



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Home Automation Using Esp8266 With Google Assistant

Department of Electronics and Communication Engineering,

TKR College of Engineering and Technology, Hyderabad, Telangana, India.

Author1: M.D.Moinuddin, M.D.Abdul Rahman, M.V.S. Vamsikrishna, M.Dharaneeshwar Reddy

*Author 2: A.Karthik Sagar, Assistant Professor, Dept of ECE,
TKR College of Engineering and Technology, Hyderabad, India.*

ABSTRACT

In the midst of this rapidly evolving world of over 50 billion internet-connected devices, all new inventions are made solely from need. Today, the IoT is sweeping the world not only because it makes life easier, but because it is much more efficient. From time to time, new breakthrough technologies are created with the help of the IoT. Ultimately, people no longer have to rely on traditional machines that are slow and require more effort. This is a prototype home automation system that allows you to control everyday devices such as fans, lights, and other loads at the push of a button on the device. To enhance usage of wireless fidelity and reduce usage of sensors embedded on each appliance we introduce the usage of APIs and wireless modules. The whole project will be using API to communicate with NodeMCU and Relay module so that a machine to machine communication is established over WiFi and loads connected could be remotely controlled with google's voice assistant. In this project we will be using these technologies: Embedded Systems, cross platform API named Sinric Pro is used here to integrate the working. Once the project is fully built one can control upto 4 appliances like fan, light, and any other load over WiFi via Google Voice Assistant installed on user's phone.

Keywords: Automation, ESP8266, Application Programming Interface(API), Embedded Systems, Internet of Things, Cloud.

1. INTRODUCTION

IoT is taking the world by storm not only because it makes life easier but also much more efficient. Every now and then a new path breaking technology is made with the help of IoT. So ultimately humans would no longer need to rely on conventional machines which work slower and take more effort. Such one is our intent to put forth this project which brings appliances of daily usage and internet together to serve for an advancement in electronics and machine to machine communication. This is a prototype home automation system which can control your daily usage appliances like fan, lights and other loads through a tap of a button on your device. To enhance usage of wireless fidelity and reduce usage of sensors embedded on each appliance we introduce the usage of APIs and wireless modules. The main objective of this project is to develop a home automation system using an ESP8266 NodeMCU with being remotely controlled by any smartphone via voice control. Modern houses are gradually shifting from conventional switches to centralised control system, involving remote controlled switches. Ever thought of a life where you could just command your home appliances to work as you need just by using your voice? Gone are the days where you have to be a billionaire to have an automated house which is voice activated. With this project prototype we can control electronic appliances like T.V, fans, light set cover the internet with

your voice and that to under a low budget. Home automation is anything that enables you to use your home's lighting, heating and appliances more conveniently and efficiently. It can be as simple as remote or automatic control of a few lights, or it can be a complete system that controls all major parts of your home. Custom set to your own personal preference. It focuses on wireless home automation technologies - these are easy to retrofit into existing homes now need for new wiring and no ripping up the carpets or drilling holes in the walls. Each technology has its own unique features and benefits that makes some more suited to particular applications, whilst others can be seen for all general home automation installations.

1.1 METHODOLOGY OF THE PROPOSED SYSTEM

This project proposes the implementation of a smart home automation system. Home automation means controlling lighting, entertainment systems, and appliances with minimal human intervention, without the use of manual switches. You can also include home security such as access control and alert systems. Home devices connected to the Internet are an important part of the Internet of Things ("IoT"). In this home automation system, fans, light bulbs, connectors, etc. are connected to the relay module to control four appliances. Since these devices are configured with API (Sinric Pro), the software part of the project will recognize the device you are trying to set up. Then you can connect the API to the Google Home app to send commands, and the NodeMCUE SP8266 WiFi module will receive commands wirelessly from your smartphone over the internet. Use the Google Home App to encode the ON / OFF signal and send it to the server and the ESP8266 board. This project requires an internet connection and will not work without an internet connection. All configurations are programmed into the Node MCU. Use C ++ to program this setup. When the ESP8266 nodeMCU is powered by at least 3.3V, you can control the connected device by voice command via Google Voice Assistant. Device status, power consumption, online status, network details, etc. can be monitored via both WebAPI and mobile applications.

