

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL



HOME AUTOMATION

USING GOOGLE ASSISTANT

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ABSTRACT

The main objective of this project is to develop a home automation system using a Nodemcu(esp8266) being remotely controlled by any Android OS smart phone with voice control. As technology is advancing so houses are also getting smarter. Modern houses are gradually shifting from conventional switches to centralized control system, involving remote controlled switches. Presently, conventional wall switches located in different parts of the house makes it difficult for the user to go near them to operate. Even more it becomes more difficult for the elderly or physically handicapped people to do so. Remote controlled home automation system provides a most modern solution with smart phones. In order to achieve this, a relay board is interfaced to the Nodemcu at the receiver end while on the transmitter end, a IFFFT application which is connected to google assistant on the cell phone sends ON/OFF commands to the receiver .Then by voice control we can operate the electronic devices.

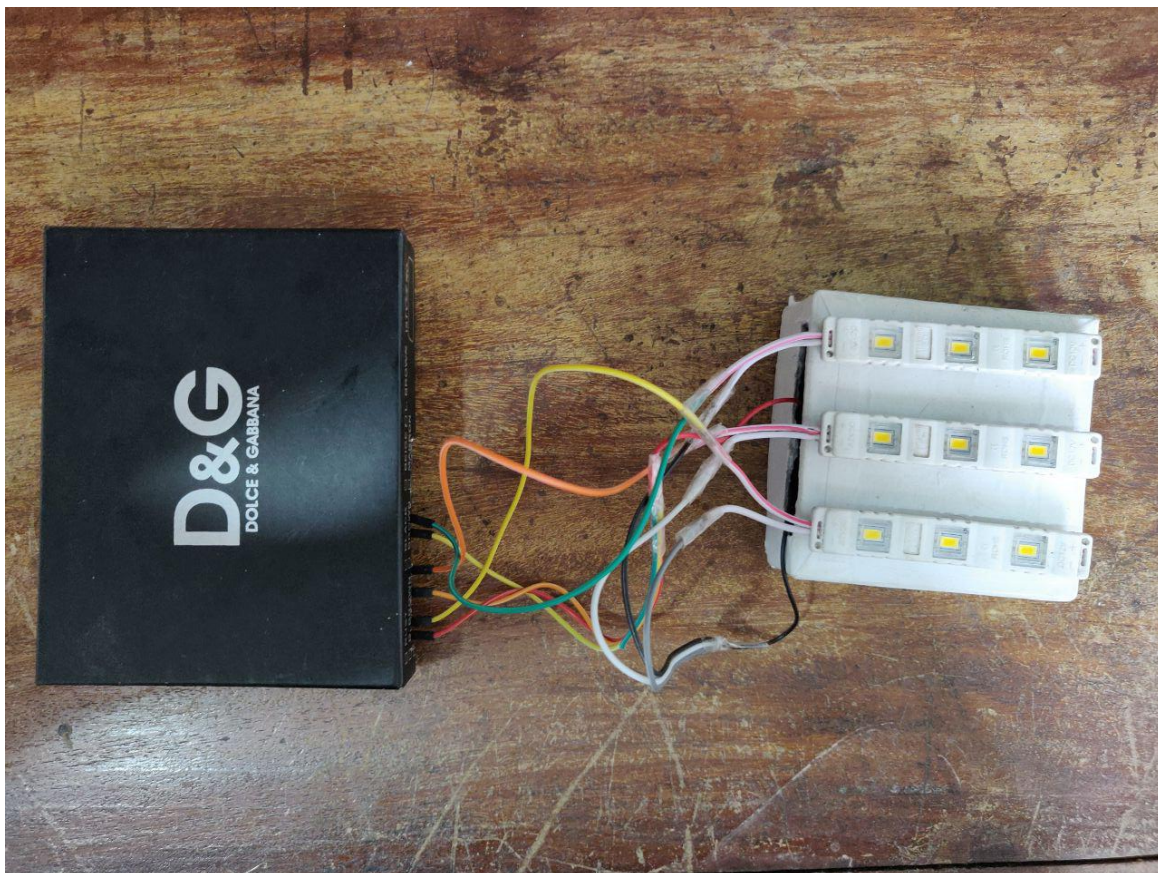
INTRODUCTION

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Off-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it. We have come up with a new system called node mcu based home automation using google assistant. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control.

This project helps the user to control all the electronic devices using his/her smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using voice control. With the help of this system you can control your home appliances from your mobile phone.

