Review on Home Automation Using NodeMCU and IFTTT

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Abstract -Internet application and technology development has become very high. IoT is a network in which all physical objects are connected to the internet through network devices and exchanges data. By using IoT, the objects can be controlled from one place. IoT can be described as the network connecting objects in the physical world to the Internet.Smart home is the most important application of IoT. The demand for smart homes increases day by day. Home automation system enables automating of all the home electronics and appliances efficiently. Home automation systems are very convenient as they control lights, fans, television, air conditioners and security alarms. It can be more efficient in controlling the home appliances with the use of appropriate sensors.

*Key Words***:**Internet of Things, Home automation, NodeMCU, Arduino IDE, Smart home.

1. INTRODUCTION

A home automation system allows the users to control electric appliances that are based on wired communication [1]. As the technology is advancing, the automation is being preferred in various fields. Home automation using voice commands can be used to control various appliances and devices. A cost effective home automation system is necessary for the busy people in their day to day life [2]. This paper proposes a cost effective system. It employs Google assistant for giving user commands and the NodeMCU microcontroller, with WiFi connectivity for accessing and controlling devices and appliances remotely. It uses the Arduino IDE- a platform application to write and upload programs and Adafruit IO- a cloud service to handle data. By giving the voice commands using Google Assistant, various appliances like televisions, lights, air conditioners, security alarms, home theater, etc., can be controlled automatically.

2. RELATED WORK

Vinaysagar K N1, Kusuma S M2 (2015) [1] proposed a home automation system that consists of server, and sensors. The microcontroller Intel Galileo development board, with built in WiFi is used as web server and to control and monitor the various sensors. The aim of the paper is to provide an automation system which can be accessed from the web browser of any local PC and also from mobile handheld devices connected through internet. The temperature sensor is used to measure the room temperature, gas sensor detects the presence of gases and the PIR sensor detects the presence of intruder. These sensors are used to enhance the home automation system.

Manish Prakash Gupta (2018) [3] proposed a design for voice controlled home automation by using Google Assistant. The NodeMCU board is connected with relays along ULN 2803 IC. The IFTTT application is used to create the simple statements and the Blynk application is used to control hardwares remotely and it also display and store sensor data. The user's voice command is given through the Google Assistant and the data is passed to the IFTTT application. From the IFTTT application the signal is passed to NodeMCU and then to the relays through which the home appliances are controlled.

J. Kavitha1, O. Naveen2, P. Manoj Kumar3, K. Subba Rao4 1 (2018) [5] presented the design and development of home automation system by using the Arduino, Bluetooth module, Home Automation, Android application. The Arduino Uno helps in interfacing and processing the signals. The Bluetooth module is used to connect the devices to operating the appliances within the range of Bluetooth. Relay drivers act as electro-magnetic switch used to control the home appliances. The aim of the paper is to control all the home appliances by using the touch screen operation. The MIT App Inventor is used to build Functional apps to control the home appliances. By selecting one of the options in the android application the signals are passed through the microcontroller and reaches the relay module thus turning on/ turning off the appliances.

Shrey Aggarwal1, Sunny Verma2 (2017) [6] proposed the simple Home Automation system using GSM. Arduino UNO board is used to develop the home automation system. GSM is used to control the appliances from anywhere in the world. When a text string is sent from mobile phone, the arduino decodes the string and checks for the exact match with already stored strings. If the strings gets matched, then the arduino triggers the relay to turn on and turn off the home appliances.

Rudrendu Mahindar1, Madhav Prakash2, Sananda Ghosh3, Sumani Mukherjee4 and Dr. Rabindranath Ghosh5 (2018) [7] have used NodeMCU and Blynk Server to build an effective home automation system. Three sensors are used. DHT11 for sensing the ambient temperature and humidity prevailing in the room, the light sensor is used to know the condition of illuminance prevailing in the room. Ultrasonic sensor is used to measure the depth of water level from the brim of tank. Switching modules and interface modules are also used. The sensor values are viewed by the user through the mobile application and the user decides his action to control the appliances. The user can press the button in the application, so that the microcontroller receives the instruction through internet and sends it to the relays. The relay turns on and turns off the appliances based on instructions. The home appliances

like water pumps, fans, air-conditioner, heater, micro-wave oven etc., can be controlled.

