Voice Controlled Home Automation

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Abstract - It has become a craze these days because comfort becoming major priority in 21st century. This paper presents a proposal for home automation using voice via Voice Controlled by IoT (Internet of Things (IoT) is ideal buzzing technology to influence the internet and communication technologies).This paper presents a proposal for home automation using voice via Voice Controlled by IoT(Internet of things(IoT) is an ideal buzzing technology to influence the internet and communication technology). Dometicsterm for home automation 1st coined by Jim Hill has been evolving totally and drastically in Home Automation. We saw many home automation technologies introduced over these years from Zigbee automation to Amazon Echo, Google Home and Syska Home. To implement these systems it will cost around 200$ (USD)-300$(USD) makes expensive to implement such system by everyone. Well, this paper describes the implementation of such a system in cheap and effective method. The system is implemented using ordinary appliances used in household.Voice commands are given to the Google Assistant which is natural language and with the help of IFTTT (If This Then That) application. The Blynk application is used for the commands given by IFTT that are decoded and then sent to the microcontroller. The microcontroller in exchange controls the relays connected to it as required, turning the device connected to the respective relay commanding of On or OFF as per the request of the user to the Google Assistant. NodeMCU is microcontroller used and the communication between the microcontroller and the application is established via Wi-Fi (Internet).

Key Words: **Internet of Things, NodeMCU, Blynk Application, IFTTT application, Smart Phone, Google Assistant.**

1. INTRODUCTION

Every day in modern centaury people expect something new either new devices or may be new technology to simplify their day to day life. The developers and researchers are always trying to find new things to provided comfort to the people. When people come home after long hectic and hard working day needs comfort while reaching home. Modern technology and devices would help them to switch on their lights, fans or play music, videos etc which reduces their effort can be done with their using Smartphone makes their home more comfortable.

In past times housekeepers work like House Assistant were a way for rich and millionaires to keepsup their homes smart in past. Even now when technology is easy to available and handy enough only few and well people of society are known and blessed with new smart devices. Not everyone is able to afford a human assistant, or some smart home kit. Hence it becomes basic need for finding an in expensive and affordable smart home kit assistant for normal families through which families keeps growing.

This paper proposes such inexpensive system. The Google Assistant, the IFTTT application, the Blynkapplication and the NodeMCU microcontroller are the major components along with a relay board comprising of 4/8 relays along with ULN 2803 IC. Voice is used to give commands to the Google Assistant which is natural voice. All of the components used in the system are connected each other over the internet using Wi-Fi which puts this system under the Internet of Things (IoT).

2. SYSTEM DESIGN ANDIMPLEMENTATION

The system design is divided into two main categories:-

i. Hardware- Capability to connect to the router. It has also capable of turning on/off specified devices, such as lights and fans. It is called the 'Control Unit'.And,

ii. Software- The Blynk app, the IFTTT app and the Google Assistant are the software of the design used in controlling natural voice and these applications would be integrated in the Androiddevice.

The Control Unit comprises of the microcontroller- NodeMCU and the 4/8 Channel Relay board. Relay board uses ULN 2803 IC to control the relays. The Blynk app is used on Android device which communicates with the microcontroller and sends the desired signal through internet. Figure 1 below shows the basic system design architecture.
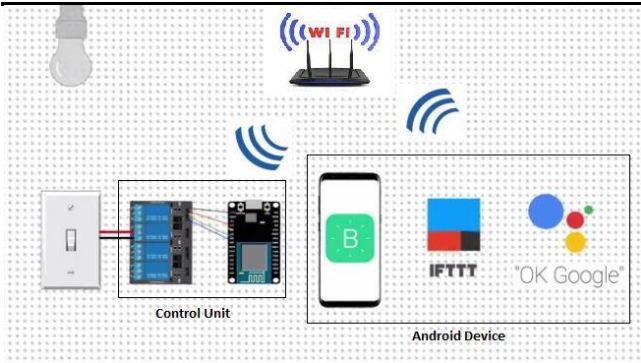
Fig -1: Basic System Architecture

The hardware also called the Control Unit comprises of the NodeMCU microcontroller and the Relay board. NodeMCU's digital output pins are connected to the Relay pins of the Relay board. Finally, each and every Relay is connected to an appliance. In the fig- 1 the second relay is connected to a bulb.

