HOME AUTOMATION USING GOOGLE ASSISTANT PREDICATED ON IFTTT

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ABSTRACT: This study suggests a Google Assistant-based home automation solution. We have a variety of home automation technologies, including Bluetooth, zigbee, and other mobile apps. As we use Google Assistant for home automation, the proposed research stands out among others. The goal of the home automation system is to use voice commands to operate the electrical equipment in the home or business. This interactive home automation system is distinct from all other home automation systems that have been created in the past in its own particular style. The majority of the systems currently in use on the market employ an Arduino or Raspberry Pi chipset that are designed to control a number of devices inside a house, which include

1.INTRODUCTION

Our lives are constantly altered and elevated by technology. It's like adopting a new way of thinking or performing everyday tasks in a new method that is quicker, better, easier, and more reasonably priced. The development of cellular mobile communication over the past ten years has altered how people live and work. The mobile phone is quickly transitioning from voice-only communication to global networking. Mobile technology integration with home automation systems is now conceivable due to the quickly developing state of mobile communication technology. An automation system for the house makes it possible to operate electrical equipment. The automation of electronic, electrical appliances inside the home is made possible by a mix of hardware and software technologies [1]. Using home automation, you can:

2. PROPOSED SYSTEM:

The idea of our research is to integrate the Google Assistant with the NodeMCU (ESP8266) microcontroller and to control the home appliance with it. Here we are using Google Assistant to control the Home Appliances, This is done By using microcontroller NodeMCU, Blynk Application, IFTTT Web Server, Smartphone with Google Assistant. When we give the command to the Google Assistant like "Turn on the light", then those commands are forwarded to the Blynk application, then the Blynk application will communicate with the microcontroller and the microcontroller will control the relay module to turn on the light which is connected to it. Here the Google Assistant cannot directly communicate/control with either the microcontroller or the Blynk application, so to solve this problem we are using the IFTTT as a bridgebetween the Google Assistance and the Blynkapplication.

3. EXPERIMENTAL WORK:

Install and configure the Blynk application- Here first we need download and install the Blynk app from the playstore, then login with the Facebook. Then click on new project and give it a name, then select the board as NodeMCU and connection type as wifi. After successful project creation Blynk will send an Auth token to the gmail linked with the facebook account we have used before. Then add 4 buttons in workspace and select the pins as D3,D4,D5,D6.
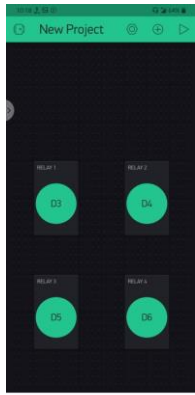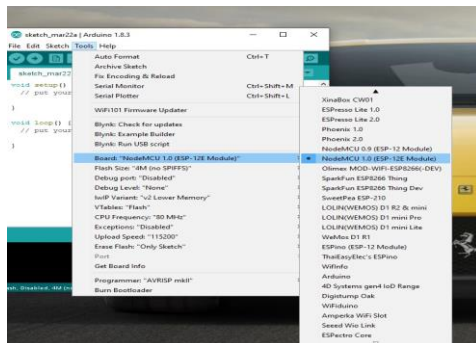

Fig1. Blynk Application

Setting up the Arduino IDE and Blynk Libraries- Download the Arduino IDE and install it. Once it is installed then download the Blynk libraries and importthem into Arduino IDE. Also install the NodeMCU board into the

Arduino IDE. After the installation open the Arduino IDE and connect the NodeMCU to the System. Select the appropriate port in the tools menu and also select as NodeMCU.

Fig2. Boards installing

Source Code- Here we need to type the source code of our research. In the code we have to concentrate on 3 lines they are the Auth token, SSID and Password. In the place of Auth token we need to enter the Auth token which we received during the Blynk app configuration and in the place of SSID and password we need to enter SSID and password of our router. Upload the code to the NodeMCU.

