

Design and Implementation of Home Automation System using Google Assistant and Blynk

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Abstract -With the advancement of technology, Home Automation Systems have gained much popularity around the world and this is mainly because of the comfort and convenience it provides to its occupants. But it is still not able to touch all sectors of economy owing to the large setup and maintenance cost. Thereby, restricting the use of such systems only to economically higher sectors of society.

In this paper, we have proposed a system that is extremely cost effective, easy to operate and has potential to attract nearly all sectors of economy. The system will use simple voice commands to operate and manage our home electrical appliances. We propose to use existing Google Assistant, NodeMCU(ESP8266 , a very low cost WIFI Module) as a microcontroller, Blynk Application that is available free of cost on Play Store, an android mobile device and an IFTTT interface.

Key Words: IoT, Google Assistant, IFTTT, Wi-Fi, NodeMCU ESP8266.

1. INTRODUCTION

Home Automation is one of the wide and important fields [1] of IoT that has a huge potential of growth and can completely change the way people are living today. For some, these systems can serve as a luxury and for others (specially disabled and elderly people) it can be as a necessity. Typically, a home automation system allows one to control and operate different appliances from a centralized control unit. These systems can turn ON or OFF appliances such as electric bulbs, lights, fans, air conditioner etc. remotely. In this paper we have discussed an approach to build a home automation system that can control your home electrical appliances by using simple voice commands.

These systems are based on the principles of IoT that stands for "Internet of Things". It is a concept that allows several devices to connect and communicate over the internet. IoT can be considered as a giant network of connected devices sharing data among them. The proposed system makes use of NodeMCU (ESP8266), BLYNK application, Google assistant (IIFT), electrical appliance (bulb), Android Smart Phone and

connecting jumper wires to build a simple voice controlled home automated system.

Home mechanized framework strategy is the capacity of the framework to begin or control home apparatuses or home gadgets utilizing remote sensor systems [1-2].

1.1 Problem Specification:

Automated systems currently available have many constraints that limit the use of it diversely. Some of them may include- their heavy cost, singleton control and lesser range of connectivity.

2. LITERATURE REVIEW

As per our study, there have been many home computerized frameworks that have been proposed and have come into existence. There have been different models and ways through which the technology has been taken a level up from the then existing scenarios. Some frameworks have used the web applications and some directly operate through mobile devices to make the automation of home possible. Every module has its own novel features. Here some affiliations are effectively chosen that are attempting to give better home computerization structure highlights

N. Sriskanthan [3] in his paper has spoken about the automated home framework that works on the Bluetooth module using a personal computer. But his model regardless, doesn't support versatile advancement of technology on smartphones.

Al-Ali and Al-Rousan [4] in their paper proposed an implementation of an automation system based on Java which could control the contraptions at home through Web, but their design could not stand the restart of server.

Muhammad Izhar Ramli [5] developed a model of controlled electrical contraptions system using Web that overcame the issue of restarting the server automatically in the dire circumstances of no connectivity with web.

E.Yavuz and Hasan[6] have proposed to use a mobile contraption and PIC remote control microcontroller to control the home contraptions, using pin-check algorithm. But there was no wireless control of devices.

Sushant Kumar [7] used voice recognition and user interface to control the appliances. He made the use of Bluetooth technology to control the appliances.

3. PROPOSED SYSTEM

The proposed system aims to reduce most of the key problems in the existing home automated systems. Here we propose a system that is very cost effective, easy to use, wireless, energy efficient, secure, remotely controllable and flexible. Home appliance such as an electric bulb or a fan is connected through the NodeMCU ESP8266 microcontroller. The NodeMCU is fed with a program in such a manner that it responds to the voice inputs from a smart phone. This system could be applied on each and every appliance at home. This setup will reduce the cost of electricity to a considerate amount. Here, we can also give the user a comfortable zone by providing him with the flexibility of choosing his very own kind of commands. Using a Wi-Fi module enables a user to operate the devices remotely, that is, even when he is far away from his place.

4. COMPONENTS USED

i. NodeMCU (ESP8266)

NodeMCU is a micro-controller uni. It refers to an open source firmware which uses the Lua scripting language. Its firmware is dependent on ESP8266 Wi-Fi SoC which enables the availability of web to appliances surrounding it. ESP8266 bridges the gap between the user and the appliances [2].



Fig -2: NodeMCU (ESP8266) Development Board

ii. Relay board

Any relay acts as a switch for any appliance connected to it. The power is supplied to them in the form of electrical

signals. The opening and closing of the circuit is driven by the current passed through coil which either release or pulls the bar used for opening or closing the circuit [13]. In this project, on or off signal is provided by the micro-controller. A four-channel relay is used in the proposed system which can allow four devices to run together.



Fig -2: Four- channel Relay

iii. Blynk Application

Blynk is a platform that allows us to rapidly build an interface for the hardware devices to control and monitor them. Blynk is dedicated to Internet of Things. Blynk app is available for both Android and iOS platform.

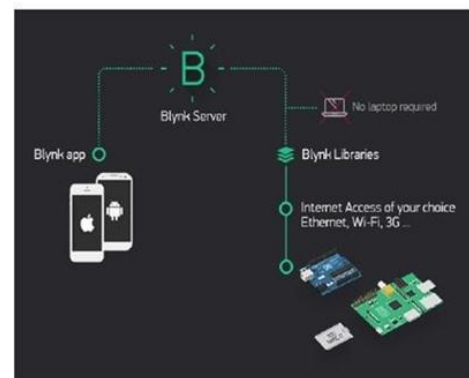


Fig -3: Functioning of Blynk Application

iv. IFTTT APPLICATION

'If This Then That' popularly known by the name IFTTT is a web service that is used to create applets [10]. Applets are nothing but the set of interrelated conditional statements that hook up the different applications. These are fired when an event occurs in web service. Here we have used this service to allow the communication between Google assistant and the Blynk application.

