

Smart Lab using Google Assistant

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Abstract: Today, Technology has made us live with ease and comfort. Smartphone's have become our part of life. . Messages on phone, Emails on phone, Notifications on phone as well as controlling electronic appliances on phone. We have developed a smart technology or the technology has made us SMART. IOT (Internet Of Things) helps us gather information as well as control electronic appliances. In this project, we have used NodeMCU for connecting our lab with the Internet. Also the controlling is done using Google Assistant, Alexa, and Manual Switches, no need of any external software's to be installed.

IndexTerms: IOT, NodeMCU, Smart, Home Automation, Google Assistant, Google Home, Alexa.

I. INTRODUCTION

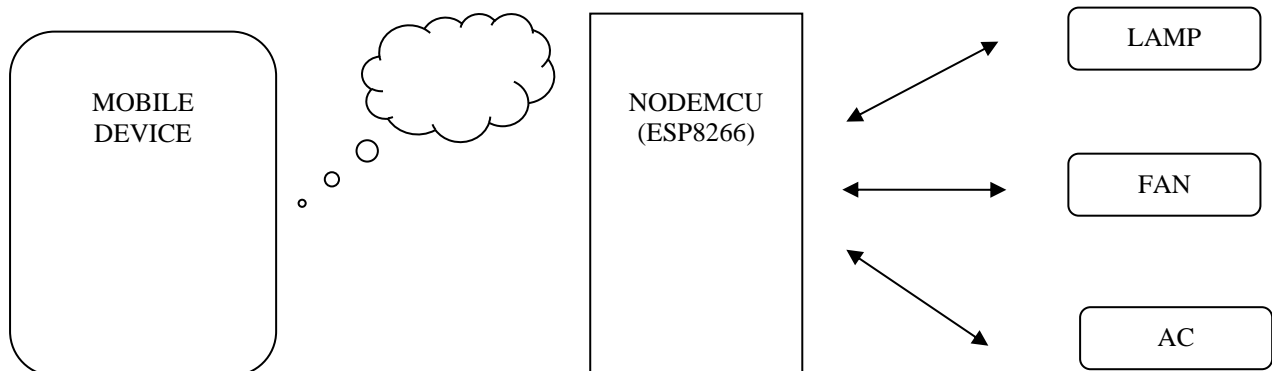
There are many wireless technologies available for home/lab automation in today's era. RF technology, Bluetooth, IR, GSM, WIFI, IOT and the list goes on. The best option to choose is which would work with best work timings and wide range. We have chosen IOT as it has the widest range; we can access and control the system from any part of the world. The only requirement is to have Internet availability. Once we are connected to the Internet, the status of the devices is visible to us on our Smartphone and we can control its operation by a button press or voice control.

"Home automation" refers to the automatic and electronic control of household features, activities, and appliances. The utilities and features of our home can be easily controlled via Internet. There are three main elements of a home automation system: sensors, controllers, and actuators. Having day to day developing technology is a proud moment to the whole world. The foremost aim of the technology is to increase the efficiency and to decrease the effort. In this trending world, Internet of Things is being given extreme importance. In that, Automation, leads to have less effort and much efficiency.[1]

This project aims to automate the electronic appliances of our Lab. IOT (Internet Of Things) is the bridge connecting the whole world together. This project uses NodeMCU (ESP8266) as the controller to control the appliances in our Lab via Google Assistant. In this lab automation project, we can control & monitor the real-time feedback of the appliances in the **Google Home** and **Alexa App** from anywhere in the world. The project also runs via Manual Switches if there is a power cut or in absence of Internet.

Google assistant is AI (Artificial Intelligence) based voice command service. We can interact with the google assistant, using voice and it can search on the internet, schedule events, set alarms, control appliances, etc. This service is available on smartphones and Google Home devices. We can control smart home devices including lights, switches, fans, and thermostats using our Google Assistant.

II. THE CONCEPT



The communication between the system and the user is recognized by the wireless method. The user command to the server through Google Assistant by voice recognition, the incoming command through Google Assistant are proceed and forward to the next process. Then the microcontroller collects these commands and applies to the appliances. If the command is proper and correct then NodeMCU will be work upon it otherwise it will not and need to give new correct command to the Google assistant through mobile.

The block diagram gives a clear idea about the working of our project. We have our smart phone connected to Wifi (Internet connection). The central working board is the microcontroller (NodeMCU ESP8266) which is the bridge between our Mobile Device or Smartphone and the electronic devices.

