

## IFTTT Based Energy Efficient Smart Home Automation System Using Voice Assistant

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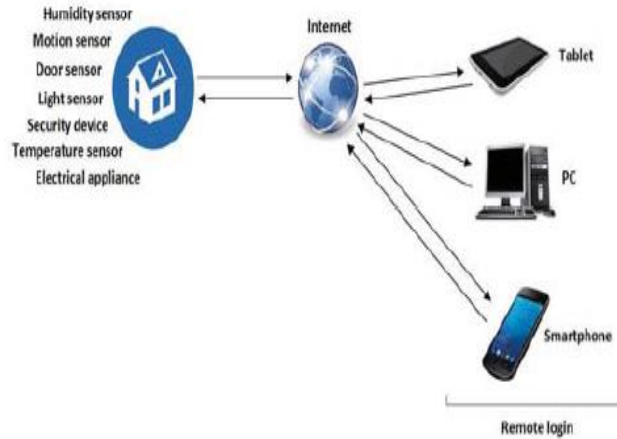
### Abstract

Automation is introduced in almost all the fields, for the betterment of human life. At the same time due to increase in demand on power, automotive devices should be designed in a manner which consumes less power. Home automation is majorly covered in our paper, where all the things around us can be controlled and monitored with a help of our smart devices. The proposed system help in controlling the home appliances with the help of Google assistant. Node MCU microcontroller board is used for controlling the appliances inside the home, as it contains a microcontroller unit and a Wi-Fi module. So, connection of additional Wi-Fi module can be avoided. IFTTT application, which can be used in our smart phones helps in connecting it to the devices around us. Natural Voice commands can be given as input to the Google assistant, which in turn send the command with the help of IFTTT application to the ordinary home appliances to make them ON/OFF.

**Keywords:** IFTTT, Node MCU, Google assistant, Blynk Application, Aurdino

### 1. Introduction

We can see that every “thing” around us is getting modernized. We can make the things around us to communicate with each other with the help of the new technologies. This can be done by placing the sensors or actuators in the things and all can be connected with any of the communication techniques like Bluetooth, ZigBee, Wi-Fi or BLE. As we see that the cost of electronic components are dropping and many new devices have been invented for our daily life with these technologies. IoT is gaining attention in number of sectors which involves smart inventions. It is possible to monitoring the devices and sending control actions. Apart from Internet of things another field which attracts everyone is artificial intelligence. Image and Video processing, Natural language processing, Image to text translate, etc., is made easier with artificial intelligence. Google assistant, Amazon alexa, Apple siri are well known products which are designed with artificial intelligence. Smart devices are designed in such a way which reduce human work. Turning on/off the TV, changing the channels, controlling the air conditioning, Opening the doors, Security alert, etc., is made possible with internet of things which helps for disabled people. System proposed in our paper consumes less power and cost effective too. The work can be categorized into two major blocks hardware module and Software module. The hardware module is used for interfacing with the home appliances and the software module sends the user commands to the devices. We have used our Google assistant and alexa for surfing things, answering our queries, for route map. In this paper it is shown that virtual assistants can be helpful in controlling the electronic devices. It can be done by simply saying “Turn ON light”..



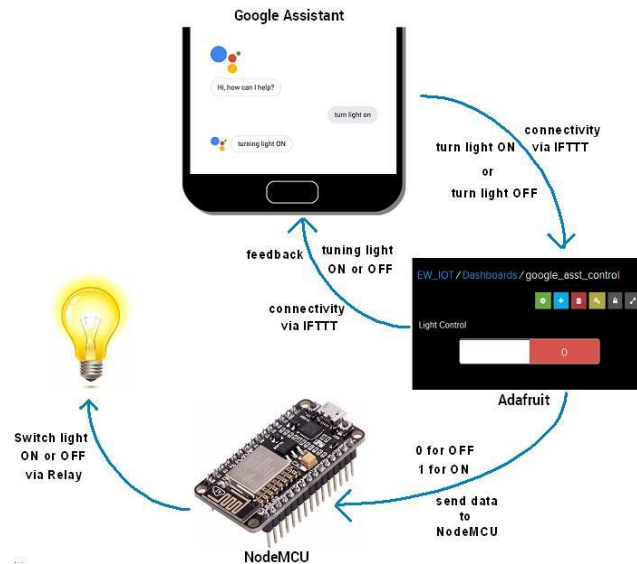
**Figure 1: Smart Sensor interface for home automation**

