IOT BASED CIRCUIT BREAKER USING NODEMCU

MINI PROJECT REPORT

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BONAFIDE CERTIFICATE

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INTERNALEXAMINER 1   **INTERNALEXAMINER 2**

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ABSTRACT

The fundamental purpose of monitoring electronic appliances in the modern world by using Internet of Things (IoT) is to control them based on situational demands. With the advancement of technology, the need for efficient controlling is more as it optimizes performance and saves unnecessary wastage of power. The basic home appliances are fan, light and water pump which consume maximum power. Unnecessary wastage of power and resources by turning on lights during day time or high speed fans in winter season or water pump during overflow of water from tank can be avoided in this way. A system has been proposed to control home appliances and break the circuit for anytime from anywhere in the world and efficiently utilize power by controlling appliances properly. Blynk app has been used to read data from sensors located in home environment and user controls home appliances based on these data. Being busy in hectic schedule of daily life user may not be able to read sensor data continuously to take some action through app. So the designed system sends an emergency notification in user's mobile app.

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LIST OF ABBREVIATIONS

IOT   INTERNET OF THINGS

NODEMCU   NODE MICRO CONTROLLER UNIT

Wi-Fi   WIRELSS FIDELITY

GPIO   GENERAL PURPOSE

                    INPUT/OUTPUT

CPU   CENTRAL PROCESSING UNIT

IOT   INTERNET OF THINGS

CHAPTER 1

INTRODUCTION

IOT or internet of things is an upcoming technology that allows us to control hardware devices through the internet .Here we propose to use IOT in order to control home appliances, thus automating modern homes through the internet. This system uses 4-loads to demonstrate as house Appliances Controlling. Our user friendly interface allows a user to easily control these home appliances through the internet Worldwide. For this system we use an NodeMCU (Node Microcontroller Unit).This microcontroller is interfaced with a Relay modem to get user commands over the internet. Relays are used to switch loads. The entire system is powered by a 5V Adaptor/Charger (Micro- type). After receiving user commands over the internet, NodeMCU processes these instructions to operate these loads accordingly and display the system status on an Smart Phone Display. Thus this system allows for efficient home automation over the internet.

In this we have used the Blynk Community Application For controlling the Home Appliance all over the world. The Method used for controlling are Swiping the figures on Smartphone or Voice Control with Google assistant and After that we have used the latest technique that is IFTTT Platform & Web- Hooks For triggering our circuits. It will trigger the circuit as it gets input command from the Google assistant.

CHAPTER 2

LITERATURE SURVEY

BLUETOOTH BASED CIRCUIT BREAKER SYSTEM USING CELL PHONES

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. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.

GSM BASED HOME AUTOMATION SYSTEM USING CELL PHONES

Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM. The home sensors and devices interact with the home network and communicate through GSM and SIM (subscriber identity module).The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select

appropriate communication method among SMS, GPRS and DTFC based on the command which received GSM module.

WI-FI BASED CIRCUIT BREAKER SYSTEM USING CELL PHONES

Wi-Fi based home automation system mainly consist three modules, the server, the hardware interface module, and the software package. The figure shows the system model layout. Wi-Fi technology is used by server, and hardware Interface module to communicate with each other. The same technology uses to login to the server web based application. remote users can access server web based application through the internet using compatible web browser. Software of the latest home automation system is split to server application software, and Microcontroller (Arduino) firmware. The Arduino software, built using C language, using IDE comes with the microcontroller itself. Arduino software is culpable for gathering events from connected sensors, then applies action to actuators and pre- programmed in the server. Another job is to report the and record the history in the server DB. The server application software package for the proposed home automation system, is a web based application built using asp.net. The server application software can be accessed from internal network or from internet if the server has real IP on the internet using any internet navigator supports asp.net technology. Server application software is culpable of; maintain the whole home automation system, setup, and configuration.

CHAPTER 3

PROBLEM STATEMENT

Due to circuit breakage now a days the wire men are facing several accidents and problems. The circuit breaker concept will helps in identify the breakage/fault in the circuit. so this concept can be suitably included in house smarter, safer, energy efficient and automated. This project focuses on building a safe, automated system by using the internet connection that will smartly control the appliances like Lights, Fan, TV, AC, Heaters, vehicles etc. in our home, Industries, Offices, Schools & Colleges anytime and anywhere in the world. It sends alerts about the status of particular device on Smartphone App, Message on Mobile Phone, by E-mail and also gets all these information on the Cloud Server objective behind the project is to operate home appliances. high level of security by the use of Relays and Sensors over the Internet. The main purpose of this project is to create a break the circuit system in very affordable price, so that even middle class family can afford it comfortably.

