

# IOT Based Smart Energy Efficient HomeAutomation System

Aditya Kumar<sup>1</sup>, Nagendra babu<sup>2</sup>, Reddy Sai Kumar<sup>3</sup>, Maladi Prasanna Kumar<sup>4</sup>

<sup>1</sup>Students, Dept. of Electrical and Electronics Engineering, Lovely Professional University, Punjab, India

<sup>2</sup>Students, Dept. of Electrical and Electronics Engineering, Lovely Professional University, Punjab, India

<sup>3</sup>Students, Dept. of Electrical and Electronics Engineering, Lovely Professional University, Punjab, India

<sup>4</sup>Students, Dept. of Electrical and Electronics Engineering, Lovely Professional University, Punjab, India

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**Abstract** - The idea behind IOT based smart energy efficient home automation system is to minimise our household energy wastage. Often, we leave our home by not turning off some of the electrical appliances like lights, fans etc. This results in unwanted usage of energy. To reduce this energy wastage, we made a IOT based smart energy efficient home automation system which can be controlled by google assistant using our voice commands. Blynk is a free mobile application used to create virtual switches. It is being linked to IFTTT website which stands for "If This Than That" helps in creating if else conditional statements. This IFTTT website acts as a bridge between google assistant and blynk app. NodeMcu (ESP8266) is a low power consuming microcontroller used to act according to our voice command given through google assistant by controlling the relays connected to it. The electrical appliances connected to these relays can be turned on/off according to our commands.

**Keywords**—Home Automation, Relay, Node MCU (ESP8266), IFTTT, Adafruit, Internet of Things (IoT), Google Assistant, Voice Control, Smartphone.

## I. INTRODUCTION

Everyone like getting our things done without our intervention. Especially people working for long hours at office and tired. Home Automation is such a thing which can help us in this aspect. With the help of home automation using IOT we can control our home appliances with the minimal of work by just giving voice commands through google assistant.

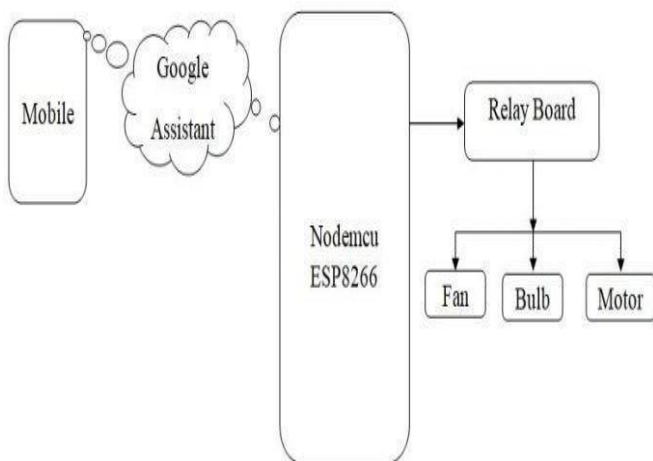


Fig 1 Signal Flow

## Internet of Things

This is the most rapidly growing technology in the world currently. Investments in this sector are growing more because of its huge demand in the public. IoT will add \$15 trillion to global GDP in next 20 years. It may solve many problems in various fields like energy, health services, disaster management, agriculture etc. In the present situation IoT is perfect example of evolution of the internet, by taking an extensive change in its ability to get and analyse the distributed data.

## Home Automation

Home Automation is the automatic control of home appliances. Now a day's people after working for long hours want utmost comfort and relaxation at home. So, to meet their demands this smart home automation using IOT has evolved. With the help of this technique our domestic electrical appliances can be controlled with our voice commands through google assistant. We turn on fans and lights when we are at home and often, we forget turning them off in the hurry of reaching office in time. With the help of this IOT based smart home automation we can turn them off anywhere we are, resulting in saving the energy and to reduce the electricity bill making this a IOT based smart energy efficient home automation system.

## II. PRAPOSED WORK

NodeMCU (esp8266) is powered with USB. The GND and Vcc pins of the relay channel are connected to GND and 3.3v pins of the NodeMCU respectively. The relay channel inputs I/p (1) and I/p (2) are connected to the general purpose I/O interface pins GPIO0(D3) and GPIO2(D4) of the NodeMCU respectively.