2. LITREATURE SURVEY

Wireless Home Automation System using IoT is the system that controls the home appliances like speed of fan, light and temperature using the mobile phone anywhere around the globe through the internet.

The global smart home purchases will surpass the 475 million mark in 2020.

By 2023, the smart home industry automation in homes will be 53.9%.

31% of US broadband households own a smart speaker.

118 million people in the US engage in some form of voice search activity at least monthly.(this research was based on US)

Smart devices penetration will grow by 55% by the year 2022.

The worldwide connected home market is projected to grow at a CAGR of 25% from 2020 to 2025.(compound annual growth rate)

81% of consumers say they are more likely to purchase a new home that has smart technology. Households will spend \$19.4 billion to acquire smart security systems.

For energy efficiency, users can analyse the usage of each appliance from their phone. With all these features incorporated in a single system with a good and simple user interface, this system is cost effective and perfect for old age people living alone in their houses.

Wireless Home Automation system using IoT is a system that adopts the computers system or mobile devices to control essential home purposes and features undoubtedly through the internet from anywhere around the world, an automated home is frequently called a smart home. It implies saving electricity and human energy.

According to this survey, we understand that the existing system has some problems and requires some of the resources that cause the system to be costly. It is not as popular in Asian countries, to increase the scope of these systems needs to be implemented with some user-friendly interfaces which will help users and gives more efficient access to the system.

