

IOT based Home Automation using Cloud

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Abstract— Home automation refers to the converting of all the electrical and electronic devices into an automatically operating system to the user-defined conditions and includes the reduction of human efforts. This system includes the established communication between the cloud and the physical devices. This system has a low-cost microcontroller that enables cloud communication. We provide the optimized system with the ESP 8266 Wi-Fi controller integrated Arduino and the input sensors to provide the required input to the controller. Generally, establishment facility of cloud will produce high cost but we provide with the low-cost cloud accessing and low power consumption with ESP 8266.

Index Terms— Internet of Things, Esp8266, Cloud organizing, Arduino microcontroller, Google Assistant.

I. INTRODUCTION

Home is the sheltered space for every individual, we get peace at our home. Scientists have invented many things eg.Bulb,Fan, etc. At every minute a new Technology has developed, to make humans feel leisure and comfort. For adding additional comfort and to save energy, automation evolves. Home automation means handling and controlling the home appliances by using the controller. Internet of Things(IoT) is the technology that allows the users to control the home appliance through internet and access at any part of the world.

In our system we used Iot, to control the home appliances through internet. A Smart home can be defined as a home which is fully automated by using technologies, it comprises of sensors,controllers,etc.. And it improves the quality of life. The ultimate aim of this project is to help the orderly and disabled people to access the home appliances through mobile phone or desktop or tab and also to reduce the usage of electricity in the home. The automated home can make people feel very safe, comfortable, secure, and it saves the money. For example is a user is far away from home, she/he can access their home appliances at any part of the world. Nowadays many people are accepting this technology. This paper will explain the flow of controlling appliances through internet using cloud technology.

II. LITERATURE SURVEY

Valentina Bianchi, Paolo Ciampolini, Ilaria De Munari, et al in 2019 proposed an “RSSI-Based Indoor Localization and Identification for ZigBee Wireless Sensor Networks” in Smart Homes. Techniques based on received signal strength indicator (RSSI) are often used, relying on fingerprinting or proximity algorithms. Shubham Kumar, Shajulin Benedict, Srilakshmi Ajith, et al in 2019 developed an “Application of Natural

Language Processing and IoT Cloud in Smart Homes”.IoT cloud-assisted solutions could serve several applications, including the Smart Home Automation, due to the availability of high-speed mobile networks coupled with cost effective, accessible and fast embedded hardware. Rahul Kumar, Garima Sarupria, Varshil Panwala, Smit Shash, etal in 2020 introduced an “Power Efficient Smart Home with Voice Assistant”. A system that emphasizes on power efficiency as well as can be integrated with the already existing appliances. NodeMCU, along with Raspberry Pi, Firebase real-time database, is used to create a system that accomplishes such endeavor’s and can control relays, which can control these appliances without the need of replacing them. We reviewed all the reference papers and we assure that we done our work which is not in the reference paper.

III. SYSTEM ARCHITECTURE

The problem faced by the old technology is it is not accessible for long range. Our aim is to build a smart home which can be accessible for a very long range. Once we developed the home automation device we can connect any home appliance ,and we control it from any place.

A.ESP8266

The ESP8266 is a device, it is used to control any microcontroller through Wi-Fi network. It is a set of high performance and high integration wireless.

The ESP8266 Node MCU (Micro controller Unit) it is a small computer integrated on the chip. It is the open source for the IOT platform.

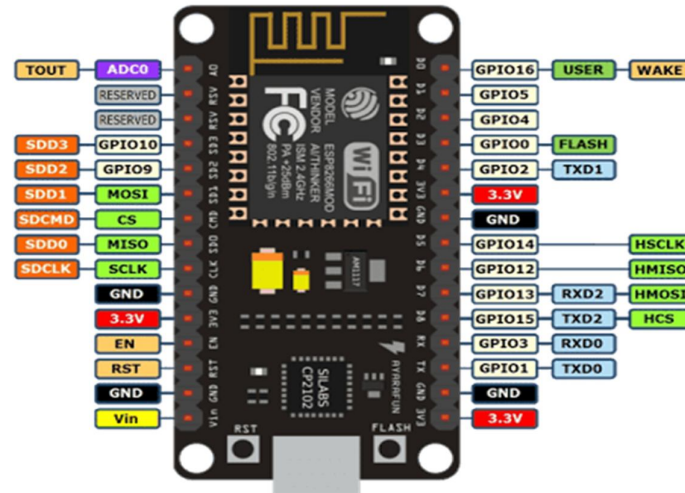


Diagram of ESP8266 with pins details

B. Pir Sensor

The PIR (passive infrared sensor) in (Fig.1) is used to sense and count the persons who entered into the home and based on that count the system works automatically. It connects with Arduino through these pins: VCC is connected to +5V and GND to GND. Then the Digital output Pin of the PIR sensor is connected to the digital I/O pin 8 of the Arduino.