## 2. Literature Survey

Automation can be extended in such a way to safeguard and to reduce human work. At the same time consumption of energy is rapidly increasing. It can be reduced by closely monitoring the energy consumption in a regular manner. For this a method [1] is designed in a with an IoT board which comprises a Wi-Fi module, Current sensor and a microcontroller. Thus outlet of each device is monitored for the amount of energy consumed. In [2] home automation is done where the control is given to the multiple users through an android application. Only authorized members is allowed to control the appliances of a particular home. Google services and the cloud computing were used for transmitting the control messages between the devices. We can see a rapid development in smart homes which incorporates most of the recent technologies. These kinds of smart devices will be helpful for physically challenged persons. [3] Proposed a method for controlling the devices through voice command. We can connect virtual assistants directly to our devices for controlling it. Amazon Alexa is used for voice assistant. Fuzzy based control system is presented in paper [4], which monitors the thermal comfort zone and controls the load. As the user can control the devices, the authorization should be given to minimum users alone to operate in secure way. IFTTT provides a type of service which offers a solution for connecting various heterogeneous devices all together. It is found that there can be a malicious attack for IFTTT users for accessing their devices. A method introduced in the paper [7] proposed a method for providing security in IFTTT services. One time password authentication method is employed here and analyzed with a suitable model.

## 3. Materials and Methods

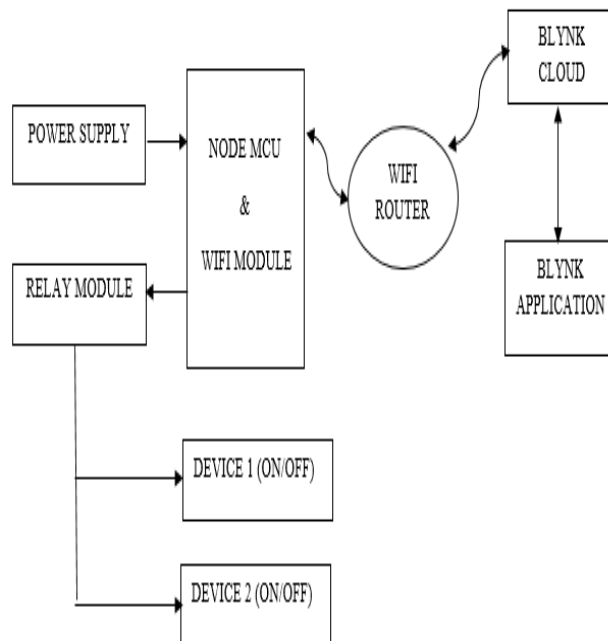
The system designed using the proposed method is applicable for all automotive devices. Here the implementation is shown for household devices. Google assistant in our phones uses Artificial intelligence for recognizing our natural language. My making use of it, the commands are given by our own language. These commands must be decoded for better understanding of microcontroller IFTTT and Blynk applications are preferred. After receiving the commands the microcontroller gives a signal to the relays for turning the devices ON/OFF, it is done based on the commands given by the user. NodeMCU microcontroller is used for our application can the communication is established with WIFI connection.



**Figure 2: Work flow**

Connections are made as shown in the figure 2. Where the input is given as voice command which in turn turns the lights ON/OFF.

#### 4. BLOCK DIAGRAM DESCRIPTION



**Figure 3: Block diagram of Receiver side**

##### 4.1. NodeMCU

Ardino and Rasberry pi are commonly used for designing a device based on IoT. For connecting those controllers with internet some kind wireless networks is needed which is not in built in ardino and rasperry pi. NodeMCU is Node Microcontroller Unit which is built in Wi-Fi module.



**Figure 3: Pin diagram of Node MCU**

ESP8286 Wifi module is available inside the single chip of NodeMCU. MQTT protocol is also supported by this controller. The memory and total storage space supported is 128Kb and 4Mb respectively. Power can be supplied through battery or through the USB port. NodeMCU is used in our system for controlling the relay switches based on the commands received from the user.

#### **4.2 Relay**

A four channel relay module is used which helps in switching the devices connected to it. On receiving the electric signal from the microcontrollers like arduino, PIC, AVR the relay switches the devices attached to it mechanically. The devices can be interfaced with the relay directly. Each relay present in the module can turn on/off the device connected to it individually. The operating voltage range to turn the switch on/off is from 1.0 volts to 5 volts. Different types of relay modules are available and it can be chosen based on our needs.