CHAPTER 4

PROPOSED METHODOLOGY

4.1 PROPOSED BLOCK DIAGRAM

This circuit model is used to identify the error in the line by using the Optocoupler which is connected to the IOT device. That can be controlled by mobile application.
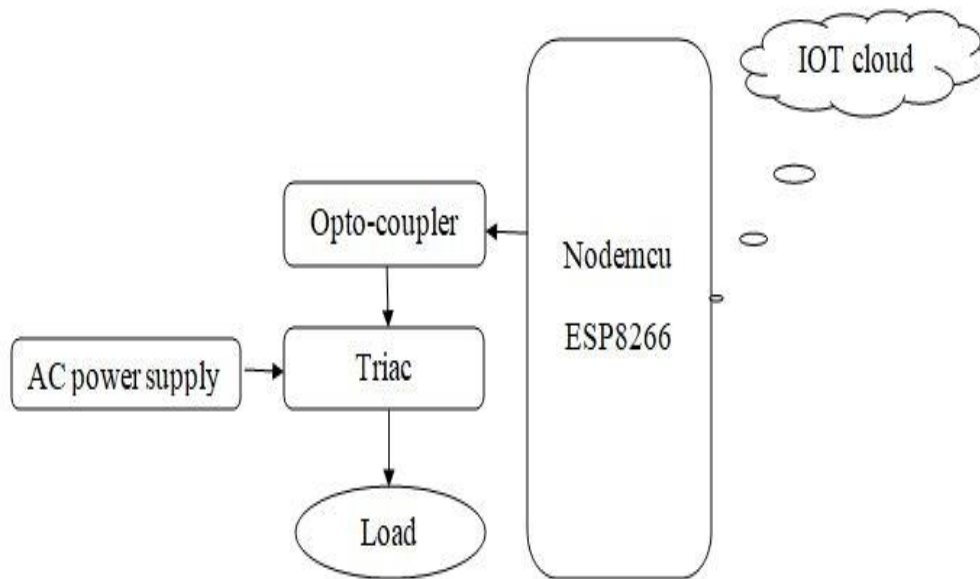

Figure 4.1 Block Diagram of IOT Based Circuit Breaker Using NodeMCU

4.2 SMARTPHONE (IOT CLOUD)

UsedforcontrollingPurpose,forgivingcommandandgainoutput,forthisblynkAndroid app is required.

4.3 NODEMCUESP-8266(Wi-Fi ENABLED MICROCONTROLLER)

To take input and perform operation. As per programme fed in the Microcontroller and obtain output as per user requirements

4.4 RELAY

A relay is an electrically operated switch.Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and have double throw (changeover) switch contacts as shown in the diagram.
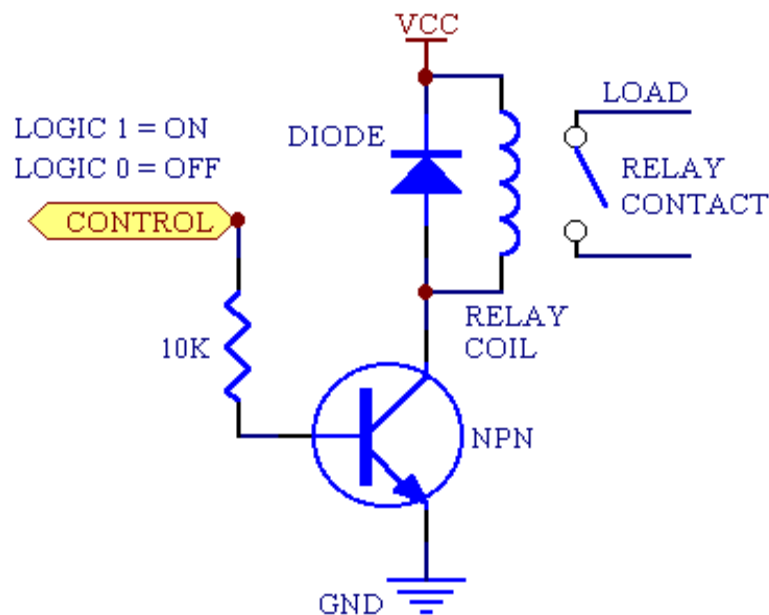
Figure 4.4 Circuit Diagram of a Relay

