



Voice Control Home Automation Using Google Assistance

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**Bachelor of Software & Electronic
Engineering**

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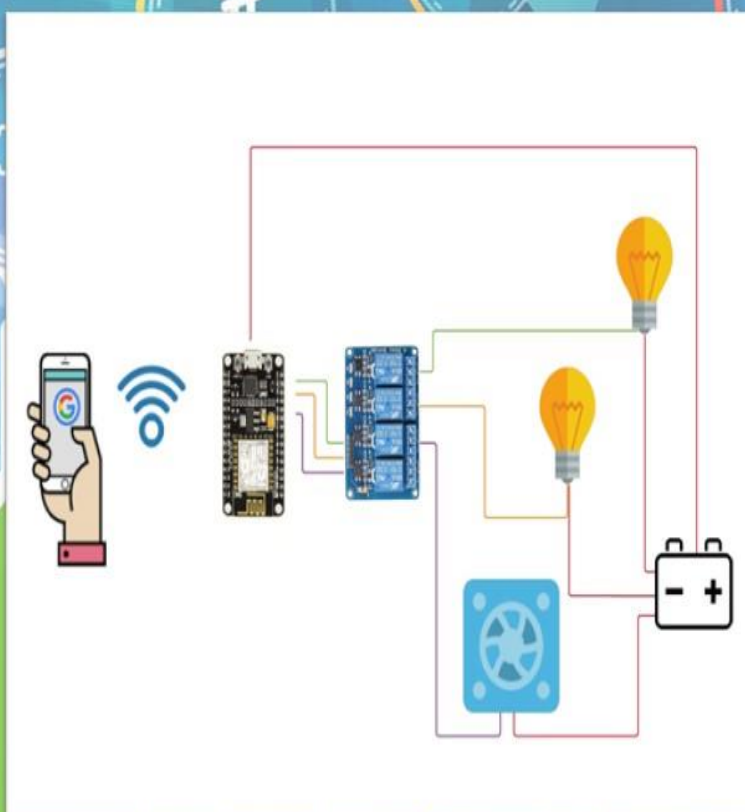
Project Poster

Voice Control Home Automation Using Google Assistance

Introduction and Features

This project put forwards the implementation of voice control home automation that will allow us to control household electrical appliances like lights and fan by using voice command in google assistance application on our smartphone.

The main goal of this voice control home automation project is to reduce human efforts but also energy efficiency and time-saving which also very useful for elderly and disabled people.



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B.Eng. Software and Electronic
Engineering(Hons)

Hardware

- ESP8266 Microcontroller
- Relays
- Smartphone
- Power supply
- Lights
- Fan

Software

- Google Assistance
- IFTTT Freeware Web-based
- Adafruit IO Dashboard
- Arduino



Declaration

This project is presented in partial fulfilment of the requirements for the degree of Bachelor of Engineering in Software & Electronic Engineering at Galway-Mayo Institute of Technology.

This project is my own work, except where otherwise accredited. Where the work of others has been used or incorporated during this project, this is acknowledged and referenced.

Acknowledgements

I would like to express my special thanks of gratitude to my supervisor Paul Lennon as well as other lecturers Michelle Lync and Brian O'Shea for their helpful support on this project.

I am thankful to them.

Secondly, I would also like to thank my friends and any people I have referenced their work to help with this project I am very greatly for your support.

And finally, I would like to thank myself for the hard work I put in this project and no giving up on it.

I am making this project not only for marks but to also increase my knowledge.

Thanks again to all who help me, I really appreciate it.

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1.Summary

This project put forwards the implementation of voice-controlled home automation using google assistance application and esp8266. Home appliances are connected to the microprocessor and communication is established between the esp8266 microcontroller Wi-Fi module and mobile device or tablet via google assistance application. The device with low cost and scalable to less modification to the core is much important. It presents the design and implementation of automation system that can control home appliances via smartphone or tablet

Voice controlled home automation system will prove very useful in everyday life to reduce human efforts but also energy efficiency and timesaving which also very useful for elderly and disabled people.

The concept of controlling home appliances using human voice is very interesting. The proposed system has two main components and they are:

1. voice recognition system and 2. wireless system. This system to control home appliances uses a voice controlled android application. By the increasing use of internet, mobile phone, and wireless technology, it makes life easier for users to remotely access and control their household devices.