For establishing a connection between the two applications a Blynk token is required to be entered during the applet creation.

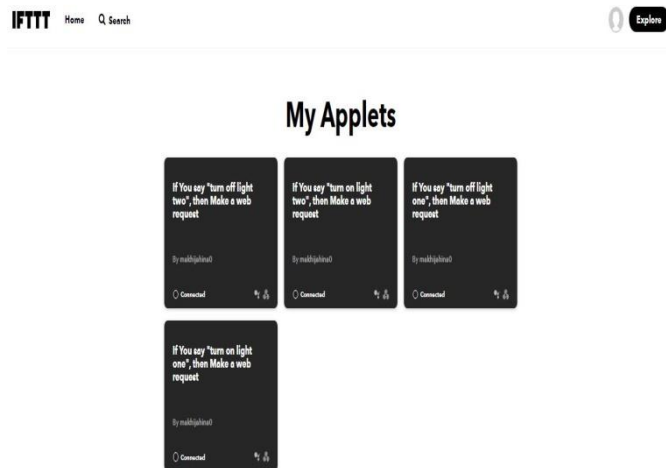


Fig -4: IFTTT applets

v. Google assistant

Google Assistant is an AI enabled software agent provided by Google. It is used to accomplish tasks for a user, based on the commands provided by him. Here, we use it to provide voice commands to operate home appliances.

5. WORKING DESCRIPTION

In this system, the user provides voice commands through the Google Assistant, available on his smart phone. These commands are to be sent to the Blynk application in order to operate the connected appliances.

But the Google Assistant cannot directly communicate with Blynk platform. This is where we need an IFTTT interface to establish a connection between them.

IFTTT interface is available free of cost on Google Play store and App store. And can easily be installed on user's smartphone. We also have an option to utilize the web version of it. IFTTT needs to be linked with the Blynk platform through the Google assistant applets provided by the IFTTT platform using the dedicated link for Blynk. While creating the applet, it is required to enter the statement of the commands that the user will use during the running system.

Now, IFTTT further delivers the commands to the NodeMCU ESP8266 microcontroller which is a Wi-Fi module that has to be available near the appliances to be automated. This Wi-Fi module gives the commands to the 4-channel relay directly connected to the appliances. This relay module then turns ON or OFF the device, as per the directions from the user.

Following is the pictorial description of the working of the system:

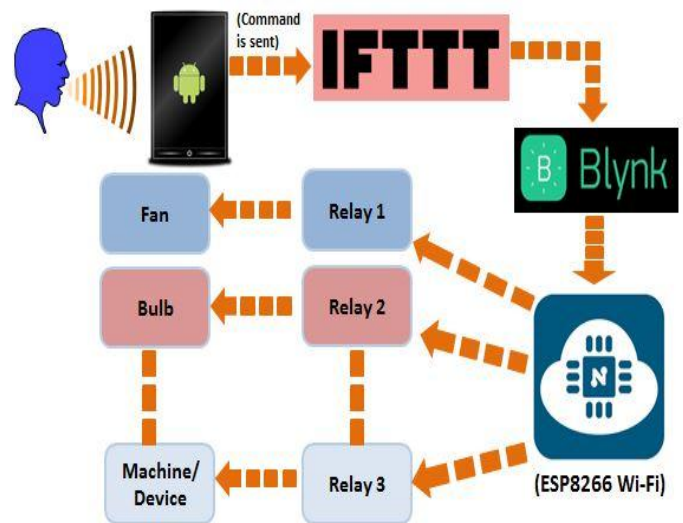


Fig -4: Work Flow diagram of the Home Automated system.

6. RESULTS

We were able to operate the electrical appliances like electric bulb, light and fans by giving simple voice commands. We were able to switch ON and OFF the appliances. A similar setup can also be used for heavy loads such as an air conditioner, washing machines, etc.

Also we found that the cost of the system dropped in comparison to the already existing systems making the system cost efficient. This system is also found to be very useful for the people who are disabled or who remain mostly out of their homes due to work. The image below shows the implemented model of the system.

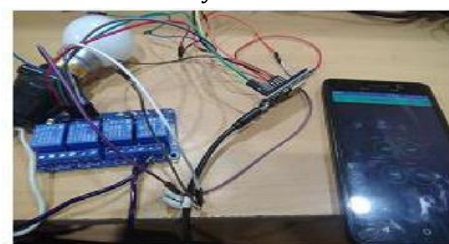


Fig -5: Implementation prototype

7. CONCLUSION

Using the proposed home automation system, we were successful in controlling and monitoring the home appliances (like bulb). This voice controlled home automation system proves to be simple and cost effective as it uses a low cost microcontroller (Wi-Fi module) and free mobile application that can be used on our existing smart phones. Since appliances can be controlled remotely, it proves to be energy efficient. This system is strong and powerful for people who are differently abled or are living in isolation or who have achieved old age, probably those who can't accomplish the turn on/off of the appliances by themselves and are dependent upon others.

8. FUTURE SCOPE

The designed system uses simple voice commands to control and monitor home appliances. We can expand its functionality by adding a security feature using voice recognition techniques that would allow only an authentic user to control devices. Further this can also be enhanced to control heavy appliances like ACs, washing machines, etc.

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