4.5 DESCRIPTION OF THE POWER SUPPLY

The circuit uses standard power supply comprising of a step-down transformer from 230v to 12v and 4 diodes forming a Bridge Rectifier that delivers pulsating dc which is then filtered by an electrolytic capacitor of about 470microf to 100microFarad. The filtered dc being UN regulated IC LM7805 is used to get 5v constant at its pin no 3 irrespective of input dc varying from 9v to 14v.The regulated 5volts dc is further filtered by a small electrolytic capacitor of 10 micro f for any noise so generated by the circuit. One LED is connected of this 5v point in

series with a resistor of 330ohms to the ground i.e. negative voltage to indicate 5v power supply availability.

4.6 OUTPUT

These are the output Generated from the given input by the user the user can set the various output sections and can gain output through any of the section like load i.e., home appliances A for light, home appliances B for fans, home appliances C for motor and many more.

CHAPTER 5

HARDWARE AND SOFTWARE REQUIREMENTS

5.1 HARDWARE TOOLS

5.1.1 Triac

There is however, another type of semiconductor device called a "Triode AC Switch" or Triac for short which is also a member of the thyristor family that be used as a solid state power switching device but more importantly it is a "bidirectional" device. In other words, a Triac can be triggered into conduction by both positive and negative voltages applied to its Anode and with both positive and negative trigger pulses applied to its Gate terminal making it a two-quadrant switching Gate controlled device. A Triac behaves just like two conventional thyristors connected together in inverse parallel (back-to-back) with respect to each other and because of this arrangement the two thyristors share a common Gate terminal all within a single three-terminal package. Since a Triac conducts in both directions of a sinusoidal waveform, the concept of an Anode terminal and a Cathode terminal used to identify the main power terminals of a thyristor are replaced with identifications of: MT1, for Main Terminal 1 and MT2 for Main Terminal 2 with the Gate terminal G referenced the same. In most AC switching applications, the Triac gate terminal is associated with the MT1 terminal, similar to the gate-cathode relationship of the thyristor or the base emitter relationship of the transistor.
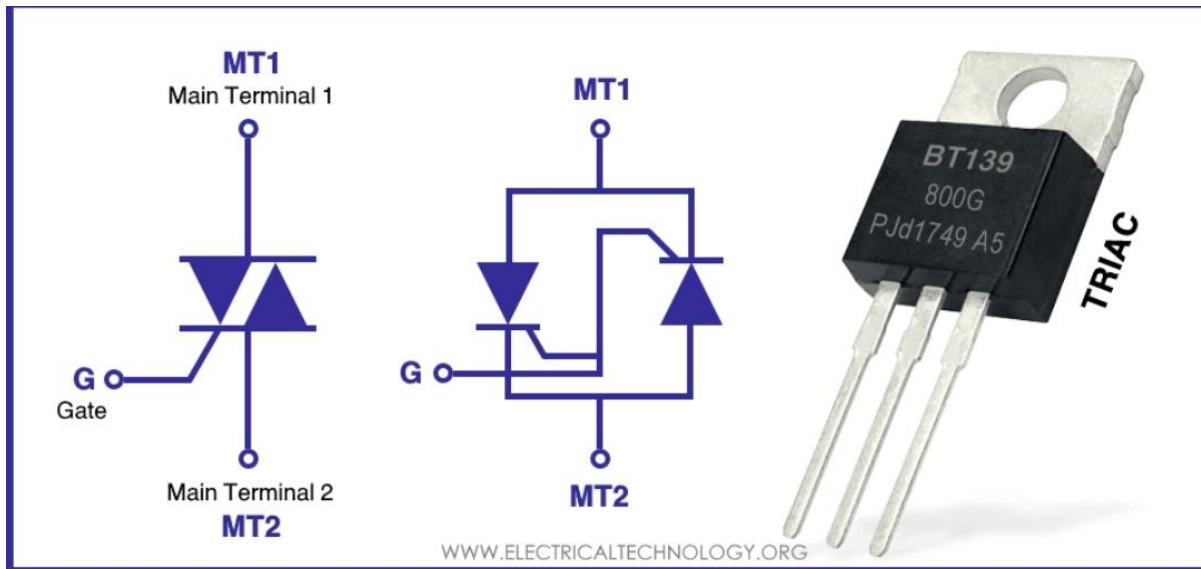
Fig.5.1. Symbolic Representation of TRIAC

