



## Home Automation Using Wi-Fi Module

1Yash Vishwas Chaudhari, 2Akhil Dnyaneshwar Dukare, 3Nikhil Ramash Dhum, 4Jayesh Bhagwan Gangurde

1B.E Electrical, 2B.E Electrical, 3B.E Electrical, 4B.E Electrical

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### ABSTRACT:

Home automation system achieved great popularity in the last decades and it increases the comfort and quality of life. In this project an overview of current and emerging home automation systems is discussed. Nowadays most home automation systems consist of a smartphone and microcontroller. A smart phone application is used to control and monitor the home appliances using different type of communication techniques. In this project the working principle of different type of wireless communication techniques such as CAN, Wi-Fi are studied and their features are compared with each other so the users can choose their own choice of technology to build home automation system. Moreover, in this project the survey of different home automation systems is discussed and their advantages are highlighted. Day-to-day life is getting simpler due to the rapid growth of technology. Almost everything has become digitalized and automatic. In this project, a system for interconnecting sensors, actuators, and other data sources with the purpose of multiple home automations is proposed. Wireless Home Automation system(HAS) using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is

sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system differs from other system by allowing the user to operate the system from anywhere around the world through internet connection. It **requires a Node MCU board, Relays, Blynk Application. In this paper we present a Home Automation system (HAS) using Blynk Community**

## INTRODUCTION:

Home automation system is growing rapidly, they are used to provide comfort, convenience, quality of life and security for residents. Nowadays, most home automation systems are used to provide ease to elderly and disabled people and they reduce the human labor in the production of services and goods. Home automation system can be designed and developed by using a single controller which has the ability to control and monitor different interconnected appliances such as power plugs & lights. One of the greatest advantages of home automation system is that it can be controlled and managed easily from an array of devices such as smartphone, tablet, desktop and laptop. The rapid growth of wireless technologies influences us to use smartphones to remotely control and monitor the home appliances around the world. Several home automation systems use smartphones to communicate with microcontrollers using various wireless communication techniques such as Wi-Fi. Smartphone applications are used to connect to the network so that the authorized users can adjust the setting of system on their personal devices. Different type of home automation systems offers a wide range of functions and services, some of the common features are appliance control, remote control lighting. This project describes the implementation and working principles of some existing home automation techniques and it compares their cost, speed and other functionalities. There are different home automation technologies accessible in market but guidelines about this technology is very low, in this project work a comparison of some existing home automation technologies is discussed so users can choose their own choice of technology. This project also discusses the comparison of some popular home automation techniques and highlight their advantages.

The Internet of Things is a system that allows devices to be connected and remotely monitored across the Internet. In the last years, the IoT concept has had a strong evolution, being currently used in various domains such as smart homes, telemedicine, industrial environments, etc. Wireless sensor network technologies integrated into the IoT enable a global interconnection of smart devices with advanced functionalities. A wireless home automation network, composed of sensors and actuators that share resources and are interconnected to each other, is the key technology to making intelligent homes. A “smart home” is a part of the IoT paradigm and aims to integrate home automation. Allowing objects and devices in a home to be connected to the Internet enables users to remotely monitor and control them. These include light switches that can be turned on and off by using a smartphone. smart irrigation systems that will start at a specific time of a day, on a custom monthly schedule, and thus will control water waste. Smart home solutions have become very popular.