Hardware Assembly- Connect the NodeMCU and the relay module by using some jumper wires. The connection must be made as follows
D3 of NodeMCU - INI 1 of Relay D4 of NodeMCU - INI 2 of Relay D5 of NodeMCU - INI 3 of Relay
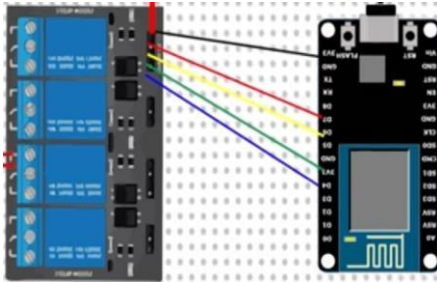D6 of NodeMCU - INI 4 of Relay GND-GND

Fig3. Connecting NodeMCU with Relay

Next power the NodeMCU by using a micro USB charger and also power the Relay module with a 9v battery. Then connect the electrical Appliances to the Relay.
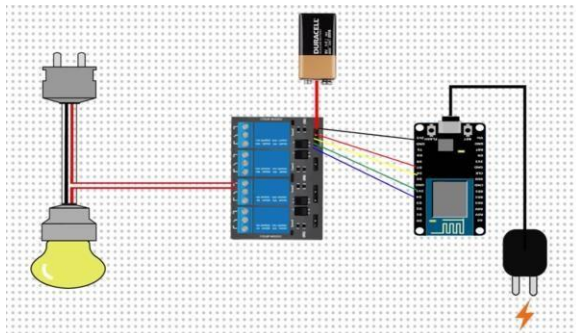

Fig4. Circuit Connection

Before configuring there is a last change we need to do in Blynk app that is open the project and for each of the button interchange the out from 0 to 1 and from
1 to 0 and also change the mode from PUSH to SWITCH. Repeat these steps for every button.
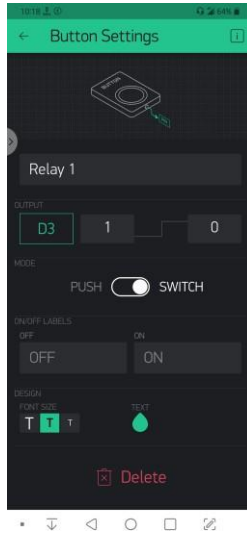
Fig5. Blynk Application after changes

Configuring IFTTT- First visit the website IFTTT.com and sign up with the Google account which is used during the configuration of the Blynk application. Once signed in then click on My Applets then click on new Applet. Then click on it this and search for Google Assistant and click on connect, at this time IFTTT will ask you permission to use your Google account. Then the following screen is displayed.
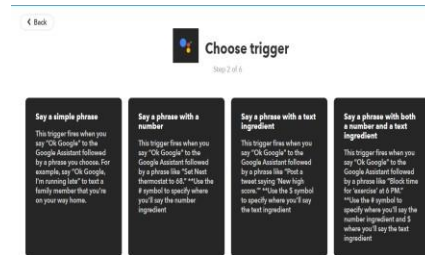

Fig6. IFTTT web server

Select say a simple phrase and give the command as Turn on the light and also give the command that what Google Assistant should say in response like "Ok turning the light on" and then click on create trigger. Next we need to select than that and search for Webhooks and click on connect and select create a web request then the following is displayed. Here in the place of URL use the URL of Blynk server India along with the Auth token and with the digital pin, In method use GET, for Content type use application/json and in body use ["0"], here 0 means turn on then click on finish. In the similar way create an another Applet to turn off the light.
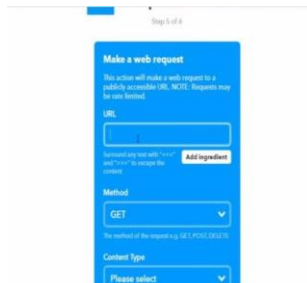