HARDWARE USED

- Nodemcu wifi module(esp 8266)
- Relay board
- Power source(9V Batteries)
- Leds
- Connecting wires
- Smart phone(connected to internet)

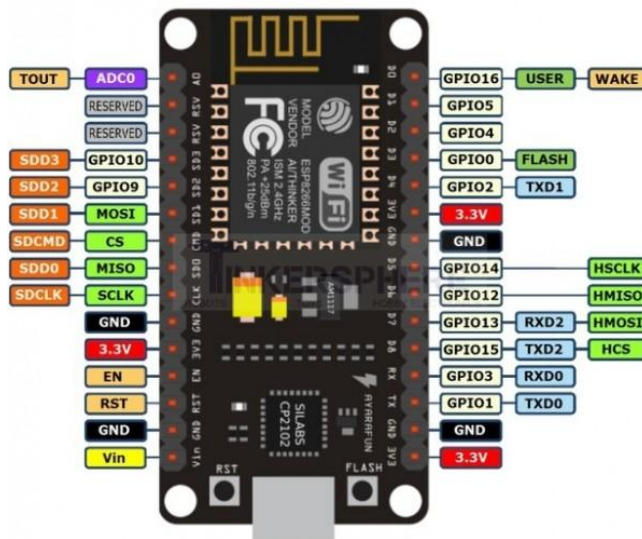


NodeMCU (ESP8266)

The NodeMCU(Node MicroController Unit) is an open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip called the ESP8266. The ESP8266 contains all crucial elements of the modern computer: CPU, RAM, (wi-fi), and even a modern operating system. When purchased at bulk, the ESP8266 chip costs only \$2 USD a piece. That makes it an excellent choice for this system design.

The NodeMCU aims to simplify ESP8266 development. It has two key components.

i. An open source ESP8266 firmware. The firmware provides a simple programming environment based on eLua



ii. A development kit board that incorporates the ESP8266 chip on a standard circuit board. The board has a built-in USB port that is already wired up with the chip, a hardware reset button, Wi-Fi antenna, LED

lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board.

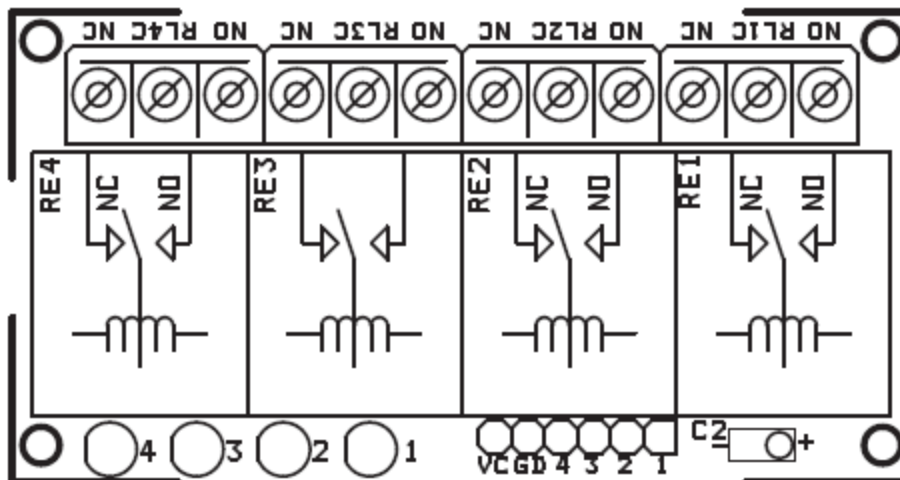
RELAY BOARD

A relay is an electromagnetic switch. It is activated when a small current of some microampere is applied to it.