5.1.2 Relay Module

This is a 5v 4-channel relay interface board, and each channel needs a 15-20mA driver current. It can be used to control various appliances and equipment with large current. It is equipped with high-current relays that works under AC 250V 10A or DC30V 10A. It has a standard interface that can be controlled directly by microcontroller. From the picture , you can see that when the signal port is at low level, the signal light will light up and the Optocoupler relay (it transforms electrical signals by light and can isolate input and output electrical signal) will conduct, and then the transistor will conduct, the real coil will be electrified, and the normally open contact of the relay will be closed. When the signal port is at high level, normally closed contact of the relay will be closed. So you can connect and disconnect the load by controlling the level of the control signal port.

Fig.5.2. Relay Module

5.1.3 NODEMCU(ESP 8266)

NodeMCU is a low-cost open source IOT platform. It initially included firmware which runs on the ESP8266 WI-FI Soc from Expressive systems, and hardware which was based on the ESP-12module.later, support for the ESP32 32-bit MCU was added. The term NODEMCU stands for node microcontroller unit it has open source hardware and software environment. NodeMCU is also called as Devi kit 1.0. It is on board system on chip (SOC) called ESP-8266.the ESP8266 is low cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability.The ESP8266 is the name of a micro controller designed by Expressive system. The ESP8266 itself is a self-contained Wi-Fi networking solution offering as a bridge micro controller to WIFI and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NODEMCU dev

kit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Fig.5.3. NODEMCU(ESP 8266)

5.1.4 Power Supply

The circuit uses standard power supply comprising of a step-down transformer from 230v to 12v and 4 diodes forming a Bridge Rectifier that delivers pulsating dc which is then filtered by an electrolytic capacitor of about 470microf to 100microF. The filtered dc being UN regulated IC LM7805 is used to get 5v constant at its pin no 3 irrespective of input dc varying from 9v to 14v.The regulated 5volts dc is further filtered by a small electrolytic capacitor of 10 micro farad for any noise so generated by the circuit. One LED is connected of this 5v point in series with a resistor of 330ohms to the ground i.e. negative voltage to indicate 5v power supply availability.
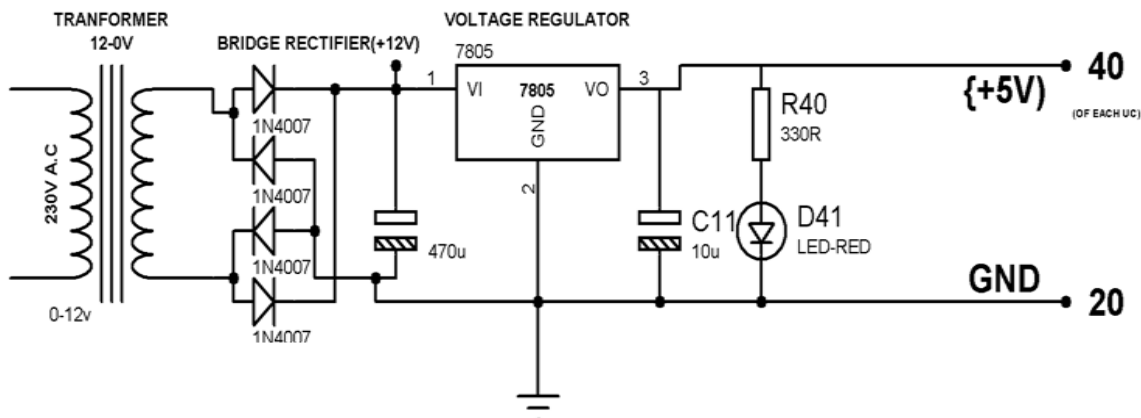
Fig.5.4. Power Supply