A lot of research has been done and many solutions have been proposed to remotely access this voice-controlled home appliances. Some of them used internet, wireless technology to communicate and control home appliances.

The main aim of my project is to build a perfect companion for those at home. My system is a smartphone/tablet-based system that can accept voice to direct commands via google assistance application and process them. The system will provide users switching any device ON/OFF from anywhere in their home.

In this project I have successfully implemented a voice-controlled home automation system controlling relays using google assistance application with esp8266 microcontroller chip.

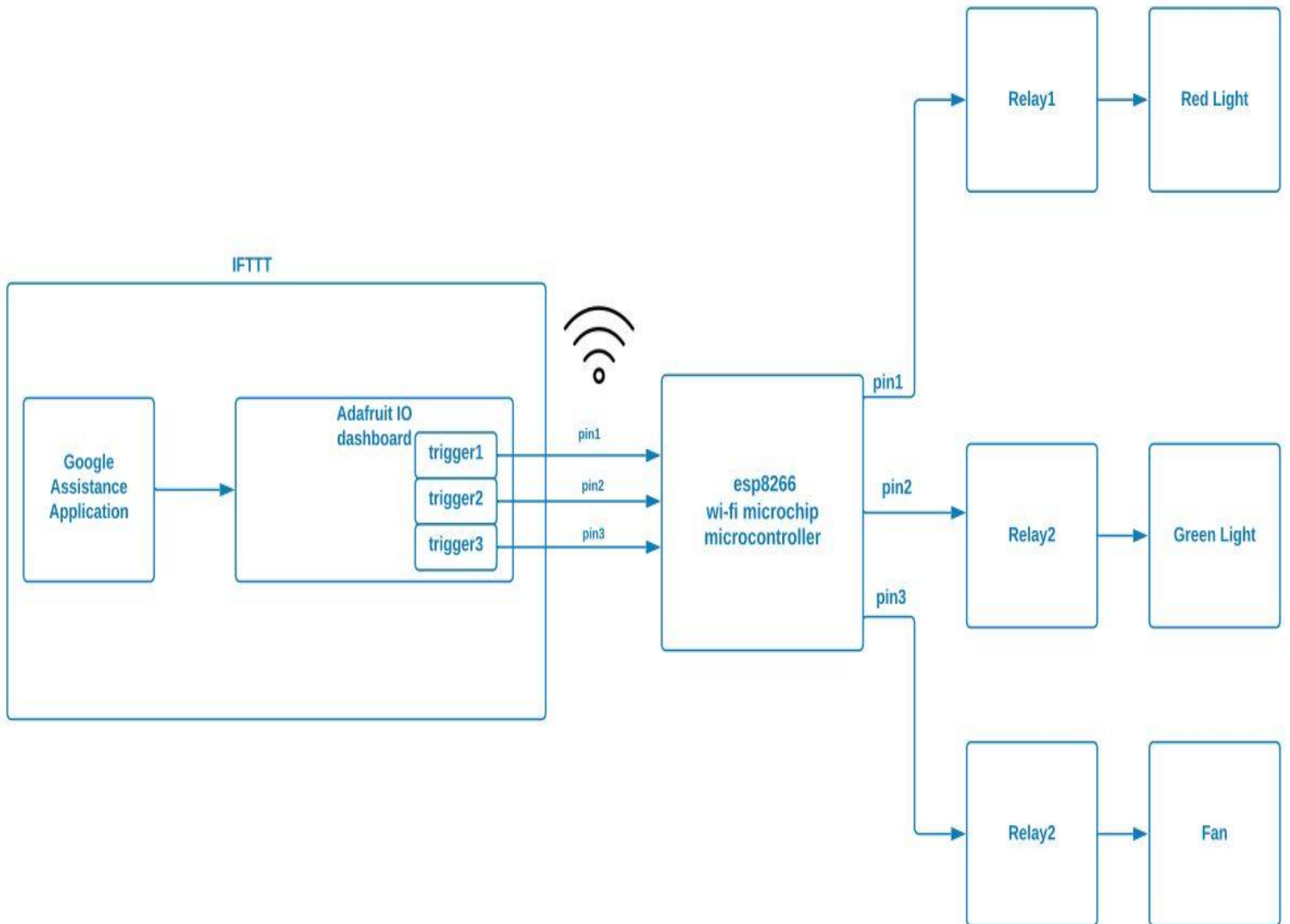
2.Introduction

Main feature of voice control home automation is to allow users to control household electrical appliances like lights and fan by using voice command in google assistance application on smartphone or tablets.