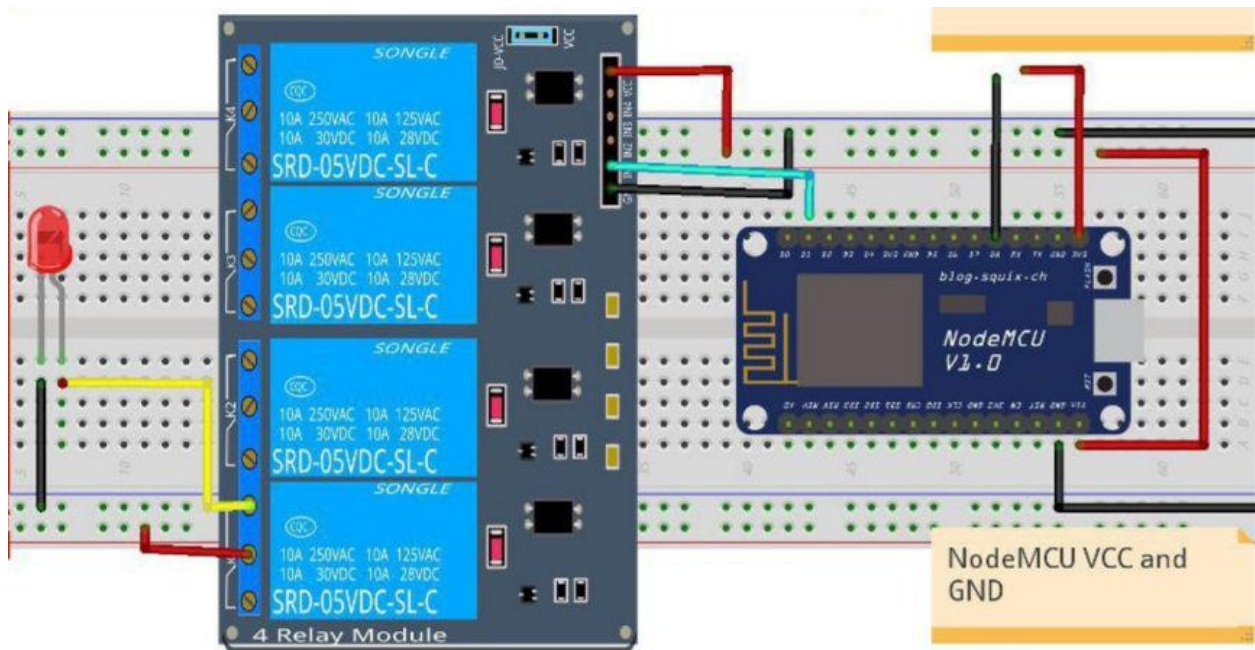


Normally a relay is used in a circuit as a type of switch, an automatic switch. There are different types of relays and they operate at different voltages. When a circuit is built the voltage that will trigger it has to be considered. In this system the relay circuit is used to turn the

appliances ON/OFF. The high/low signal is supplied from the NodeMCU microcontroller. When a low voltage is given to the relay of an appliance it is turned off and when a high voltage is given it is turned on. The number of appliances can be modified according to the user's requirements.



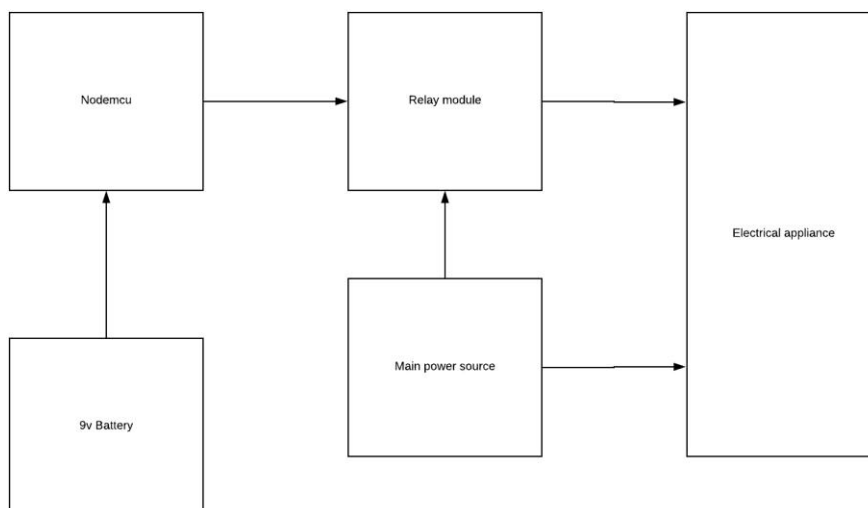
PROJECT MODULE



Explanation:

We write the code given in the next page and dump it into the nodemcu board. This code helps the wifi module to connect to the adafruit server from where it receives instructions.

After that we connect the hardware as shown in the above figure with the relay module.