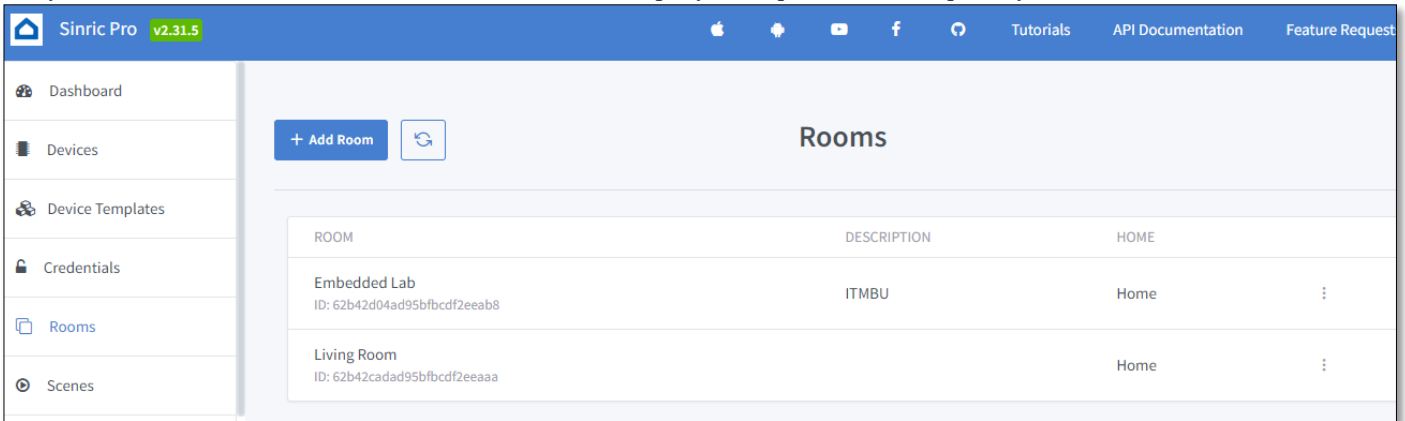
The NodeMCU will be connected via Relay switches to the electronics appliances like Lamps, Fans, AC, Projector etc. Also the system is designed in such a way that electronic appliances can be controlled by normal Manual switches. This is done to ensure proper working the system even if Internet connection is not available.

Google Home App, Google Assistant or Alexa can control our system, these are the default Google applications in our Smartphones. For this system, we have used Sinric Pro to connect to the IOT system. 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.