NodeMCU(ESP8266)

The NodeMCU(Node Microcontroller Unit) is an open source software and hardware development environment that is built around a very inexpensive SoC(System-on-a-Chip) called the ESP8266. The ESP8266 is implemented, design and manufactured by Express (contains all crucial elements of the modern computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK). When we purchased ESP8266 at bulk, the chip costs only $2 USD a piece. That makes it an best and excellent choice for the system design.

The NodeMCU aim is to simplify ESP8266 development. It has two key components:-

i. An open source ESP8266 firmware that is built on top of the chip manufacturer's proprietary of SDK. The firmware provides a very specific simple programming environment based on embedded Lua (eLua), which is a very simple,effective and fast scripting language with an establishment of developer community. For new comers, the Lua scripting language is easy to learn and understand. And to add on NodeMCU which can be programmed with the Android IDEtoo.

ii. A development kit board that incorporates the ESP8266 chips on a standard circuit board. The board has a built-in USB port that is already wired up with the chip;hardware reset button, Wi-Fi antenna, LED lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board. Figure 2 below shows the NodeMCU developmentboard.

RELAYBOARD

A relay is an electromagnetic switch. It is activated when a small current of some microampere is applied to it.

Normally a relay is used in a circuit as a type of switch, which works like an automatic switch. There are many different types of relays and they can be operate at different voltages. The voltage that will trigger when a circuit is built which has to be considered. In this system the use of relay circuit is to turn the appliances ON/OFF. The high/low signal is supplied from the NodeMCU microcontroller unit. When a low voltage is given to the relay of an appliance it is turned off and when a high voltage is given it is turned on simultaneously. The relay circuit to drive four appliances in the Home automation system is shown in figure 3. The number of appliances can be modified according to the user's requirements.
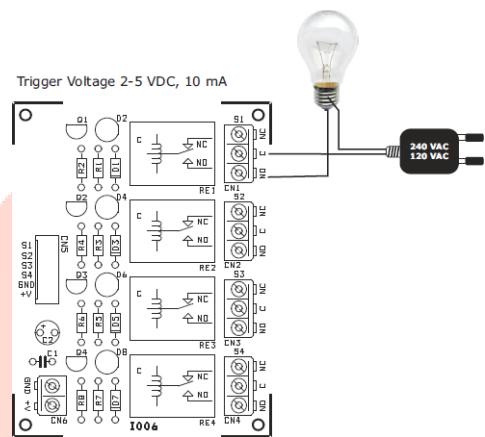

Fig -2: NodeMCU (ESP8266) Development Board


Fig -3: Relay Board Wiring Diagram

ULN 2803IC

ULN 2803 IC is used as a relay driver. It is a High voltage and high current Transistor Array Integrated Circuitespecially used with Microcontrollers where we need to drive high power loads. This IC consists of 8 NPN Darlington transistor connected with common Clamp diodes for switching the loads connected to the output. This Integrated Circuit is widely used to drive high loads such Lamps, relays, motors etc.

Most of the Chips like TTL, CMOS, PMOS, and NMOS operates with low level signals which operates at the range of (0-5) V and are incapable to drive high power inductive loads. However this chip takes low level input signals (TTL) and uses that to switch/turn off the higher voltage loads that are connected to the output side.

The ULN2803 IC consists of 8 NPN Darlington Transistors pair which provides the proper current amplification required by the loads. A Darlington pair has two transistors that act

as a single transistor providing of high current gain. In this pair the current is amplified by the first transistor is further amplified by the next transistor providing high current to the output terminal as well.
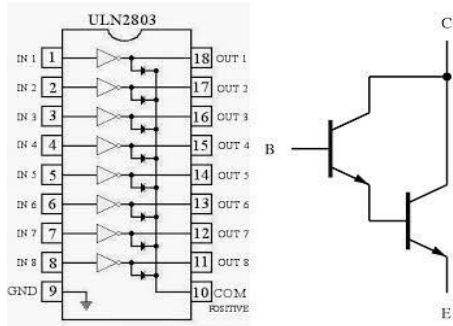
a.   b.

Fig -4: a. ULN 2803; b. Darlington Pair

SOFTWARE

The software of the system is mainly consists and proposed of the Blynk Application and the IFTTTapplication using Google assistant.