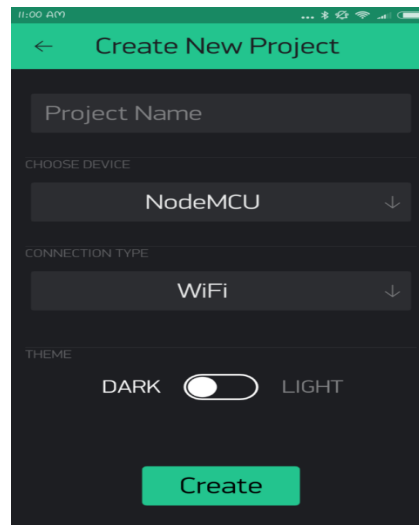


**Figure 4: Four Channel Relay Module**

#### **4.3 Blynk Application**

Blynk is an open platform designed to support in ios and android mobile phones. It helps in sending the commands to the microcontrollers like NodeMCU, arduino and raspberry pi. Graphic interfacing can be made possible with this blynk app. As we are giving the data through Google assistant, we need to link the blynk and Google assistant and it is carried out by IFTTT app. On receiving the commands from IFTTT the blynk sends it to the NodeMCU. All we need to do is just to download blynk app and follow few steps to

create an account. Once the account is selected NodeMCU is selected and we have to select the WiFi option. Auth token will be created which will be used in NodeMCU. Then the widget must be created based on the device we are connecting.



**Figure 5: Blynk application**

Add a button to your dashboard and assign the states to the chosen button. Assign ON and OFF states to logic 0 and 1. Select the switch option instead of push button.

#### **4.4 IFTTT Application**

As we need to connect Google Assistant with blynk application we are in need of IFTTT. IFTTT is used to interconnect different applications. It can be done easily by installing an IFTTT app or through the website. Open the applet and choose service option will occur, here we are going to connect Google assistant so it is selected. Next is to select the phrase we need to give as voice input. Here “Turn on the light” and “Turn off the light” phrases are chosen as a trigger input. Web hook is opened and a web request is made. Blynk auth token created will be used here and URL request link should be made for turning ON and OFF and used here. Once all done the action button should be clicked. Thus the applets for ON/OFF buttons are created. After following these procedures we just need to open Google assistant with the registered Gmail account.

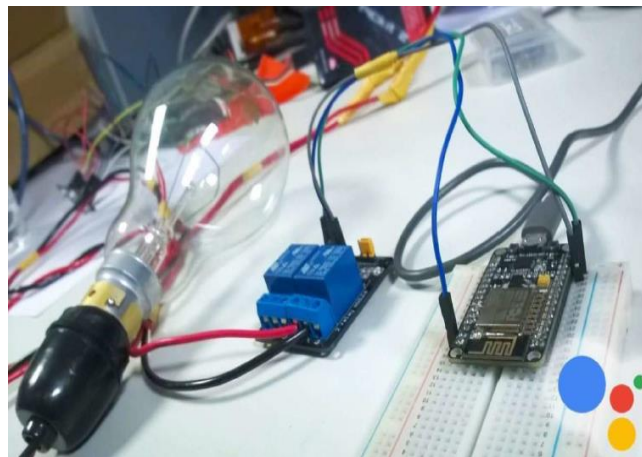
### **5 Results and Discussion**

It is shown in the paper that all the electronic in the devices in the home can be controlled with this proposed technique. Google assistant is used for accepting our voice commands. Commands that we are giving should be pre-defined in Blynk application. Figure 6 shows the voice input through google assistant.



**Figure 6: Voice input through Google assistant**

Following figure 7 shows the connection of a lamp with NodeMCU controller.



**Figure 7: Connection of devices with NodeMCU**

Output shown is for turning ON/OFF single lamp. We can connect as much devices as we need. It can be further extended for monitoring the devices by getting the status.

## 6. Conclusion

Internet of things is a fast grown area where we can even make the things around us to communicate between themselves. For the connecting to the internet the things must support some kind of wireless networks. Microcontrollers like arduino and raspberry pi does not have any such in built options. NodeMCU is designed by overcoming this limitation which has an in built ESP8266 module. As devices can be controlled through voice it will be helpful for physically challenged people.

### *Conflict of Interest*

*On behalf of all authors, the corresponding author states that there is no conflict of interest.*

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