Smart Home Automation

EE-306 Microprocessors & Microcontroller Applications.

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Submitted to:

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Abstract

• The Smart Home Automation aims to provide a voice controlled home automation system with an android interface which can be accessed remotely (using wifi or internet) to control the various electrical appliances available in the surrounding area by connecting them to the internet (via a microcontroller) to make them accessible.

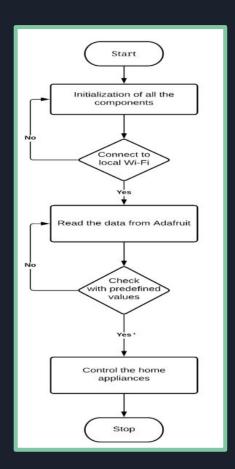
Problem Statement

- It is not comfortable and easy work for disabled people such as blind people or people who can't
 walk properly or are bound by a wheelchair to navigate around a house to access the electrical
 appliances. And people who can't type messages will not be able to use the messages are not able
 to use message based smart home systems.
- The aim of this project is to develop a voice recognised smart home system using arduino uno and a wi-fi module to help tackle these issues in the day to day life of people.

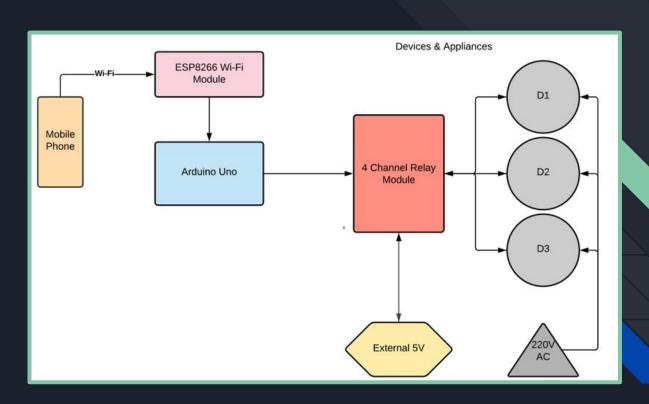
Proposed Work

- Arduino Uno is the microcontroller used as the main component of the project. It is connected
 to the internet through the ESP8266 wifi module. And using relays it is connected to the
 electrical appliances. The smart home system can be accessed either through google assistant
 or an app interface built in java.
- IFTTT applets (IF This Then That) is used to create the conditional logic of the code which helps to send and receive signals from and to arduino via the wifi module.
- Adafruit IO is an API used to receive signals from internet to a microcontroller. This is used in association with IFTTT applets to make conditional statements for example:
 - Condition Statement (If This): Turn on the lights
 - Respond (Then That): Send the response to Adafruit IO

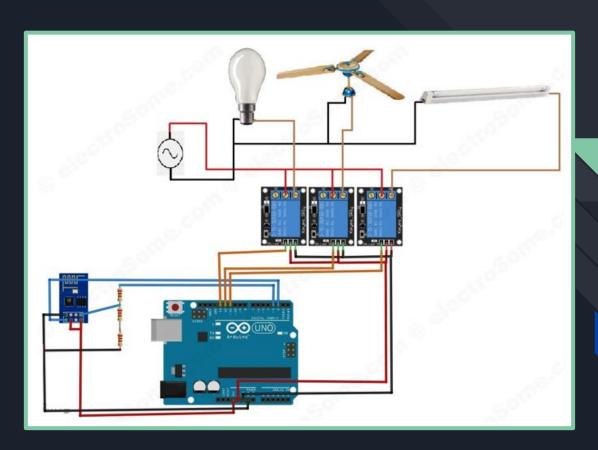
Functioning Of The Proposed System



Design of Smart Home System



Circuit Diagram



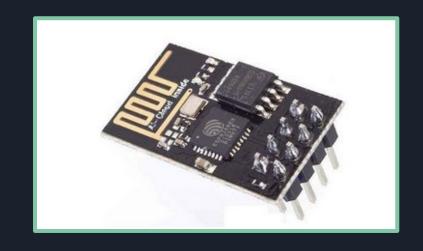
Arduino Uno

- The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.
- The Uno in Arduino Uno means that it has only one allocated port for communication. The code for arduino is written in C++.



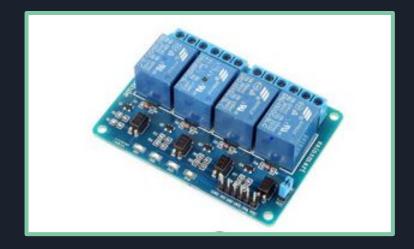
WiFi Module - ESP8266

- The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network.
- The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware.



Relay Board

 A relay is an electrical device which is generally used to control high voltages using very low voltage as an Input.