BLYNKAPPLICATION

Blynk is a Platform with iOS Operating System and Android apps to control Arduino, Raspberry Pi, NodeMCU etc. and many several other boards over the Internet. Blynk is especially designed for the Internet of Things(IoT). Used to control hardware remotely, it can also display sensor data, store data, visualize it and do many other coolthings.

Blynk App setup is required; easily available free of cost and we set it up as per the requirement. We can use this app begin by creating a project and then selecting the microcontroller we are using. After which create the toggle buttons for each relay associated with the digital pins of the microcontroller. Once this process is done, Blynk sends an authentication token to the registered email id for this particular project. This token should be noted and saved for its use while programming the NodeMCU and setting up the IFTTTapplication.
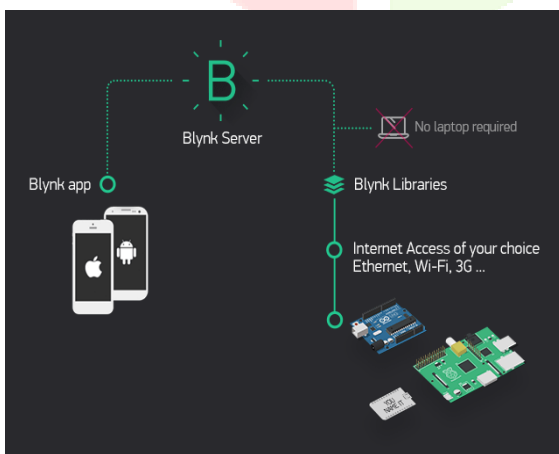

Fig -5: Functioning of the Blynk Application

IFTTT APPLICATION

IFTTTalso known **If Then This That** derives its name from the programming conditional statement "if this, then that." IFTTT is both a website and a mobile app that launched in 2010 and has the slogan "Put the Internet to work for you". The idea of IFTTT is to automate everything from your favorite apps and websites to app-enabled as an accessories and a smart devices. Whatever the company provides is a software platform that connects apps, devices and services from different developers in order to trigger one or more automations involving those apps, devices and services. Here, the use of IFTTT application is to bridge the gap between the Google Assistant commands and the Blynk app.

While setting up the IFTTT application first requires logging in after which we need to create an applet(freeware web-based service that creates chains of simple conditional statements) and then "This",i.e. the trigger, here we select Google Assistant and then we will type in the commands to which the Google Assistant should respond and to this command it should control the appliance/relay associated with it. The response command from the Goggle Assistant can also be typed in asdesired.

After configuring the trigger, i.e. "This" of the application we need to configure the "That". What should be done once the Google Assistant hears the command which we just configured? This is decided by setting "That" of the app. We click "That" and then select web hooksand click   connect.   Web hooks   will allow   us   to send commands to the Blynk Server. Now, in the URL we type the IP address of the Blynk server followed by the Authentation token sent by the Blynk and then the pin number of the microcontroller to which the device to be controlled is connected. The URL should be in the following format:

http://188.166.206.43/AuthToken/pin/CorrespondingDigitalPinNo

Then in the method we select 'PUT' and the content type is 'Application/JSON' and in the body we write ["1"] to turn ON and ["0"] to turn OFF. This creates the action for the trigger i.e. the Google Assistant command. The action taken by it is simply sending a message to the Blynk app to either turn ON or OFF the concerned connected device.

Finally, the microcontroller is programmed with the actions it needs to do once it receives the signal from the Blynk application. Before that, the Blynk and the microcontroller should communicate and the communication is done via the internet and since the microcontroller, NodeMCU comes with inbuilt Wi-Fi module, it is programmed to connect to the desired network once plugged in. 'C' language is used to program the microcontroller and is programmed in the Arduino IDE.
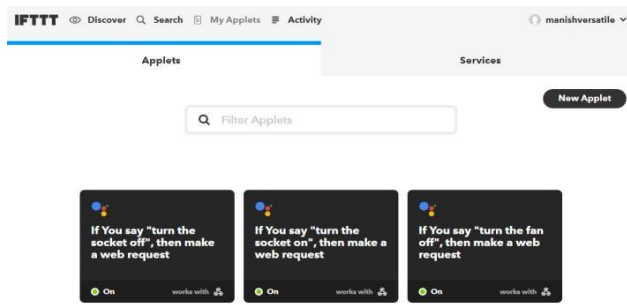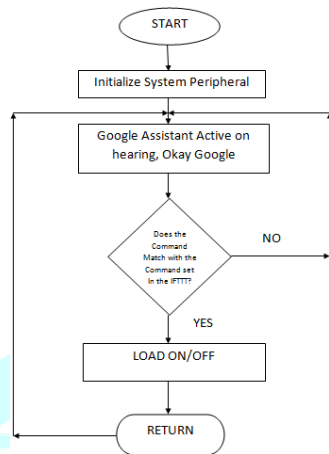
Fig -6: Screenshot of the IFTTT Application after Creating Several Applets

