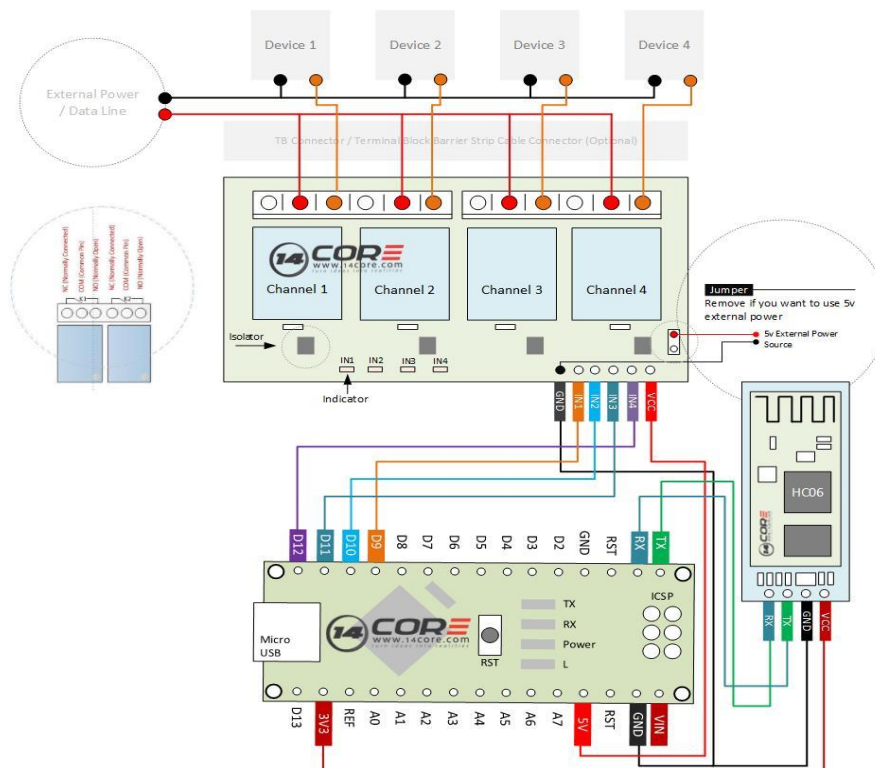


Fig.5.1 wiring diagram

Reference: <https://www.14core.com/wiring-bluetooth-hc06-4-channel-relay-switching-automation-with-android/>



Fig.5.2 Project

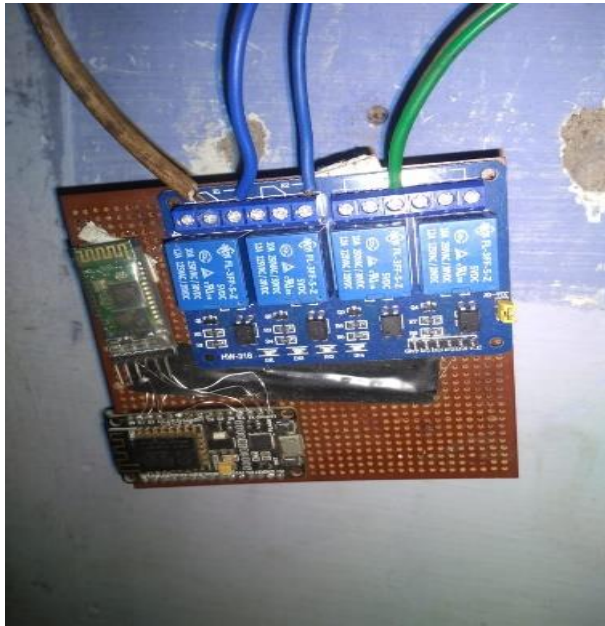


Fig.5.3 Connection

CHAPTER-6

CONCLUSIONS:

This project is developed to make a smart home automation system using microcontroller, Bluetooth module. Their main requirements was: a system that could be operated using by an app, voice control to operate the appliances from anywhere. The differently-abled, old peoples will be the most beneficiary of this system as they can operate the appliances independently. The system requires a Wi-Fi or an internet connection to function and in the absence of internet connection, Bluetooth connection is been used to function the operation efficiently. So, we proposed this system which to be highly energy saving and reliable and make people feel more comfortable and satisfied. Now everyone can utilize this technology to operate the appliances. The home automation system has been experimentally proven to work satisfied by connecting sample appliances to it and the application were successfully controlled from a wireless mobile device. We learned many skills such as soldering wiring the circuit and other tools that we use for this project and was able to work together as a team during this project. The Bluetooth client was successfully tested on a multitude of different mobile phones from different manufacturers, thus proving its portability and wide compatibly. Thus a low- cost home automation system was successfully designed. Implement and tested.

Day by day, the field of automation is blooming and these systems are having great impact on human beings. The project which is to be implemented is a home automation using Easy IOT Webserver and WIFI and has very good future development. In the current system webserver is installed on a windows PC so the home appliances can be controlled using only by using the device on which webserver is installed. This can be further developed installing webserver on cloud. Advantage of installing webserver on the cloud is that home can be controlled by using any device which has an internet connection and a web browser. By visiting the IP address of the cloud the control actions can be taken.

REFERENCES

1. <https://www.irjet.net/archives/V2/i3/Irjet-v2i3317.pdf>
2. 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.
3. DeepaliJavale, Mohd. Mohsin, ShreerangNandanwar “Home Automation and Security System Using Android ADK” in International Journal of Electronics
4. Communication and Computer Technology (IJECCCT) Volume 3 Issue (March2013).
5. Charith Perera, Student Member, IEEE, ArkadyZaslavsky, Member, IEEE, Peter Christen,andDimitriosGeorgakopoulos, Member, IEEE “Context Aware Computing for The Internet of Things: A Survey”.
IEEE COMMUNICATIONS ,SURVEYS & TUTORIAL. Basma M. Mohammad El-Basioni¹, Sherine M. Abd El-kader² and Mahmoud Abdelmonim Fakhreldin³, “Smart Home Design using Wireless Sensor Network and
6. Object Detection From Videos Captured by Moving Camera by Fuzzy Edge Incorporated Markov Random Field and Local Histogram Matching Ashish Ghosh, Member, IEEE, Badri Narayan Subudhi, Student Member, IEEE, and Susmita Ghosh