5.2 SOFTWARE TOOLS

5.2.1 Arduino

Arduino is a both an open source software library and an open-source breakout board for the popular AVR micro-controllers. The Arduino IDE (Integrated Development Environment) is the program used to write code, and comes in the form of a downloadable file on the Arduino website. The Arduino board is the physical board that stores and performs the code uploaded to it. Both the software package and the board are referred to as "Arduino." Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

CHAPTER 6

RESULTS AND DISCUSSION

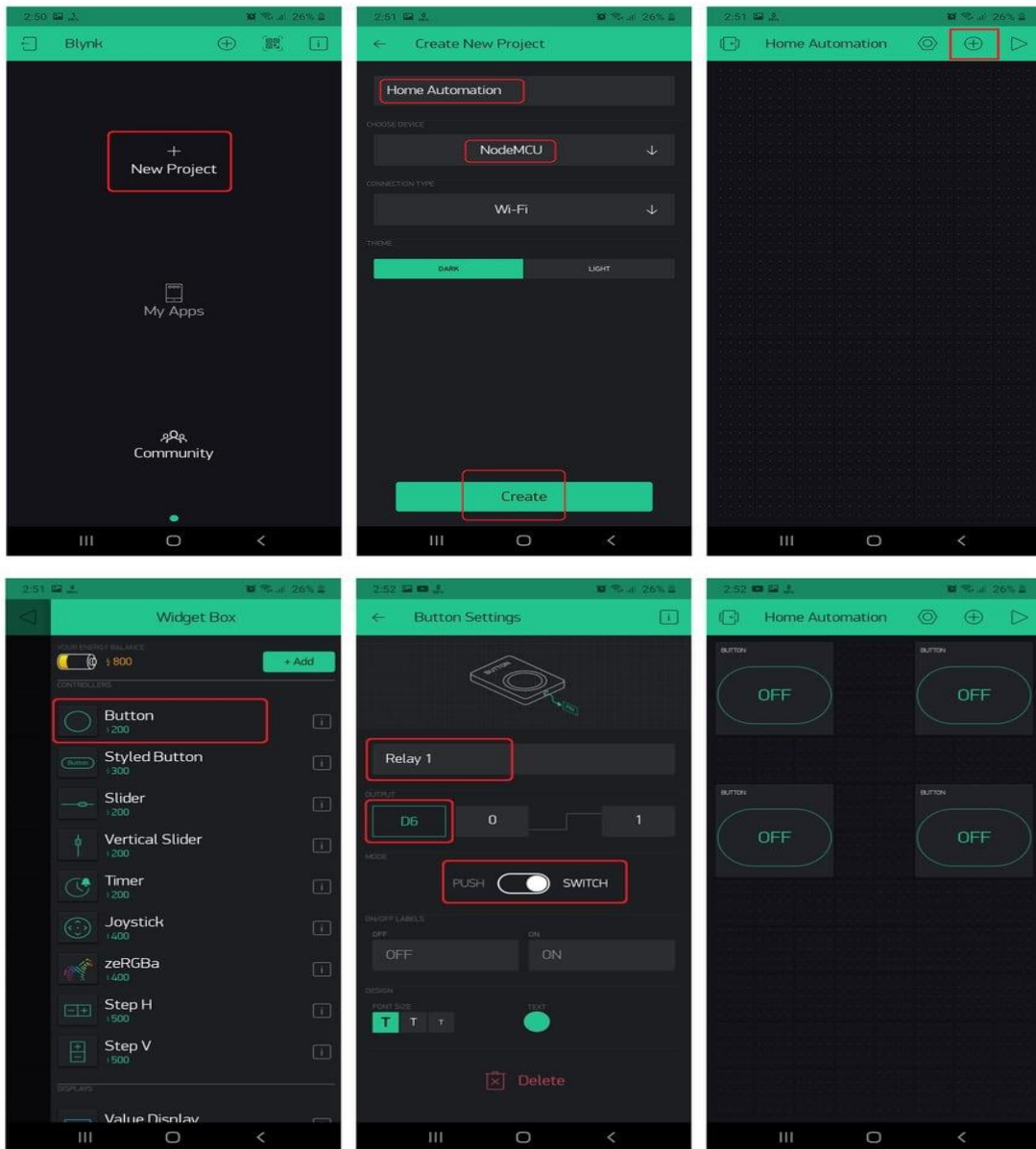## 6.1 SOFTWARE IMPLEMENTTAION

BLYNK IOT (APP)