3. METHODOLOGY

This paper provides a cost effective home automation system by using the Google Assistant and NodeMCU. NodeMCU-the microcontroller board containing ESP8266 Wi-Fi module, is used to develop the Home Automation system. Adafruit-a cloud service is used to store the data. Google Assistant is the most common application present in all kinds of smartphones. The user instructions are given as voice commands through the Google Assistant. If the command is appropriate, it is sent to the If This Then That (IFTTT) application. The IFTTT is an application used to create simple if statements called as the applets. It also acts as a central means through which the user communicates with the home appliances. The IFTTT application interprets the command and then sends it to the NodeMCU board. The NodeMCU board triggers the relay module through which the home appliances are turned on and turned off. The DHT11 sensor is used to measure the temperature and humidity and the MQ2 sensor senses the gases. The main aim of this paper is to provide a simple and cost effective home automation system to control all the home appliances from one place.

4. COMPONENTS REQUIRED

NodeMCU (ESP8266)

The Node MicroController Unit is also called as NodeMCU. It is an open source software and hardware development environment. It includes a low cost System-on-a-Chip (SoC) called the ESP8266. The ESP8266 is designed and manufactured by Expressif Systems [3]. The hardware design of NodeMCU is open for building and editing as the NodeMCU is an open source firmware.
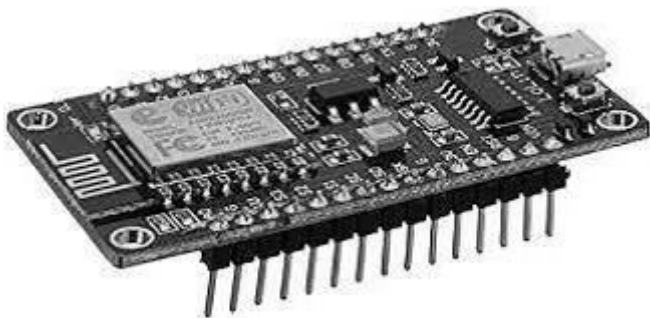

Fig -1: NodeMCU (ESP8266) Development Board.

GOOGLE ASSISTANT

The Google Assistant is a software which permits its users to control all the applications, smart devices device through it. It allows the users to give voice commands. The users can give the voice commands through google assistant and control the smart devices and applications. It is a very easy and convenient method for the users to automate their devices as they have to give a voice command [4]. Google Assistant is Google's voice assistant. It is available on all the smartphones and smart home devices.
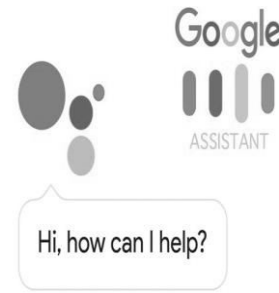

Fig -2 Google Assistant

IFTTT

IFTTT is a website used to create simple conditional statements which are called as applets. The IFTTT can be used to automate app-enabled accessories and smart devices. It is a platform that connects the apps and devices by triggering the automations. To set up an IFTTT application it must be first logged in and the desired applets can be created. After selecting the Google Assistant, the commands should be typed in such a way that Google Assistant should respond to the command and control the devices or appliances [3]. IFTTT is very efficient in connecting different applications and devices together. Users can sign up for free account and create applets as it helps in linking the apps and devices and make them to work together.

Fig -3 If This Then That Application

RELAY MODULE

The relay module is the series of electrically operated switches. A circuit can be turned on or turned off using relay module. Relay module handles voltage and current much better than the microcontroller. Each individual circuit is protected by the relay. There are three connections such as NC, COM, and NO present in each and every channel. The relay works depending upon the input signals [5]. As the relay module is based on the electromagnetic attraction, it creates electromagnetic field by which temporary magnetic field is produced. This temporary magnetic field is responsible for opening and closing the connections.
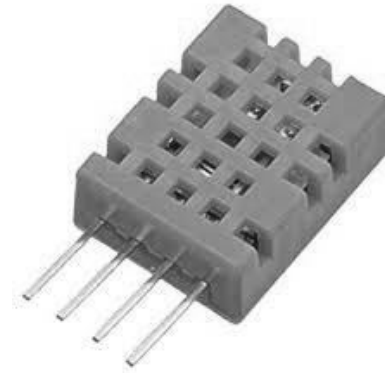
Fig -4 4-Channel Relay Board

ANALOG MULTIPLEXER

An analog multiplexer is also shortly known as a **MUX** or data selector. One input signal is selected from multiple input signals and that selected input is connected to a single transmission line. Multiple signals can share single line at different times [7]. High speed switching is performed by the multiplexer and it also handles analog applications.
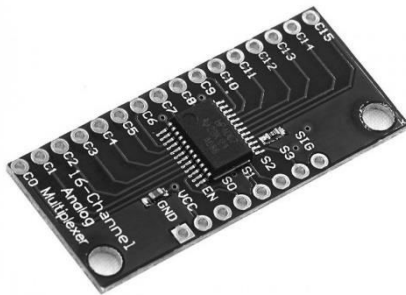

Fig -5 16 channel analog multiplexer

TEMPERATURE AND HUMIDITY SENSOR

The DHT11 is a commonly used sensor to measure the Temperature and humidity. The negative temperature coefficient (NTC) in the sensor is used to measure the temperature. Values of temperature and humidity are produced by an 8-bit microcontroller in the form of serial data. This sensor is easy to interface with other microcontrollers [8]. This sensor is used to measure both the moisture and air temperature. It detects the changes in the temperature in the air.