3. BLOCK DIAGRAM

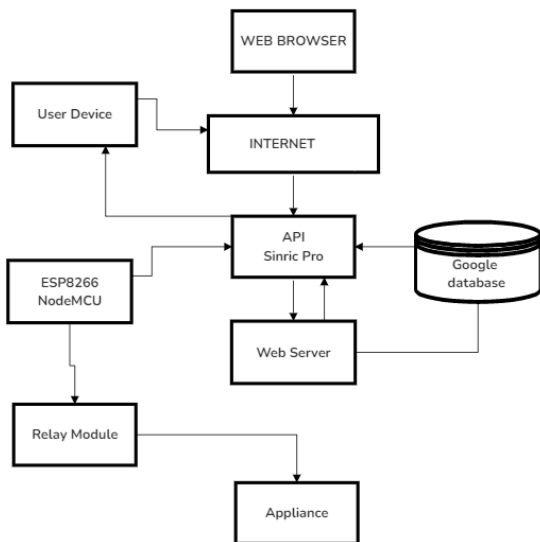


Fig 1: Block Diagram of the system

3.1 WORKFLOW

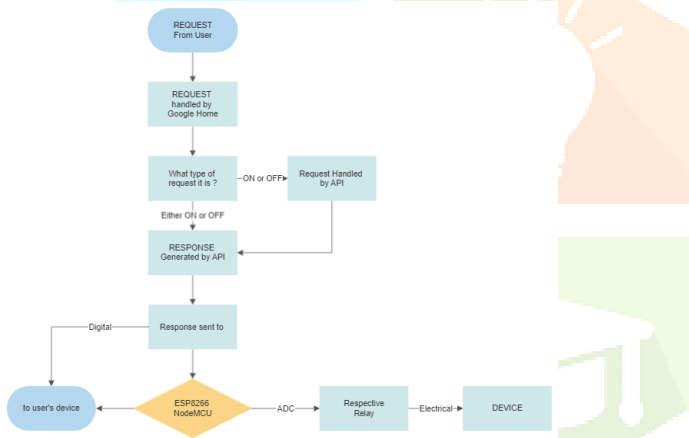


Fig 2: Workflow of the system

4. HARDWARE USED

1. ESP8266 NodeMCU,
2. Electromechanical Relay module,
3. Electric Appliances
4. Connecting Components

4.1 ESP8266 NODEMCU

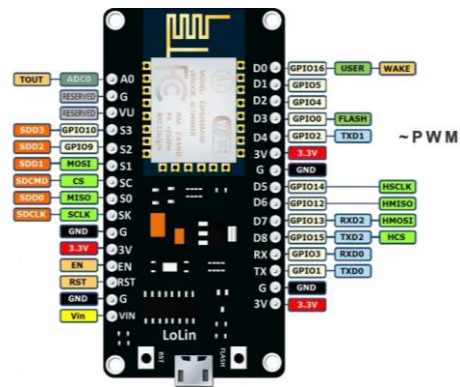


Fig 3: Pinout of ESP8266 NODEMCU

The ESP8266 NODEMCU is a Micro Controller Unit embedded with ESP8266 wifi module.

4.2 ELECTROMECHANICAL RELAY

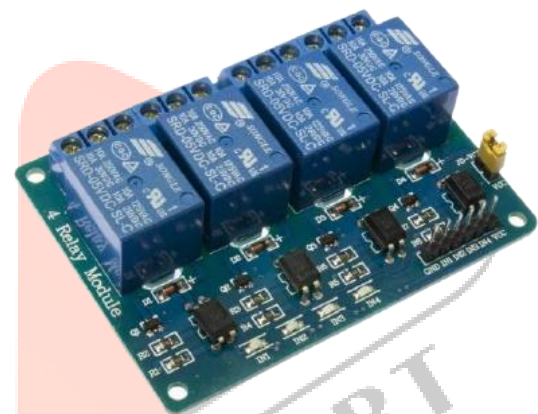


Fig 4: A four channel Relay Module

4.3 ELECTRIC APPLIANCES



Fig 5: Electric appliances bulbs and fan

4.4 CONNECTING COMPONENTS



Fig 6: Jumper cables

These are commonly called as jumper wires these allows an electrical current or signal to travel from one point on a circuit to another because the signal or current needs a medium through which to move. Connecting wires are made with copper from the inside with rubber insulation because copper is a very good conductor and rubber is a very good insulator. They are designed with such length and thickness which is ideal for connecting electronic circuits and operate on their corresponding voltages.

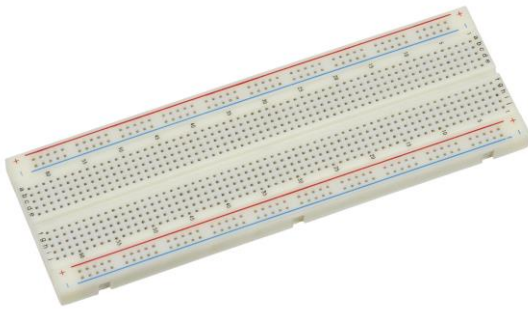


Fig 7: Breadboard

It's simple to use for making temporary prototypes and circuit design experiments. Solderless breadboards are therefore popular among students and in technical education. This was not a feature of older breadboard models. Stripboards and other prototyping printed circuit boards, which are used to create semi-permanent soldered prototypes or one-offs, can't be reused easily. Breadboards may be used to prototype a wide range of electronics systems, from simple analogue and digital circuits to entire central processing units.

5. SOFTWARE USED

In this project we used Google Home app and Sinric Pro API and Arduino IDE as programming interface.

5.1 API - Sinric Pro

The API used in this project is Sinric Pro. Sinric Pro enables developers to integrate IoT development boards (such as the RaspberryPi) with third-party applications or with Amazon Alexa and Google Home. The API can be used to retrieve device logs, find devices, update devices, and get account details. The Sinric Pro API features REST architecture, Tokens for

authentication, and JSON responses. We need to connect to the API and out of various options and features provided, we need to select add a device and add the device of our choice in our case it is a switch as we simply need to turn on and off a relay channel. Each device will be provided with a unique device ID which will help us to identify and initialise our device in real time. This device ID would go into our code which will be uploaded to our ESP8266 NodeMCU.