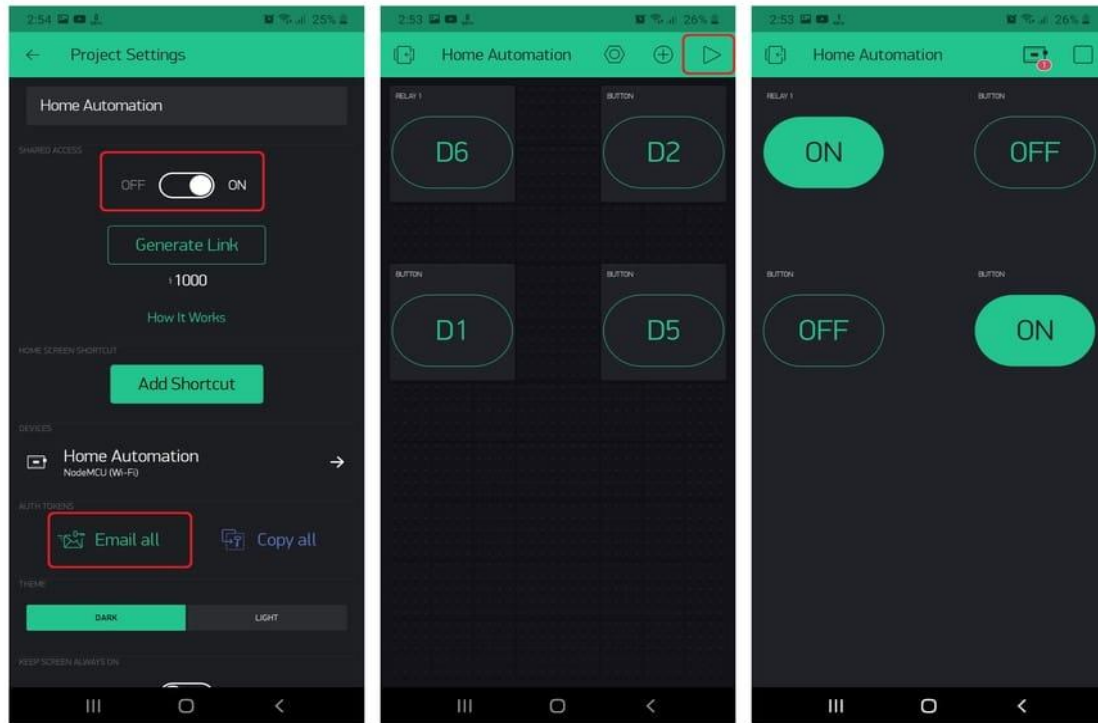Figure 6.1.1. Blynk IOT App Switch Module Creating Process Step 1