Software Requirements

- All the coding is done in C++ language and to configure Arduino, the Arduino company has developed an open-source IDE named as the Arduino IDE
- There are few APIs and services which are used for the successful completion of this project:
 - 1. If This Then That (IFTTT)
 - o 2. Adafruit IO

IMPLEMENTATION MODULES

1. Configuring Arduino

- To configure the Arduino the first step is to download the files for the board ESP8266 and managing the communication port.
- Next include the necessary libraries for the ESP8266 module and download them from the Arduino IDE.
- We have attached the code written to configure the arduino.



2. CREATING APPLETS IN IFTTT

- If This Then That (IFTTT) services are available to use for automatic services.
- IFTTT allows you to choose the trigger, as to how the applets will be started and a sending point where the response signal will be sent
- The trigger in our project for IFTTT are voice commands from the google assistant and the corresponding sending point is the feed of Adafruit IO



3. FEEDS CREATION IN ADAFRUIT IO

- Adafruit IO is an IoT based server allowing connection between the Google Assistant an Arduino Uno.
- The information is received through the voice commands from Google Assistant which act as triggers of applets created in IFTTT which further sends value to the Adafruit IO.

Default	
Feed Name	Key
☐ BulbOne	bulbone
☐ BulbTwo	bulbtwo
□ TV	tv

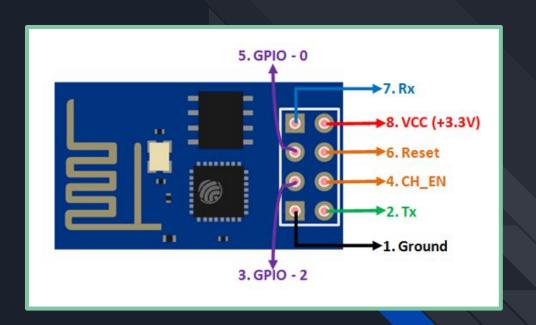
Feeds in Adafruit IO

Assembling The Circuit Elements

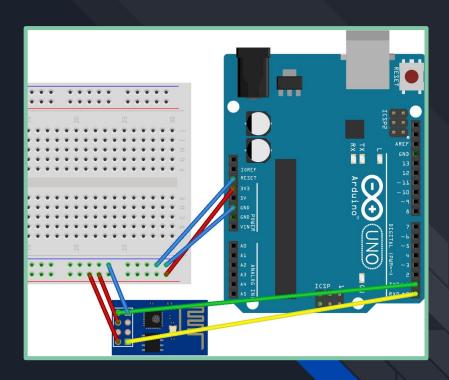
1. Relay Connections



2. ESP8266 Pin Diagram



3. ESP8266 Connection with Arduino

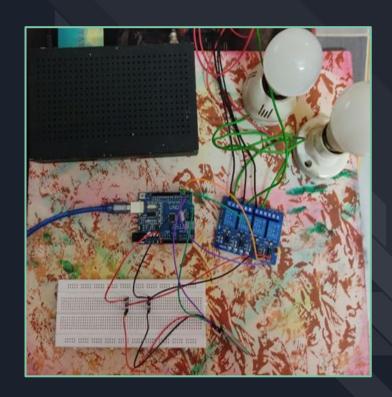


4. Electrical Appliance Connections



Circuit Implementation





Prototype



Conclusions

- This project presented the design, development and implementation of a low-cost, feasible and user-friendly smart home system based on the concepts of Internet of Things.
- The developed system can be easily implemented in a real house environment to allow real-time controlling of the home appliances.
- The proposed system can be expanded by using various sensor to automate the appliances, for example a temperature sensor can be used to automate an air conditioner to turn on automatically when a certain temperature is reached or sensors can also be used as security prospects in a home wherein the user will receive a notification if a threat is sensed.

REFERENCES

- Waheb & Kian, Tee & Ramli, Roshaliza & Zubir, Siti & Zamrizaman, Nur Thaqifah & Balfaqih, Mohammed & Shepelev, Vladimir & Alharbi, Soltan. (2019). Design and Fabrication of Smart Home With Internet of Things Enabled Automation System. IEEE Access. PP. 1-1. 10.1109/ACCESS.2019.2942846.
- M. Asadullah and K. Ullah, "Smart home automation system using Bluetooth technology," 2017 International Conference on Innovations in Electrical Engineering and Computational Technologies (ICIEECT), Karachi, Pakistan, 2017, pp. 1-6, 2017 IEEE.
- Pal, Debajyoti & Funilkul, Suree & Charoenkitkarn, Nipon & Kanthamanon, Prasert.
 (2018). Internet-of-Things and Smart Homes for Elderly Healthcare: An End User Perspective. IEEE Access. 6. 1-1. 10.1109/ACCESS.2018.2808472.

THANKING YOU