

IT 478-Internet of Things

Project Report

Project ID : 15

Project name : IOT Speech Recognition

Under the Guidance of

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1. ACKNOWLEDGEMENT

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2. ABSTRACT

Households of today are becoming smarter and more self-controlled. Home automation delivers convenience and creates more time for people. The self-controlled systems are being used in many homes today, but it is yet a relatively new and immature market. However, these technologies are growing at exponential rate. The main purpose of our project is to do home automation using an android app. Using this app one can control any home appliances from anywhere in the world with active internet connection.

3. Introduction

Homes and other systems of the 21st century will become more and more self-controlled and automated. In other words, it refers to use of IT/computer to control home appliances. It integrates electrical devices in a house with each other. For example: It can include centralized control of lighting, appliances, security lock of gates & doors to provide improved convenience, comfort, energy, efficiency, and safety. People want their life very easy and for that, we developed IoT speech recognition, In today's IT world, home automation is being popular due to easiness, flexible means of viewing/monitoring and controlling the appliances and other things according to users comfort and needs. The challenging part lies in simplicity and cost of installing them in the home and varies with increasing number of services to be monitored and controlled. This project named 'IoT speech recognition' is the idea of home automation using Android App. In this project, user can access their appliances from anywhere any time.

Due to the advancement of wireless technology, there are several different of connections are introduced such as GSM, WIFI, and Bluetooth. Each of the connection has their own unique specifications and applications. Among the four popular wireless connections, WIFI is being chosen with its suitable capability. The capabilities of WIFI are more than enough to be implemented in the design.

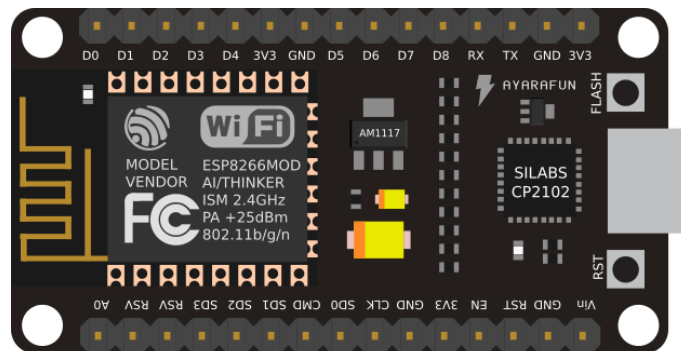
This project contains NodeMCU wifi module which is connected to the internet connection, To maintain real-time data we are going to use Firebase database service and an Android app is connected to Firebase. Home appliances are connected to the nodeMCU via a relay and In App we are using Google's ASR(automatic speech recognition). We you give the command to Android App(App requires an Internet connection) and it will change it in the database according to command.

4.Design Methodology

Components:

1. Nodemcu ESP8266
2. 4 Relay Module
3. Bulb
4. Buzzer
5. Battery 5v

4.1 Node MCU



(Image courtesy: Things board)

NodeMCU is an open source IoT platform. It's firmware runs on the ESP8266 Wi-Fi SoC, and hardware is based on the ESP-12 module and We can also code it in Arduino software using <esp8266wifi.h> library. This library provide functionality of nodemcu so, we can use nodemcu as wifi and as a router.

4.2 Relay Module

5V Relay Terminals and Pins



(image courtesy: circuit basics)

Relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used. By using this component we can work on high electricity line (220v) on any board like Arduino, Nodemcu or Raspberry Pi.