III. NodeMCU	Relay Module
Vcc	Vin
GND	GND
IN1	D0
IN2	D1
IN3	D2
IN4	D3

Table 1 Pin Connection

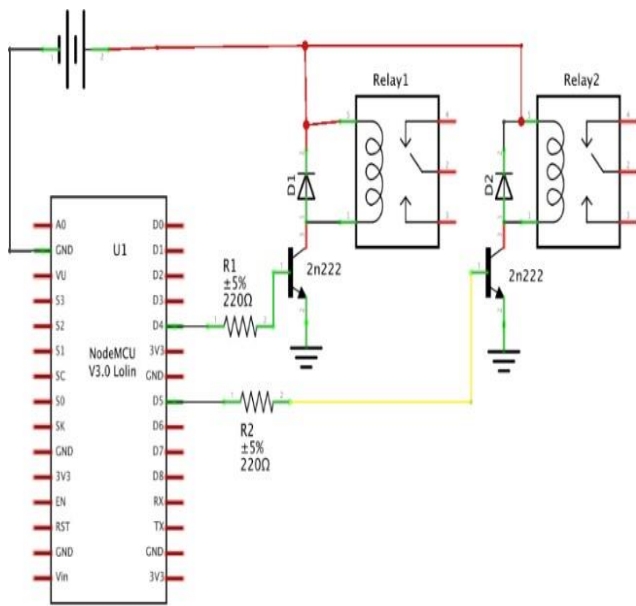


Fig 2 Circuit Connection

### III. HARDWARE NodeMCU

(esp8266)

NodeMCU is a cost-effective open source IoT platform. This includes inbuilt Wi-Fi module present in it. It is integrated with 32-bit Tensilica Xtensa L 106 microcontroller, low noise receive amplifier, filters balun, power amplifier and power management modules. It uses Lua language.

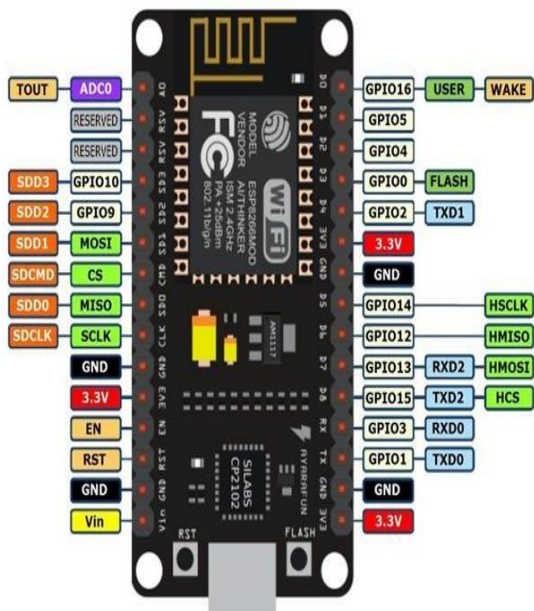


Fig 3 NodeMCU Advantages of NodeMCU

1. Low power consumption.
2. Inbuilt Wi-Fi module
3. Low cost.

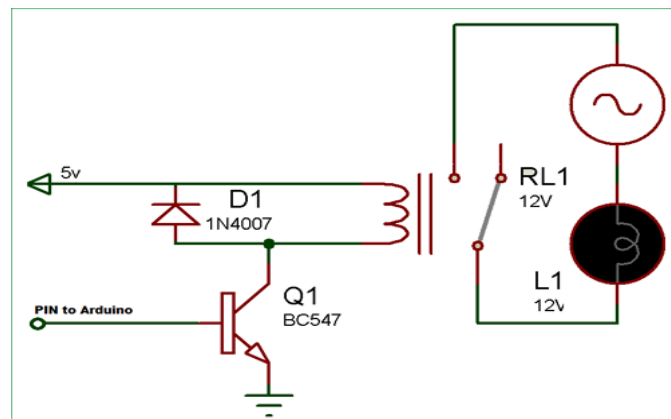


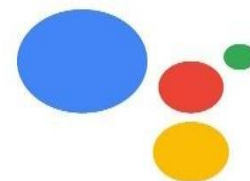
Fig 4 Relay

### IV. SOFTWARE

Google assistant

It is a software which has virtual voice assistant based on artificial intelligence from google. It receives our voice commands and acts upon it. This makes operating mobile way easier and more convenient. It can initialise by command “ok google”.