The main goal of this voice control home automation project is to reduce human efforts but also energy efficiency and timesaving which also very useful for elderly and disabled people.

My motivation in making this project is that Voice controlled wireless smart home sound very interesting, you can literally control any device anywhere in your house by giving it a voice command, sometimes people can forget to turn off things and after they settle down in a comfortable bed who wants to get up and walk up to turn it off? This project will show that they do not need to. Thus, this project will prove very useful to everyday human life, especially for elderly and handicap people who are having hard time walking.

3.Project Architecture



4.List of components used

Hardware

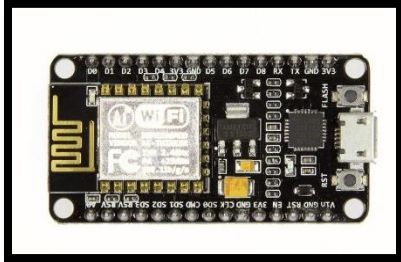
- NodeMCU esp8266 microcontroller.
- Relay.
- Smartphone/tablet.
- Power Supply.
- Home appliances device lights and fan.

Software

- Google Assistance Application.
- IFTTT Freeware Web-based.
- Adafruit IO Dashboard.
- Arduino.

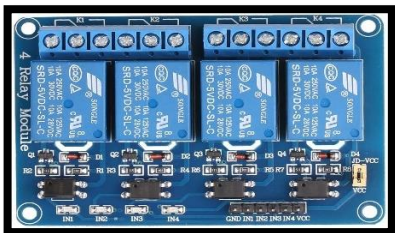
5. Hardware

5.1. NodeMCU esp8266 microcontroller



- NodeMCU is an open-source firmware and development kit that helps you to prototype or build IoT products. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language. It is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266.
- This will be my main component of this project, esp8266 will be receiving voice command signal data from my google assistance application on my smartphone.

5.2. Relay



- A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.
- This is basically used as an electromagnetic switch which can be turn on and off by an applying the voltage across its contacts by digital pinout from esp8266.

5.3. Smartphone or tablet

- Any smartphone or tablet that can access to app store/google store.
- The use of it, is to download google assistance application to send voice command.

5.4. Power Supply

- Sending voltage to supply an esp8266 and relay as well as the home appliances devices.

5.5. Home appliance devices

- Lights and fan for testing the outcome of this project.

6. Software

6.2. Google Assistance Application

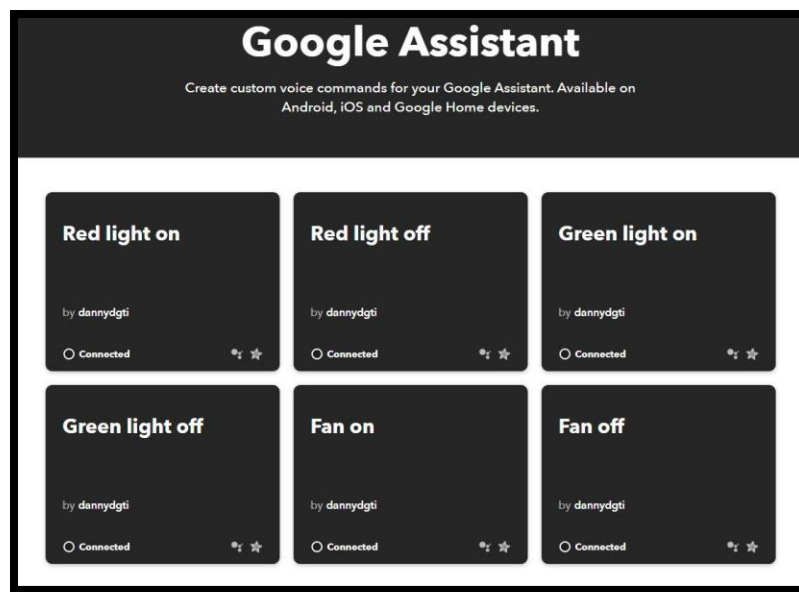


- Google Assistant is an artificial intelligence–powered virtual assistant developed by Google that is primarily available on mobile and smart home devices.
- This will be the other main role in this project, the use of this is to send voice command.