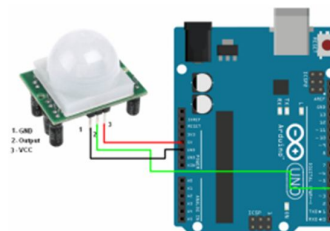
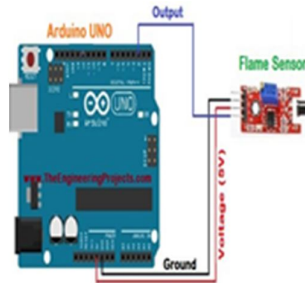


Fig.1.connection of Arduino with PIR sensor

C. Fire Sensor

Fire sensor is used to detect the fire in the Home. It has about three pins (some may have four pins): VCC is connected to +5v and GND to GND of the power supply (can be connected to Arduino's +5V). The Digital Output pin is connected with Digital I/O Pin 11 of Arduino.



Connection of Fire sensor with Arduino

D. LDR

In this project we used LDR sensor to find out whether the light is ON or OFF by calculating the intensity of light. If when the output is high it means that the light is present, if the output is low it means that the light is not present. We use potentiometer in order to adjust the sensitivity.



Diagram of LDR

E. Gas Detector

In this automation project, we used gas detector in case of any gas leakage in the home. Here we use MQ6 LPG gas sensor, when VCC is connected to +5v and GND to GND of the power supply (can be connected to Arduino's +5V). This MQ6 LPG is easy to interface with Microcontroller.

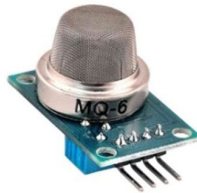


Diagram of gas detector

F. Temperature Sensor

In this project, we used Temperature sensor to measure the heat in the home, if in case of any fire accident occurs, the temperature sensor senses the temperature at the range between 20 to 80 Celsius and the output is given to the input of the controller and the controller will switch on the alarm signal and also it will give notifications to the owner of the house.

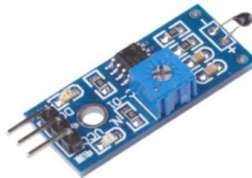


Diagram of Temperature sensor

G. Relay

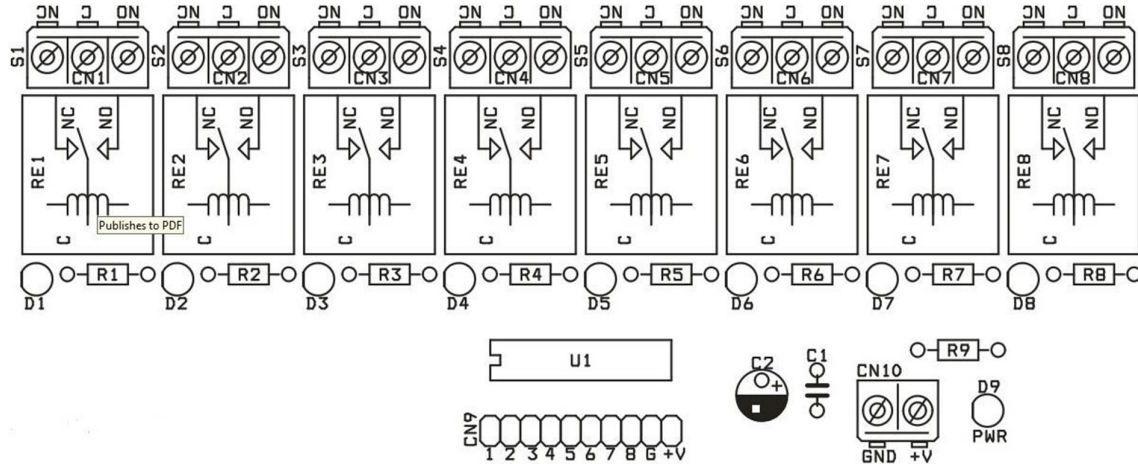


Diagram of relay with pin details

A relay is the main part in this project, we have all the controls in the relay. Relay have to operate based on the Microcontrollers instruction, if the controller informs the relay to switch on the light, the relay have to open and if the controller informs the relay to switch off the light, then the relay have to be closed. For every home appliance ,a separate relay is installed, in order to avoid the wrong input.