We use this software for giving our voice commands to control our home appliances from anywhere in the world.



Google Assistant

Fig 5 Virtual Assistant

Blynk

It is a mobile application that controls hardware over Wi-Fi. It works over tcp/ip protocol. We can create numerous IoT projects in this application. For our project virtual switches are to be created in this application to control our home appliances.

FTTT

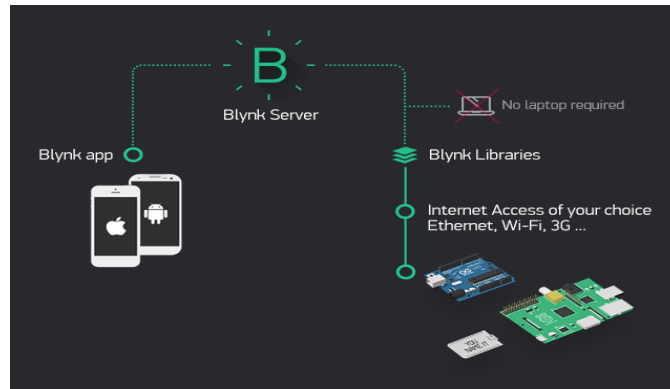


Fig 6 Blynk Server

### Relay channel module

Relay is a switch which is used to control appliances with high current. It can be controlled by microcontrollers. When high voltage signal is given to it through NodeMCU the coil in it energises and turns on the appliances. When low voltage is given, it does not turn it on making it in off state.

It stands for 'If This Then That'. This works as a bridge between google assistant and blynk application in our project. Our applet must be created that connects our google assistant and blynk application. Whenever we give necessary voice command to control our home appliances then this applet gets triggered and makes blynk to act upon it. We must sign into this site with the same google account that has been used in googleassistant.

### Arduino IDE

It is a software to write and upload code for Arduino compatible boards. The code can be written in C, C++, Java languages. We must provide our blynk application's authentication code (auth code) in our code to the NodeMCU board.

## V. WORKING AND RESULT

After making our required connections and building a prototype, we can give voice commands to control our home appliances using google assistant which uses IFTTT connecting to blynk application which controls NodeMCU.

NodeMCU makes the appliances to turn on/off according to our voice commands making our project IoT based smart energy efficient home automation system.

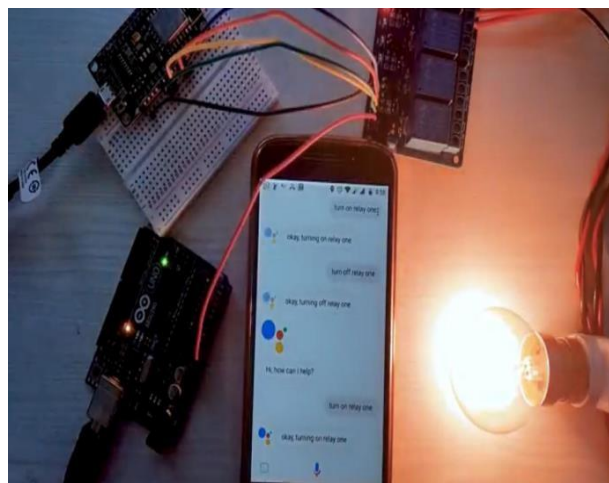


Fig 7 Working Connection

## Vi. CONCLUSION

We can control our home appliances with our voice commands using the proposed system. So, we can control our home appliances from anywhere through our voice commands at a lower price using cost effective NodeMCU and blynk app which is free of cost also if we have not turned off the appliances before leaving, we can always turn them off with our voice commands and this saves a lot of energy and money. Sensors can be used to make this a lot more secure and intelligent.

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