Fig -6 DHT11 Sensor

MQ2 GAS SENSOR

MQ2 gas sensor is one of the commonly used gas sensors in MQ sensor series. When the Gas comes in contact with the sensing material present in the sensor, the gas is detected by the sensor. Gases such LPG, smoke, hydrogen, propane, methane and carbon monoxide concentrations can be detected by this sensor [9]. This sensor detects the presence of combustible gases in the atmosphere. This sensor also has a protective layer to protect itself when the combustible gases pass through it.

Fig -7 MQ2 Gas Sensor

ARDUINO IDE

Arduino is a software, or Integrated Development Environment (IDE) that is primarily used to write and upload computer code to connect with the physical board. The Arduino IDE uses the simplified version of C++ programming to develop the source code [10]. Source codes can be written to Arduino compatible boards but it also supports other vendor development boards.

Fig -8 Arduino IDE

ADAFRUIT MQTT

Message Queue Telemetry Transport is shortly referred as MQTT. It is a protocol used for device communication and it is supported by Adafruit IO. MQTT library or client can be used to publish and subscribe to a feed. Feed data can be sent or received by publishing and subscribing. Dashboards in the Adafruit IO can be used to display the data in forms of chart, graph etc. Dashboards can be viewed from any place [6]. Adafruit IO is a cloud service that is used to manage data. It can be connected over the Internet. It is primarily used for storing and then retrieving multiple feeds of data.

Fig -9 Adafruit IO cloud service

5. CONCLUSIONS

IoTTechnology will become very efficient and everything can be controlled from one place. The IoT devices will work automatically and there is no need of human intervention. NodeMCU is a low cost microcontroller which has an integrated support for WiFi network. Since in consumes low energy, it is a best choice for the construction of home automation projects. Since MQ2 sensor and DHT11 sensor are used to measure the combustible gases, temperature and humidity, home automation can be more efficient and convenient for the users. Home automation can be developed by using all these hardware components by integrating them with internet.

REFERENCES

1. Vinaysagar K and Kusuma S , *Home Automation Using Internet of Things*, International Research Journal of Engineering and Technology (IRJET),Vol. 2, Issue: 03 | Jan. 2015.

2. Abdul Aziz Md, K Harshasri, K Shanmukharao, *Cost Effective Voice Controlled Home Automation Using IoT*, International Journal of Engineering Research in Computer Science and Engineering (IJERCSE) Vol. 4, Issue 3, March. 2017.

3. Manish Prakash Gupta,*Google Assistant Controlled Home Automation*, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Vol. 05 Issue: 05 | May. 2018.

4. Aayush Agarwal, Anshul Sharma, AsimSaketSamad, S Babeetha, *UJALA- Home Automation System Using Google Assistant*, IJARIIE-ISSN(O)-2395-4396, Vol. 04 Issue-2 2018.

5. J. Kavitha1, O. Naveen2, P. Manoj Kumar3, K. Subba Rao4 1 *Bluetooth Based Home Automation Using Arduino and Android Application*, Volume 6 Issue III, March 2018.

6. Shrey Aggarwal1, Sunny Verma2, *Home Automation System Using Arduino and Gsm* , Volume: 04 Issue: 12 | Dec-2017

7. Rudrendu Mahindar1, Madhav Prakash2, Sananda Ghosh3, Sumani Mukherjee4 and Dr. Rabindranath Ghosh5, *IoT-based Home Appliances Control System Using NodeMCU and Blynk Server*, Vol. 5, Issue 6, June 2018.

8. https://www.fecegypt.com/uploads/dataSheet/1480848003_2_channel_5v_10a_relay_module.pdf.

9. https://learn.adafruit.com/adafruit-io/mqtt-api

10. https://www.idt.com/products/memory-logic/bus-switch/analog-multiplexers-and-demultiplexers

11. https://components101.com/dht11-temperature-sensor

12. https://lastminuteengineers.com/mq2-gas-senser-arduino-tutorial/

13. https://learn.sparkfun.com/tutorials/what-is-an-arduino/all