5.2 GOOGLE HOME

The Google Home app helps you set up and control Google Nest or Home speakers and displays, and Chromecast. You can control thousands of compatible lights, cameras, speakers, and more. You can also check your reminders and recent notifications, all from a single app. The Google Home app is available on Android phones and tablets, and iPhones and iPads. At the top of the home app screen, the name of your home appears. If you have multiple homes set up, you can tap the name to switch between homes. Quick actions give you total control over your entire home. Each button acts as a control for a device, service, or group of devices. Each has different capabilities, depending on the device it represents and the state of the device.

5.3 ARDUINO IDE

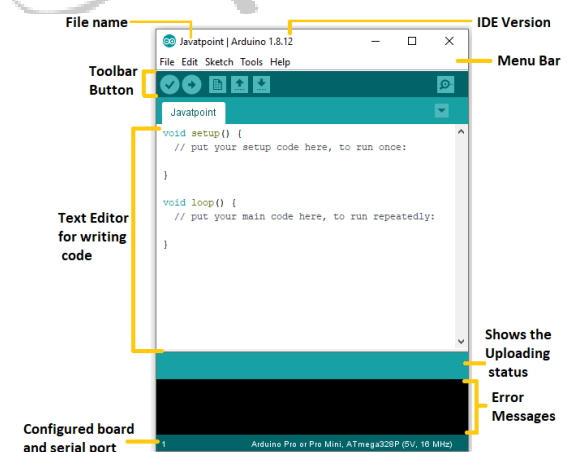


Fig 8: Overview of Arduino IDE

The Arduino IDE is open source software used to write code and upload it to your Arduino board. Programs or code written in the Arduino IDE are often referred to as sketches. To upload sketches written in the Arduino IDE software, you need to connect the Genuino and Arduino boards to the IDE. The upload button compiles

and executes the code written on the screen. In addition, upload the code to the connected board. Before uploading a sketch, you need to make sure that the correct board and port are selected. After completing all the above actions, click the Upload button on the toolbar. The latest Arduino board can be reset automatically before you start uploading. On older boards, you need to press the reset button on the board.

6. OPERATION AND WORKING

We can operate our project via voice control, with an app interface, web API(Sinric Pro), and manual control. As we have set up the devices over API and written them in our program and programmed our NodeMCU accordingly, so, now we have successfully established our devices on the internet as software also in real time as circuitboards.

6.1 GOOGLE HOME AND WEB API

We once configure these devices over our API we can connect it to our Google Home app. Google home app provides a very exquisite feature for controlling devices which are setup over an API. So as soon as we connect Sinric Pro to Google home they share the data as it is. Once it gets connected we can see the devices in the Google home app, we set up earlier in our API as same as they were setup by us. Now we can tap on and off from the app as well as from the browser with our web API.

6.2 VOICE CONTROL

Our project is Google Assistant built-in, Now Google Home and assistant is able to answer to your commands. Without being connected to the internet, Google Home can't do a whole lot. While Google Home is a decent enough speaker, you can find better wireless speakers for less money if you don't plan on connecting to the internet. When you do connect Google Home to the internet, you unlock the functionality of Google Assistant. The way it works is you say "OK Google" or "Hey Google," and then talk to the device almost like you would talk to a person. When we say the command "turn on Relay One" it turns on the corresponding relay. NOTE: Google assistant accepts commands as they are being programmed to do if we set up the

device in our API with the name of Relay One only then google home identifies it as relay one.

7. RESULT ANALYSIS

The process of the smart automation approach in this system was tested and put to implementation. The results turned out to be as per expectations. As the voice command was given to the Google voice assistant it was executed and gave promising results by turning on the corresponding device as requested by the user. In the first activity, the system was controlled over voice control while in the second activity the system was controlled with google home. The google home app allows us to connect to the API where we have configured our devices. When we connect our API to google home, whatever the number and type of devices be set up in the API will be displayed as a controlling interface in the google home app.