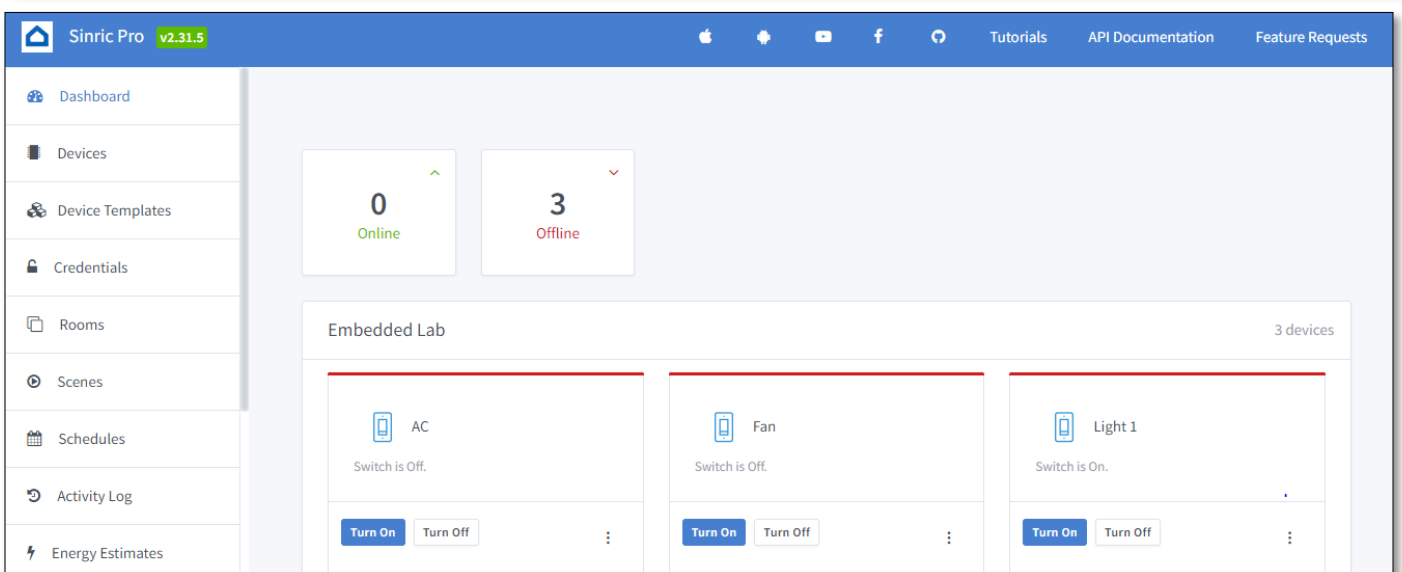
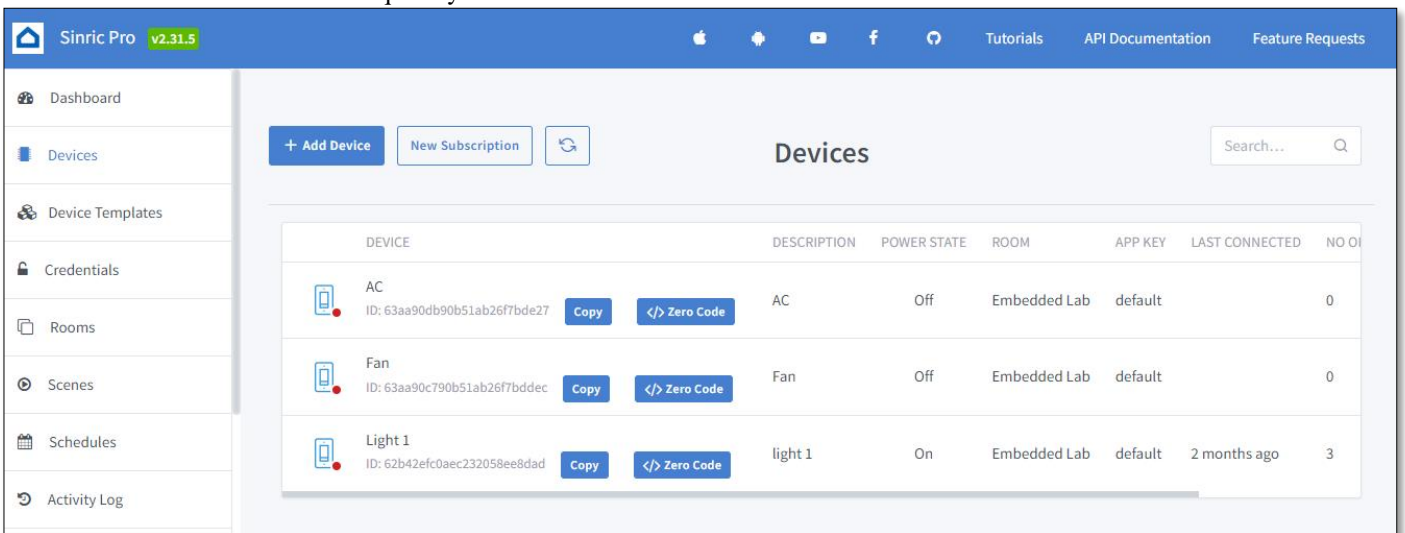
III. SINRIC PRO ACCOUNT

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.

Firstly, create an account on Sinric Pro. Then create Rooms as per your requirements. Unique Key and ID for each room.