FLOWCHART

3. RESULT

The result was positive and the system responded well. The diagram below shows the complete prototype implementation of the proposed system.
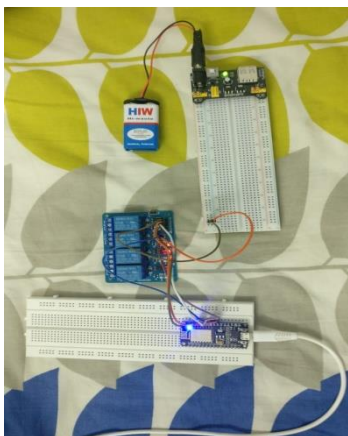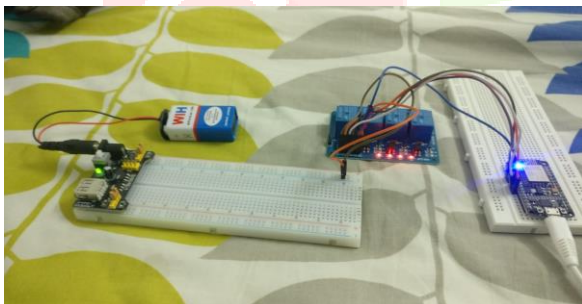

Fig 7:-Working of a Project

The system successfully worked with the app and voice control.

To provide power to relay we have used bread board power supply. Power supply was in-turn given power through a battery.

4. CONCLUSION AND FUTUREWORK

A. *Conclusion*

The home Automation using IoT(Internet of Things) has been proved to work by connecting simple appliances to it and can successfully controlled through internet. The aim of this paper was to propose a cost effective voice controlled home automation which can control general appliances found in one's home. Home Automation is highly reliable and efficient system for aged people and differently abled person those are on wheel chair it makes easy for them to switch ON/OFF the devices. Blynk server is used to make system respond more faster.By implementing this type of system, we can ensure that the energy conservation can be done. By help of this system we can increase, the efficiency of the appliances. We can have the complete control over the home appliances from a long distance. This will Increase the comfortability of human being and it will reduce the Human efforts.

B. *Future work*

Using this home automation system as a reference, the system can be expanded to include various other options which could include home security feature like capturing the photo of a person moving around the house and storing it onto the cloud. Moreover, if we want to operate a particular device at some place then this will be helpful to do that. But this can make better by thinking out of the box and by innovating ideas.

REFERENCES

[1] IFTTT: https://ifttt.com/discoverhttps://www.pocketlint.com/SmartHome/SmarHomenews

[2] Blynk : https://www.blynk.cc/ https://docs.blynk.cc/

[3] NodeMCU: https://nodemcu.readthedocs.io/en/masterhttps://iotbytes.wordpress.com/nodemcupinout/

[4] Google Assistant: https://assistant.google.com/intl/en_in/https://www.pocketlint.com/Apps/Appsnews/Googleappnews

[5] IoT: https://internetofthingsagenda.techtarget.com/definition/IoT-device

[6] ULN2803 IC working: http://www.gadgetronicx.com/working-of-uln2803-ic/

[7] Webhooks: https://webhooks.pbworks.com/w/page/13385124/Fro ntPage

[8] Application/JSON: https://www.json.org/

[9] Arduino IDE: https://www.arduino.cc/en/Guide/Environment

[10] Wkipedia:https://www.wikipedia.org/

[11] Fig 1-6 Manish Prakash Gupta Google Assistant Controlled Home Automation IRJET:May-2018