8. CONCLUSION

The need for smart home automation is evidently growing due to busy lifestyles and mundane routines. The repetitive daily tasks usually take up a lot of time that could be otherwise utilized in more important activities. A smart home application enables users to lead a stress-free life as they can manage all their activities effortlessly. However, developing a smart home app is a complex and time-consuming process as it involves establishing an interconnected system. It is, therefore, essential to have a holistic approach and a team of skilled developers to begin with. These developers are experienced in using the latest tools and cloud-based technologies to build performance-driven IoT applications to manage connected devices effortlessly. Our home automation prototype model enables the understanding of the concept and working involved in this cutting-edge technology and gives an exceptional insight into further developments of the project.

REFERENCES

- [1] *Monika M Patel; Mehul A Jajal; Dixita B vataliya, Home Automation using Raspberry Pi. International Journal of Innovative and Emerging Research in Engineering Volume 2, Issue 3, 2015.*
- [2] *Singhal, Akriti, and Ravi Tomar. "Intelligent accident management system using IoT and*

cloud computing." 2016 2nd International Conference on Next Generation Computing Technologies (NGCT). IEEE, 2016.

[3] *International journal for research in applied science & engineering technology (ijraset) volume 6 issue iv, April 2018*

[4] Tomar, Ravi, Rahul Tiwari, and Sarishma. 2019. "Information Delivery System for Early Forest Fire Detection Using Internet of Things." in *Communications in Computer and Information Science*. Vol. 1045. Springer, Singapore.

[5] Rozita Teymourzadeh, SalahAddin Ahmed, Kok Wai Chan, Mok Vee Hoong, "Smart GSM based Home Automation System.

[6] Amadeo, M., Campolo, C., Iera, A., & Molinaro, A. (2015, June). *Information Centric Networking in IoT scenarios: The case of a smart home*. In *Communications (ICC), 2015 IEEE International Conference on* (pp. 648-653). IEEE.

[7] *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering International Office Area Monitoring and Control Using IOT*, Vol.6, Issue 6, June 2017, Prof. S.A. Shaikh, Pravara Rural Engg. College, Loni, Maharashtra, Pune. (2017)

[8] *Internet of Things in Home Automation and Energy Efficient Smart Home Technologies* Simon G. M. Koo Department of Computer Engineering, Santa Clara University, CA 95053, USA

AUTHORS' BIODATA

Author 1:

M.D. Abdul Rahman is an undergraduate pursuing B.Tech in Electronics and Communication Engineering at TKR College of Engineering and Technology, HYD. He is currently working as an Agile Developer at Zensar Technologies.



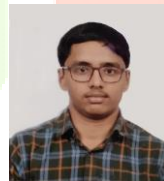
M.D. Moinuddin is an undergraduate pursuing B.Tech in Electronics and Communication Engineering at TKR College of Engineering and Technology, HYD. Ex-Data Scientist at Sharpe AI, currently serving as an open source contributor for GSSoC and PR Lead at Google DSC.



M.V.S. Vamsikrishna is an undergraduate pursuing B.Tech in Electronics and Communication Engineering at TKR College of Engineering and Technology, HYD, and is currently working as a Program Analyst at Cognizant.



M. Dharaneeshwar Reddy is an undergraduate pursuing B.Tech in Electronics and Communication Engineering at TKR College of Engineering and Technology, HYD. He worked as a cryogenics intern at Kalyani Rafale.



Author 2:



Mr. A. KARTHIC SAGAR received his B. Tech degree in Electronics and Communication Engineering from Jawaharlal Nehru Technological University in 2016 and he completed his M. Tech from Jawaharlal Nehru Technological University in 2018. He is presently working as Assistant Professor at TKR College of Engineering and Technology, HYD.