Fig7. Commands for Google Assistant

4. SYSTEM DESIGN AND IMPLEMENTATION

Here the whole system is divided into two parts

1. Hardware
2. Software

4.1. The Hardware system

The hardware system consists of mainly two components they are
NodeMCU(ESP8266)
Relay module

4.1.1. NodeMCU(ESP8266)

The NodeMCU (Node MicroController Unit) is an open source software and hardware development environment that is built around a very inexpensive System-on-a-chip (SoC) called the ESP8266. The ESP8266 is designed 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 purchased at bulk, the ESP8266 chip costs only $2 USD a piece. That makes it an excellent choice for this system design [3].
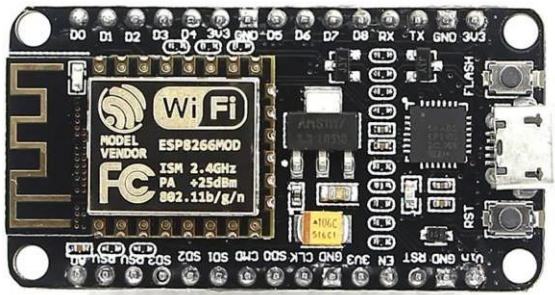

Fig8. NodeMCU(ESP8266)

Features of ESP8266:

High Durability- ESP8266 is capable of functioning consistently in industrial environments, due to its wide operating temperature range. With highly-integrated on-chip features and minimal external discrete component count, the chip offers reliability, compactness and robustness.

Compactness- ESP8266 is integrated with a 32-bit Tensilica processor, standard digital peripheral interfaces, antenna switches and power management modules. All of them are included in one small package, our ESP8266.

Power-Saving Architecture- Engineered for mobile devices, wearable electronics and IoT applications, ESP8266 achieves low power consumption of several proprietary technologies. The power-saving architecture features three modes of operation: active mode, sleep mode, and deep sleep mode. This allows battery-powered designs to run longer.

32-bit Tensilica Processor- The ESP8266 microcontroller integrates a Tensilica L106 32-bitRISC processor, which achieves extra-low power consumption and reaches maximum clock speed of 160MHz. The real-Time Operating System (RTOS) and Wi-Fi stack allow about 80% of the processing power to be available for user application programming and development.

PIN Description of NodeMCU

[5]While writing GPIO code on NodeMCU, you can't address them with actual GPIO Pin Numbers. There are different I/O Index numbers assigned to each GPIO Pin which is used for GPIO Pin addressing.

Fig9. Pin Description of NodeMCU

4.1.2. Relay Module:

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. A relay is a electro-mechanical switch. It uses electro-magnetism generated from a small voltage/current (for normal circuits its typically around 5V/6V/12V, 200mA) to switch larger voltages/currents (around, 110V/220V,16A) forhousehold appliances. Here we are using an 4 channelRelay module [6].

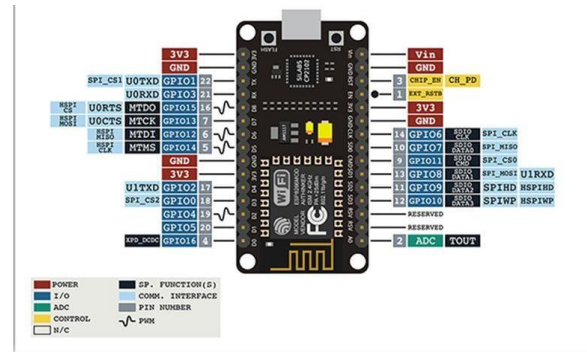**Fig10.** Channel Relay

PIN Description:

Fig11. Pin Description of Relay module

COM- Common pin
NC- Normally Closed, in which case NC is connected with COM when INTI is set low and disconnected when INTI is high
NO- Normally Open, in which case NO is disconnected with COM1 when INTI is set low and connected when INTI is high
INT 1-4- Relay 1-4 control port