IV. APPLICATION SOFTWARE

A. Google Assistant

The Google assistant is developed by Google that act as a virtual assistant on mobile or any other smart device.



B. IFTTT

IFTTT is a free web service, it is used to check the conditional statements that are triggered if any changes that occur within our web services Google.



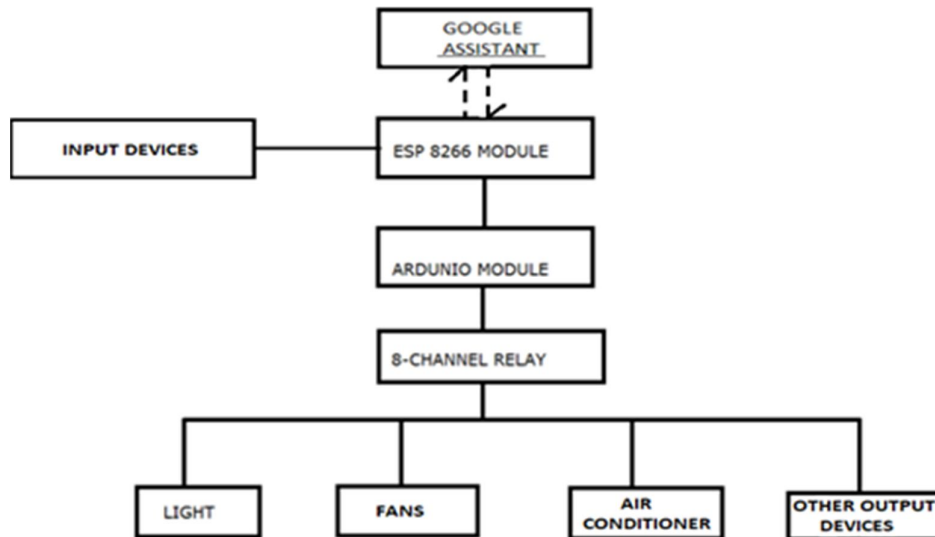
C. Web hooks

Web hooks is one of the applets in the IFTTT platform. It is used to enable the appliances based on the given command or condition by the user viva “GOOGLE ASSISTANT”.

V. SYSTEM IMPLEMENTATION AND WORKING

The ESP8266 module gets input from the Arduino. Whenever the person is detected in the input sensors, it sends the output either in analog or digital to the Arduino. Based on the conditions, the system will “ON” or “OFF” automatically. Arduino will send the data to the ESP8266 module. The ESP 8266 module acts as an intermediate to the user and Arduino. Using the Web hooks in the Cloud applets IFTTT (IF, THIS, THEN, THAT) the

conditions are given to the devices. Based on each condition the appliances are enabled. When the Appliances are enabled the notification message is given to the user by Google assistant or blynk application.



Block diagram of IoT based home automation

On the phone, the application software “GOOGLE ASSISTANT” and the ESP8266 both connect to the webserver with the help of a WIFI network. The connected devices are further connected to the IFTTT through the server. The application software controls the ESP8266 Node MCU. So that, we can control the appliances with the help of ESP8266 by the "GOOGLE ASSISTANT" and sever through the IFTTT.

VI. RESULTS

The Home Automation system is turned ON automatically when a human is detected inside the house or can be manually turned on using google assistant. The home appliances (Fan, Light, Air Cooler, etc.) are controlled and monitored based on the configured conditions. By using this system, each and every Electrical and Electronic device is controlled and monitored. Whenever the system is ON the notification message or alerts will be sent to the user. For example, this system will generate the sound and alert message when the flammable gas or fire is detected. This system will notify the electrical damages and thus reduces the Power Consumption. The system provides greater compatibility to the user. The system is Cost-efficient and user-friendly. One of the main advantages of this system is it can be monitored, controlled, and modified anywhere and anytime, and also no internet is required for a certain distance. The main attraction of the system is it offers high security and safety to our home appliances.



Output of the project



Output of the project

Fan turns ON automatically by ESP depend upon the temperature detection of the room.



It generates the sound while the flammable gas and fire is detected.

VII. CONCLUSION

The concepts of Home Automation have always been a great service to our nation This presented project is an automated home by using sensors, controllers, Node MCU Board through internet and we monitor it by using smart phones. Finally atmost aim is to limit the usage of electricity and to improve the betterment of life. The growth of Internet of Things (IoT) had given rise to new ideologies in terms of smart home system in order to control and monitor the appliances in home. In this paper, we address the issue of smart home system in the older technologies and we overcome the issues by interfacing Iot with cloud technology. Our aim is achieved by using the technologies that we have choosed and it is most comfortable and easy to implement in every one's home.

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