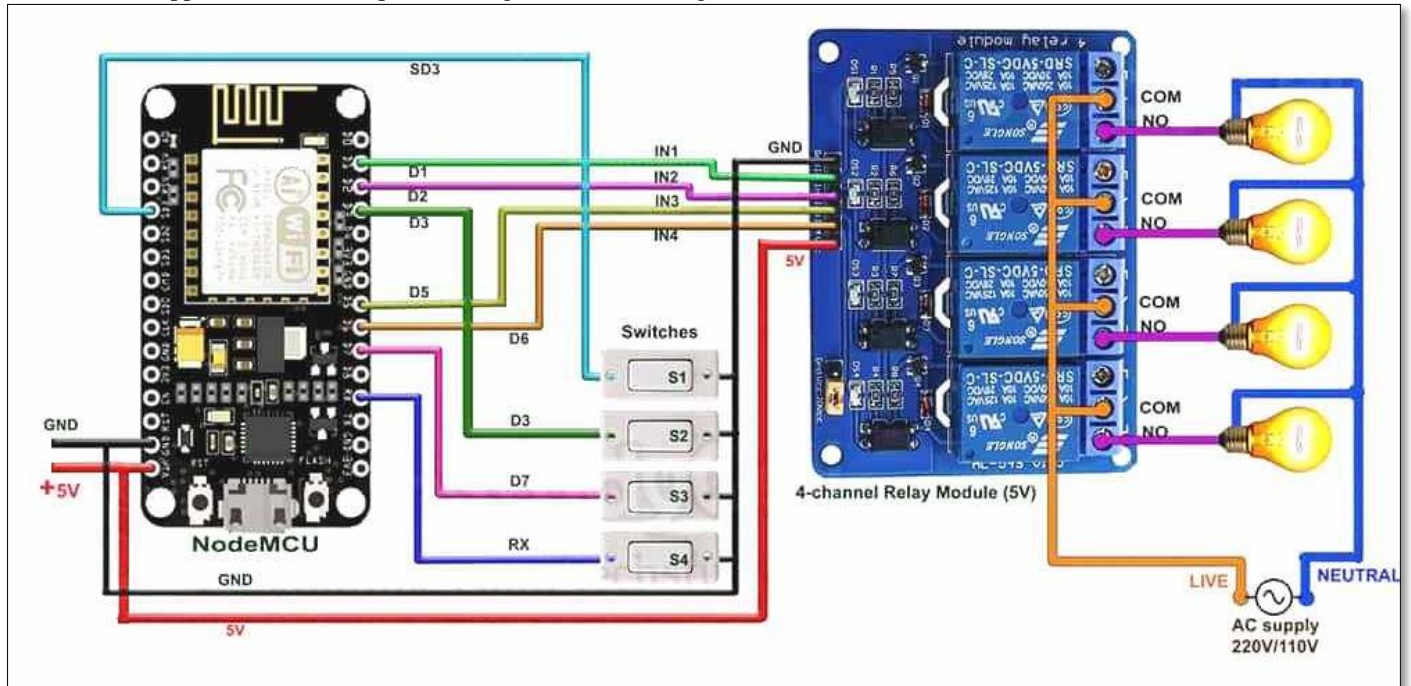


Next, create devices for each room. Give proper names and description as per your connected devices. Each connected device will have unique key and ID.



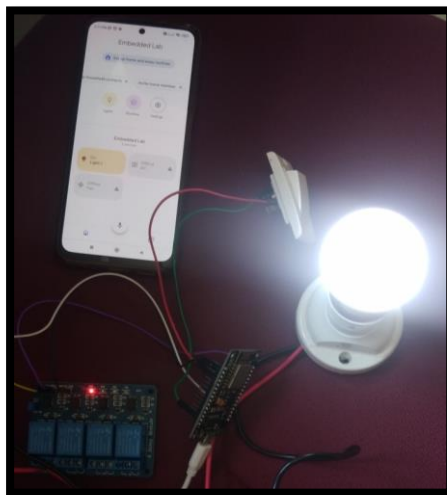
IV. WORKING

The figure below shows the circuit diagram of our system. NodeMCU is interfaced with electronic appliances via relay modules. This lab automation system consists of Manual switches for our normal usage, also when we are away from the work we can control the appliances via Smartphone, Google Assistant, Google Home or Alexa.

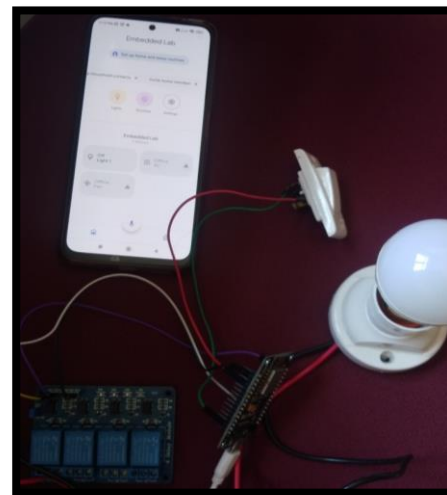


Once Internet access is available, the NodeMCU gets connected through WiFi. Once connected, the enabled Smartphones shows the status of the connected devices (electronic appliances). Also we can control its operation through Voice commands from a distant place i.e. from any point of the world.

Few working conditions images are as under. The working setup includes NodeMCU, 4 channel relay, a manual switch and a Bulb. The images show the working of our Smart Lab system through Google Home App from our Smartphone. By turning ON the Light 1 from Google Home App or Voice command the bulb turns ON. The Google Home App or Alexa App syncs with your Google Account and shows the status of the connected appliances.



The device Light 1 is Turned ON.



The device Light 1 is Turned OFF.

V. CONCLUSION

The demonstrated system is robust and fully secured. This works in presence of Internet access, also in absence of Internet access the Manual switches can be used to control the devices. The system only works with the linked Google Account, hence is not accessible to unauthorized person.

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