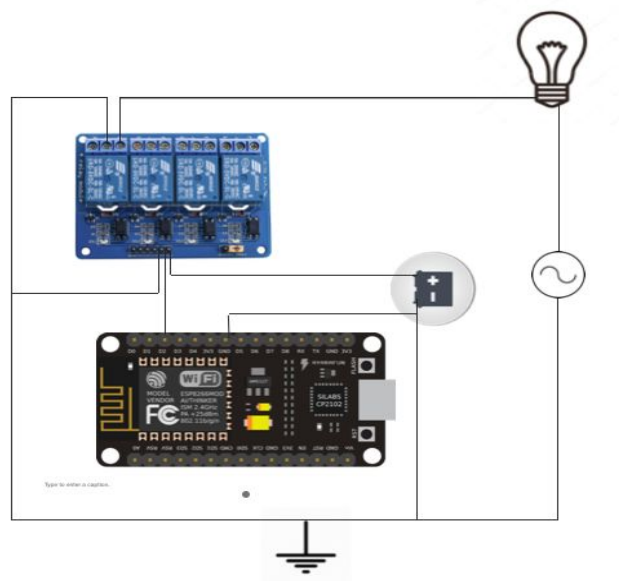
A relay switch can be divided into two parts: input and output. The input section has a coil which generates a magnetic field when a small voltage from an electronic circuit is applied to it. This voltage is called the operating voltage. Commonly used relays are available in a different configuration of operating voltages like 6V, 9V, 12V, 24V etc. The output section consists of contractors which connect or disconnect mechanically. In a basic relay, there are three contractors: normally open (NO), normally closed (NC) and common (COM). At no input state, the COM is connected to NC. When the operating voltage is applied the relay coil gets energized and the COM changes contact to NO.

4.3 Firebase

Firebase is a mobile and website development tools, which contain a real-time database, Firebase Cloud Messaging, storage, hosting etc. This platform is owned by Google so you need to register on firebase website using your Gmail id. After register, we can create App on the firebase. Firebase provides token number and URL which we can use for code in any module, For code, we need to include Firebase.h library.

5. Working

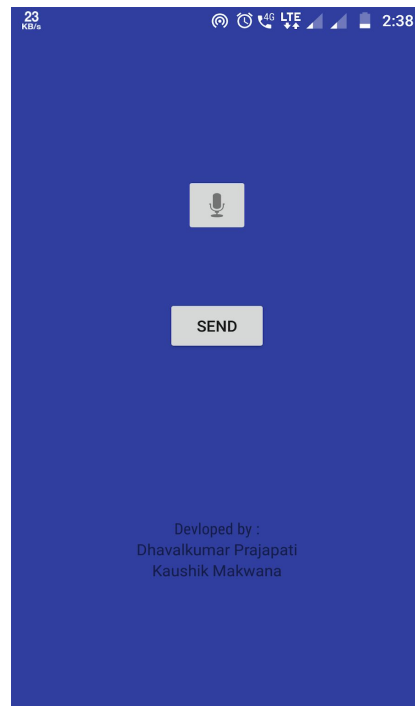
5.1 Circuit



Circuit Diagram

In our project, we have used ESP8266 (NodeMCU) which is connected to firebase via an active internet connection. When we give voice command into android app it uses google ASR engine (Automatic Speech Recognition) to convert that speech into text. Android app will send that text converted command to firebase. NodeMCU can read data from firebase server so it will act accordingly to turn on-off home appliances. NodeMCU will give input to 4 relay module which will be used as a switch to on-off appliances. When input pin gets high voltage from NodeMCU it will short its respective common and normally open pins that will result into turning on the appliance. When we get low voltage at input pin Normally closed and common pin will get shorted that will result in turning off of the appliance.

5.2 Android App



We can give voice command by clicking first button. Then google ASR engine will take voice command and it will convert in to text format. That text data will be displayed in app and as we hit the send button to send that command to firebase server. As NodeMCU is also connected to firebase it will get that data and it will act accordingly.

6. Applications

- We can control all the Home Appliances from anywhere in the world
- By just simply saying turn off all we can save lots of energy by turning all appliances when we are not in specific room.
- It can be a boon to Physically disabled peoples.
- We can implement this system in automatic agriculture industry.
- In emergency situation we can trigger other event by giving voice command.
- Help to control remote area systems

7.Future scope

- We can add more sensors that can detect human presence in specific room. If no human activity is detected in specific room than we can turn off some appliances which is not needed.
- Using machine learning we can predict turn off time of system like water pump,irrigation system,washing machine etc.

8.References

- <http://www.instructables.com/id/Quick-Start-to-Nodemcu-ESP8266-on-Arduino-IDE/>
- <https://github.com/firebase/firebase-arduino>
- <https://cloud.google.com/speech-to-text/>