ARDUINO IDE CODE

```
#include <ESP8266WiFi.h>
#include "Adafruit_MQTT.h"
#include "Adafruit_MQTT_Client.h"

#define WIFI_SSID "ajay"
#define WIFI_PASS "vinay420"

#define MQTT_SERV "io.adafruit.com"
#define MQTT_PORT 1883
#define MQTT_NAME "123548"
#define MQTT_PASS "homeautomation"

int led = D7;

WiFiClient client;
Adafruit_MQTT_Client mqtt(&client, MQTT_SERV, MQTT_PORT, MQTT_NAME, MQTT_PASS);

Adafruit_MQTT_Subscribe onoff = Adafruit_MQTT_Subscribe(&mqtt, MQTT_NAME "/f/ONOF");
Adafruit_MQTT_Publish LightsStatus = Adafruit_MQTT_Publish(&mqtt, MQTT_NAME "/f/LightsStatus");

void setup()
{
  Serial.begin(9600);
  pinMode(LED_BUILTIN, OUTPUT);

  Serial.print("\n\nConnecting Wifi>");
  WiFi.begin(WIFI_SSID, WIFI_PASS);
  digitalWrite(LED_BUILTIN, LOW);

  while (WiFi.status() != WL_CONNECTED)
  {
    Serial.print(">");
    delay(50);
  }
  Serial.println("OK!");
  mqtt.subscribe(&onoff);
  pinMode(led, OUTPUT);
  digitalWrite(LED_BUILTIN, HIGH);
  digitalWrite(led, LOW);
}

void loop()
{
  MQTT_connect();
  Adafruit_MQTT_Subscribe * subscription;
  while ((subscription = mqtt.readSubscription(5000)))
  {
```



```

    if (subscription == &onoff)
    {
        Serial.print("onoff: ");
        Serial.println((char*) onoff.lastread);

        if (!strcmp((char*) onoff.lastread, "ON"))
        {
            //active low logic
            digitalWrite(led, HIGH);
            LightsStatus.publish("ON");
        }
        else if (!strcmp((char*) onoff.lastread, "OFF"))
        {
            digitalWrite(led, LOW);
            LightsStatus.publish("OFF");
        }
    }
    else
    {
        LightsStatus.publish("ERROR");
    }
}

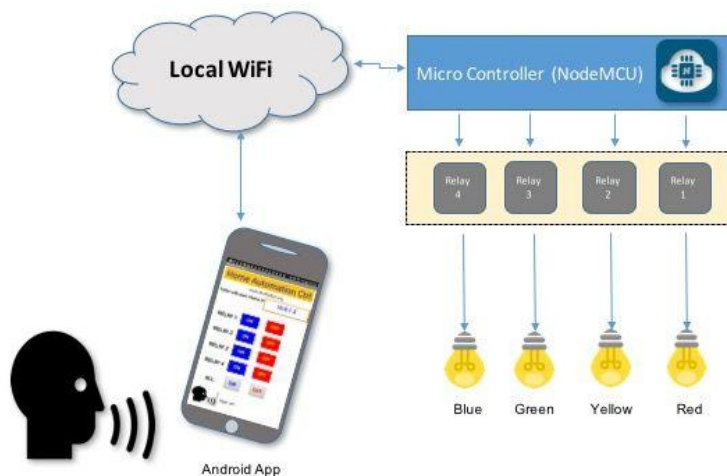
void MQTT_connect()
{
    if (mqtt.connected() && mqtt.ping())
    {
        return;
    }
    int8_t ret;

    mqtt.disconnect();
    Serial.print("Connecting to MQTT... ");
    uint8_t retries = 3;
    while ((ret = mqtt.connect()) != 0) // connect will return 0 for connected
    {
        Serial.println(mqtt.connectErrorString(ret));
        Serial.println("Retrying MQTT connection in 5 seconds...");
        mqtt.disconnect();
        delay(5000); // wait 5 seconds
        retries--;
        if (retries == 0)
        {
            ESP.reset();
        }
    }
    Serial.println("MQTT Connected!");
}

```

IFTTT derives its name from the programming conditional statement “if this, then that.” IFTTT is both a website and a mobile app that launched in 2010 and has the slogan "Put the Internet to work for you". Here, IFTTT application is used to bridge the gap between the Google Assistant commands and the adafruit server.

Setting up the IFTTT application first requires logging in after which we need to create an applet and then “This”, i.e. the trigger, here we select Google Assistant and then we will type in the commands to which the Google Assistant should respond and to this command it should control the appliance/relay associated with it. The response command from the Google Assistant can also be typed in as desired.



After configuring the trigger, i.e. “This” of the application we need to configure the “That”. What should be done once the Google Assistant hears the command which we just

configured? This is decided by setting “That” of the server. We click “That” and then select adafruit and select the pin and the input that should be given to the pin.

This creates the action for the trigger i.e. the Google Assistant command. The action taken by it is simply sending a message to the adafruit server to either turn ON or OFF the concerned connected device.

Finally, the microcontroller (Nodemcu) is programmed with the actions it needs to do once it receives the signal from the server.

APPLICATIONS AND FUTURE DEVELOPMENT

Any day-to-day, repeatable process is automatable with smart home applications. The greater the control and flexibility of these processes, the more energy and cost savings the resident experiences, which are factors anyone who pays utilities strives to moderate. The smart home revolution is likely to be more of an evolution, with the incorporation of one or two home systems at a time, gradually automating our households through smart mobile devices.

- Using this project we can turn on or off appliances through voice control
- This module saves electricity when compared to the usual one
- No physical contact with the switches is required. This reduces risk of electric shocks.
- You can control the electrical appliances in your home from anywhere in the world.
- Very cheap (8 to 10 USD)
- The project can be further expanded to a smart home automation system by including some light sensors, safety sensors, temperature sensors etc.. and automatically adjust different parameters like room lighting, air conditioning ,door locks etc.. and transmit the information to your phone.

CONCLUSION

The home automation system is has been experimentally proven to work satisfactorily by connecting sample appliances to it and the appliances were successfully controlled from a smart phone with voice control

We learned many skills such as arduino coding, application designing and other tools that we use for this project and we are able to work together as a team during the project

Hence we can conclude that the required goals and objectives of home automation system have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.