4.2. The Software System

The software system consists of

1. **IFTTT web server**
2. **Blynk Application**

4.2.1. IFTTT WEB SERVER

IFTTT derives its name from theprogramming 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 is that you use IFTTT to automate everything from your favourite apps and websites to app-enabled accessories and smart devices. What 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, IFTTT application is used to bridge thegap between the Google Assistant commands and the Blynk app.In addition to the web-based application, the service runs on iOS and Android. In February 2015, IFTTT renamed its original application to IF, and released a new suite of apps called Do, which letsusers create shortcut applications and actions [7].

IFTTT employs the following concepts:
Services (formerly known as channels) are the basic building blocks of IFTTT.They mainly describe a series of data from a certain web service such as YouTube or eBay. Services can also describe actions controlled with certain APIs, like SMS. Sometimes, they can represent information in terms of weather or stocks. Each service has a particular set of triggers andactions.

Triggers are the "this" part of an applet. They are the items that trigger the action. For example, from an RSS feed, you can receive a notification based on a keyword or phrase. Actions are the "that" part of an applet. They are the output that results from the input of the trigger. Applets (formerly known as recipes) are the predicates made from Triggers and Actions. For example, if you like a picture on Instagram (trigger), an IFTTT app can send the photo to your Dropbox account (action). Ingredients are basic data available from a trigger—from the email trigger, for example; subject, body, attachment, received date, and sender'saddress.

4.2.2. Blynk Application

Blynk application is an IOT platform to control NodeMCU, arduino and many other boards. it has application access on both IOT and android. it is primarily developed for internet of things to control hardware remotely. it can access, control, store and visualise the sensor data [8].

Hardware platforms

Blynk supports hardware platforms such as Arduino, Raspberry Pi, and similar microcontroller boards to build hardware for our research.

The following is a list of some microcontroller boards that can be coupled with Blynk:

Espressif (ESP8266, ESP32, NodeMCU, WeMos D1, Adafruit HUZZAH, SparkFun Blynk Board, SparkFun ESP8266 Thing)

Linux (C++) (Raspberry Pi, Ubuntu)

Arduino (Arduino UNO, Arduino MKR1000, Arduino Nano, Arduino Leonardo, Arduino Due, Arduino Mega 2560, Arduino Mega 1280).

Connection typesEthernet

Wi-Fi Bluetooth.

RESULT

The google assistant is initiated on start up. The voice command "ok google" directs us to the google assistant directly. the appliances can be controlled as per the commands given by the user. As an instance if the bulb in the kitchen has to be turned on the command "ok google, turn on the kitchen light" has to be given. And the device gives the feedback as " turning on the kitchen lights " and then lights gets turned on.

5. CONCLUSION AND FUTURE SCOPE

The aim of this research is to propose an inexpensive and effective voice-controlled home automation system. This system is highly reliable and easy maintained system for controlling the general appliances. Google Assistant is an emerging technology, at present most of the smartphones include Google Assistant technology, any update in the google assistant could make the device even moreeasierandreliable.

6. REFERENCES

[1]-N. Sriskanthan, F.Tan, A. Karande, Bluetooth based Home automation system, Volume 26,Issue 6, 10 August 2002, Pages 281-289.

[2]-Khusvinder Gill, Shuang-Hua Yang, Fang Yao, Xin Lu, A zigbee-based home automation system, Volume 55, Issue 2, May 2009, Pages 422-430.

[3]-https://en.wikipedia.org/wiki/ESP8266

[4]-https://www.espressif.com/en/products/hardware/esp8266ex/overview

[5]-https://iotbytes.wordpress.com/nodemcu-pinout/

[6]-https://en.wikipedia.org/wiki/Relay

[7]-https://en.wikipedia.org/wiki/IFTTT

[8]-https://en.wikipedia.org/wiki/IFTTT