6.2. IFTTT Freeware Web-based.



- If This Then That, also known as IFTTT, is a freeware web-based service that creates chains of simple conditional statements, called applets.
- This project will use ifttt to create applets that triggered by changes that occur within google assistance and adafruit io that has been linked, whenever the voice command has been said too google assistance application, it will then send data to a trigger in adafruit io dashboard.

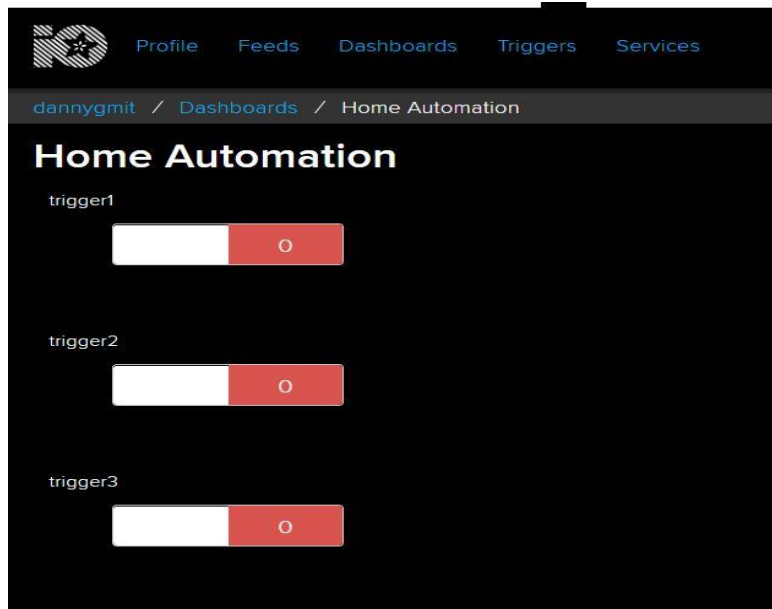


Screen shot of my voice commands for google assistance application created by me in iffft

6.3. Adafruit IO



- Adafruit.io is a cloud service - that it runs for you and you do not have to manage it. You can connect to it over the Internet. It is meant primarily for storing and then retrieving data.
- The use of this software is to create a set of triggers that are receiving data from voice commands that are sending from google assistance application.



Screen shot of my set of triggers that I created in my adafruit io dashboard

6.4. Arduino

- Arduino is an open-source prototyping platform used for building electronics projects. It consists of both a physical programmable circuit board and a software, or IDE (Integrated Development Environment) that runs on your computer, where you can write and upload the computer code to the physical board.
- The code of this project will be written using Arduino software and upload it to esp8266 microcontroller chip.

7.Problem Solving

My major problem came in very early at the beginning of this project, the problem was mainly having a very hard time deciding what I wanted to do to make this project unique and to show my skills on software engineering and how to do it.

A lot of research and hard work has been done for me to overcome this problem but it was worth it in the end, this project really suit me, since I did not have much issues while making this project.

Second major problem was my esp8266 chip got damaged which was the main part on this project while I was testing out my project right before I could even record my demonstration video, this issue has cause both physically and emotional to me. I was really frustrated and was not even sure what to do at that moment, it's best to buy a new one than find solution to fix it and I think it was impossible to fix a damaged chip. But to buy a new one I had to wait almost 2-3 weeks with the current situation we were in(covid-19), so I decided to email my supervisor (Paul Lennon) to ask his opinion on this, I got his email shortly after few hours, after that I decided to make a video recorded my demonstration anyway mainly explain what my project are, but wasn't able to show how it works at the end. It was a hard problem to overcome but it worked out in the end.

8. Conclusion

In this project I have successfully implemented a voice-controlled home automation system controlling relays using google assistance application with esp8266 microcontroller chip. This project can be used for controlling more numbers of home device not just fan and lights that showed in this by extending number of relays, and can be implemented to another level that it can be use to control home security.