Figure 6.1.2. Blynk IOT App Switch Module Creating Process Step 2

6.2 HARDWARE IMPLEMENTATION

Fig. Shows the setup of a IOT based circuit breaker using NODEMCU.The design can control the home appliances like light, fan etc….remotely manage by mobile phone. Blynk android application should download from internet. It can control electronic appliances. The working model is for examples any person in our home switch on/off light other person get information in the form of message to mobile phone. All sensors are connect and testing with each other and the system will get a output positively for known the results, shown in the below figure.
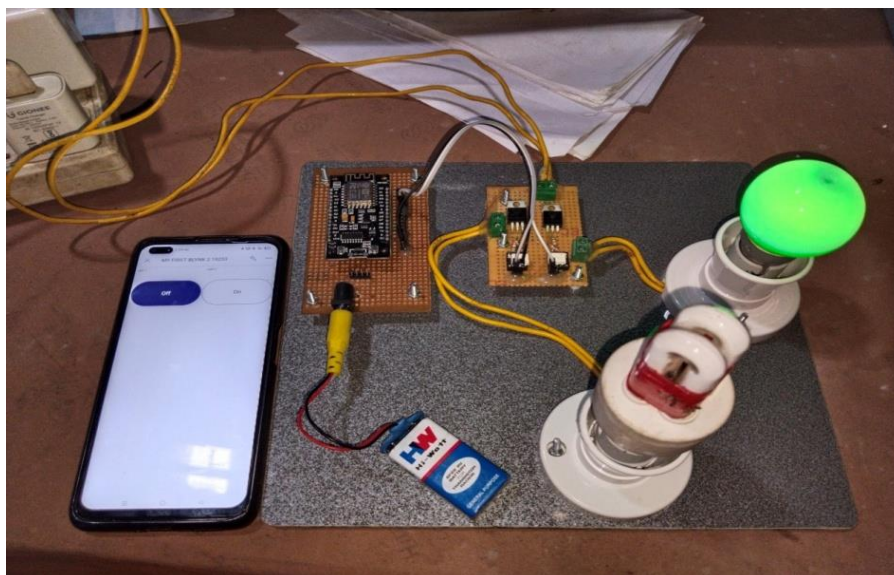
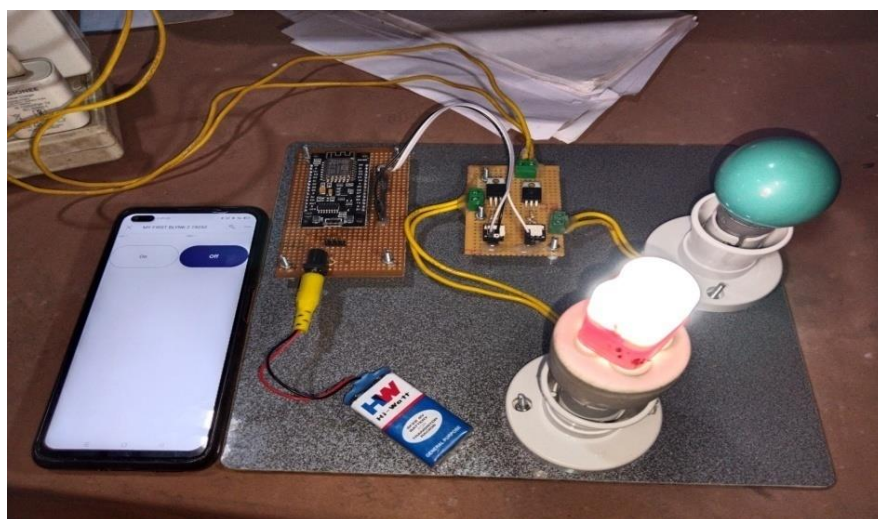Figure 6.2.1. First Switch is ON, first light is control for ON/OFF

Figure 6.2.2. Second switch is ON, Second light is control for ON/OFF

Figure 6.2.3. Both Switch is in On Position

CHAPTER 7

CONCLUSION

This work can be further upgraded by using different sensors and different home appliances. Since smart phones are widely used nowadays, this user-friendly system can be used for benefitting the mass. The cost of the system is also within reach. The circuit used for controlling AC fan speed can also be implemented in AC light dimming applications. The features that enables the user to control the circuit Break through the mobile phone and sending emergency notification to his/her Blynk app. Mobile application development companies with dedicated teams are working extensively on IoT-based applications that are connected to the cloud. Not only old-aged or physically challenged people can be benefitted using this, but any person with a smart phone can monitor and control the electronic devices without much difficulty. As awareness grows, the adoption rate is likely to increase for IoT-based mobility solutions that will automate business operations and end-to-end processes.

REFERENCES

1. Vikram.N, Harish.K.S, Nihaal.M.S, RakshaUmesh, *"A Low Cost Home Automation System Using Wi-Fi based Wireless Sensor Network Incorporating internet of Things"*, IEEE 7th International Advance Computing Conference,2017.

2. Ganesh krishna Naik N, Sri khanth KM, Vinod Kumar KM*,"Password based circuit breaker"*, IJAEEE,Vol-5,2016.

3. Tushar Churasia, Prashant Kumar Jain, *"Enhance Smart Home Automation System based on Internet of Things"*, Proceedings of the Third International Conference on I-SMAC (IoT) In Social, Mobile, Analytics and Cloud, 2019.

4. Sharma, M. L., Kumar, S., & Mehta.N, *"Smart Home System Using IoT"*, International Research Journal of Engineering and Technology, vol. 4, issue 11, Nov. 2017.

5. Singh, S., Saha, D., Khaware, P., Das, S., Raj, D., Das, S., & Nandi, C. S, *"Home Automation and Internet of Things"*, International Advanced Research Journal in Science, Engineering and Technology, 2016.