This implemented project is reliable and flexible to control any loads and the coverage area for wireless control is around 10-15 meters. Hence this project can be useful for a real time voice-controlled home automation. Thus, Arduino based voice-controlled home appliances proves to be a better remote-controlled operation on home appliances using esp8266 with google assistance application.

This project can be extended for many more automation applications such as industrial automation, automotive, military, healthcare, transportation and so on.

9. References

9.1. iFTTT

- <https://ifttt.com/>

9.2. Adafruit IO

- <https://learn.adafruit.com/welcome-to-adafruit-io/what-is-adafruit-io>

9.3. Research purpose

- <https://www.youtube.com/watch?v=1goTMGq26wE>
- <https://www.instructables.com/id/Voice-Control-Home-Automation/>

10.Code

Link to GitHub: <https://github.com/dannygmit/Final-Year-Project>

Screenshots of my code:

11.1

```
/*
*****
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*/
*****

#define Relay1      D1 /*Red Light*/
#define Relay2      D2 /*Green Light*/
#define Relay3      D3 /*Fan Light*/

/*my home wifi*/
#define WLAN_SSID    "UPC604523"
#define WLAN_PASS    "GUOZWGTD"

/****** Adafruit.io Setup *****/

#define AIO_SERVER    "io.adafruit.com" //Adafruit Server
#define AIO_SERVERPORT 1883

/**/
#define AIO_USERNAME  "dannygmit"          // Username
#define AIO_KEY       "aio_bHZY74VyzYnfHwEzVbafK2Aas6DR" // Auth Key

//WIFI CLIENT
WiFiClient client;

Adafruit_MQTT_Client mqtt(&client, AIO_SERVER, AIO_SERVERPORT, AIO_USERNAME, AIO_KEY);

//Red Light
Adafruit_MQTT_Subscribe red = Adafruit_MQTT_Subscribe(&mqtt, AIO_USERNAME"/feeds/Relay1");

//Green Light
Adafruit_MQTT_Subscribe green = Adafruit_MQTT_Subscribe(&mqtt, AIO_USERNAME "/feeds/Relay2");
```

11.2

```
//Fan
Adafruit_MQTT_Subscribe fan = Adafruit_MQTT_Subscribe(&mqtt, AIO_USERNAME "/feeds/Relay3");
void MQTT_connect();

void setup() {
  Serial.begin(115200);

  pinMode(Relay1, OUTPUT);
  pinMode(Relay2, OUTPUT);
  pinMode(Relay3, OUTPUT);

  // Connect to WiFi access point.
  Serial.println(); Serial.println();
  Serial.print("Connecting to ");
  Serial.println(WLAN_SSID);

  WiFi.begin(WLAN_SSID, WLAN_PASS);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println();

  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());

  mqtt.subscribe(&red);
  mqtt.subscribe(&green);
  mqtt.subscribe(&fan);
}
```

```

void loop() {

  MQTT_connect();

  Adafruit_MQTT_Subscribe *subscription;
  while ((subscription = mqtt.readSubscription(20000))) {

    if (subscription == &red) {
      Serial.print(F("Got: "));
      Serial.println((char *)red.lastread);
      int red_State = atoi((char *)red.lastread);
      digitalWrite(Relay1, red_State);
    }
    if (subscription == &green) {
      Serial.print(F("Got: "));
      Serial.println((char *)green.lastread);
      int green_State = atoi((char *)green.lastread);
      digitalWrite(Relay2, green_State);
    }
    if (subscription == &fan) {
      Serial.print(F("Got: "));
      Serial.println((char *)fan.lastread);
      int fan_State = atoi((char *)fan.lastread);
      digitalWrite(Relay3, fan_State);
    }
  }
}

```

```

void MQTT_connect() {
    int8_t ret;

    if (mqtt.connected()) {
        return;
    }

    Serial.print("Connecting to MQTT... ");

    uint8_t retries = 3;

    while ((ret = mqtt.connect()) != 0) {
        Serial.println(mqtt.connectErrorString(ret));
        Serial.println("Retrying MQTT connection in 5 seconds...");
        mqtt.disconnect();
        delay(5000);
        retries--;
        if (retries == 0) {
            while (1);
        }
    }
    Serial.println("MQTT Connected!");
}

```