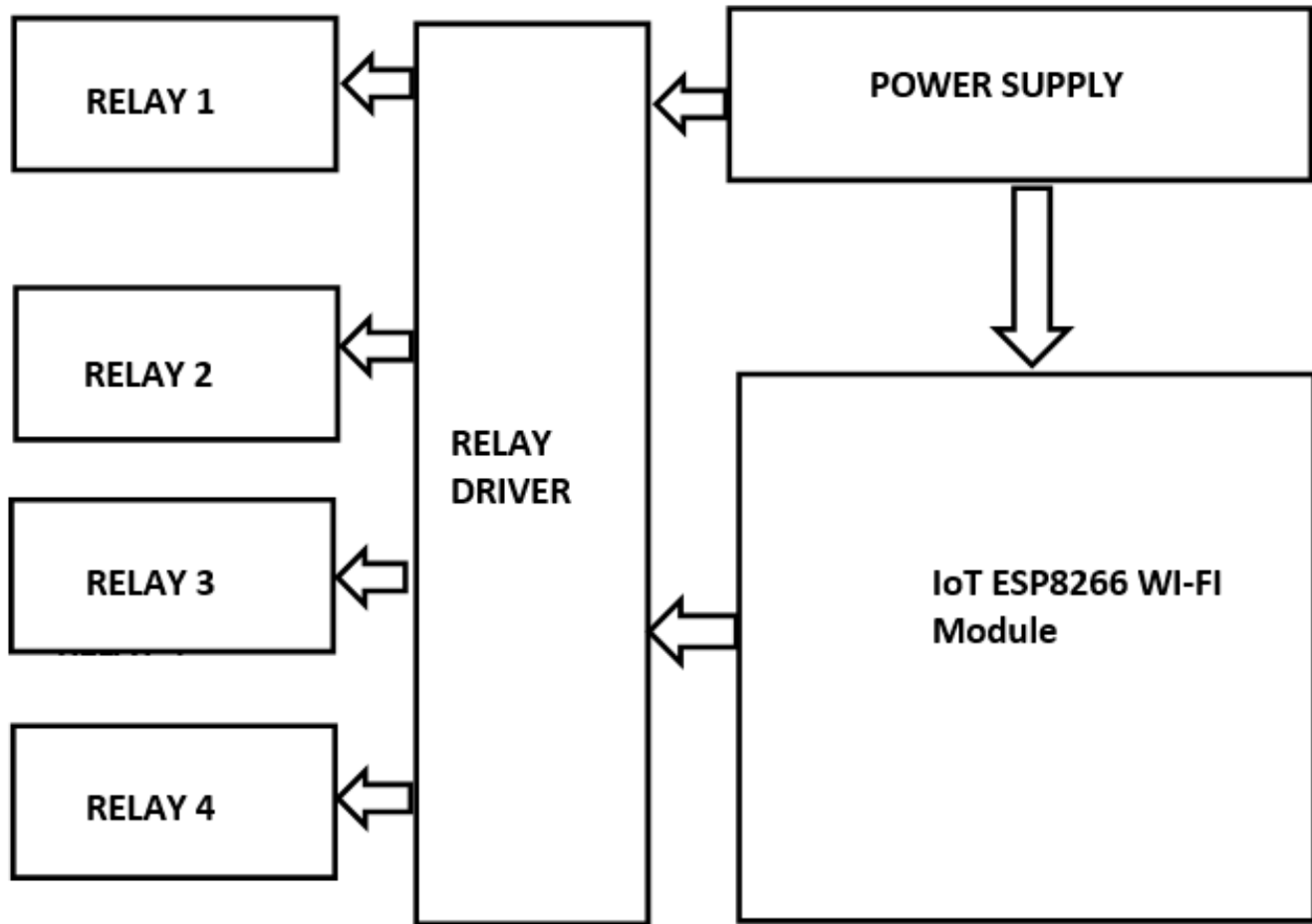
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Home automation system achieved great popularity in the last decades and it increases the comfort and quality of life. In this project an overview of current and emerging home automation systems is discussed. Nowadays most home automation systems consist of a smartphone and microcontroller. A smart phone application is used to control and monitor the home appliances using different type of communication techniques. In this project the working principle of different type of wireless communication techniques such as CAN, Wi-Fi are studied and their features are compared with each other so the users can choose their own choice of technology to build home automation system. Moreover, in this project the survey of different home automation systems is discussed and their advantages are highlighted.

Day-to-day life is getting simpler due to the rapid growth of technology. Almost everything has become digitalized and automatic. In this project, a system for interconnecting sensors, actuators, and other data sources with the purpose of multiple home automations is proposed. Wireless Home Automation system(HAS) using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system differs from

other system by allowing the user to operate the system from anywhere around the world through internet connection. It requires a Node MCU board, Relays, Blynk Application. In this paper we present a Home Automation system (HAS) using Blynk Community.

### Block diagram:



### BLOCK DIAGRAM DESCRIPTION:

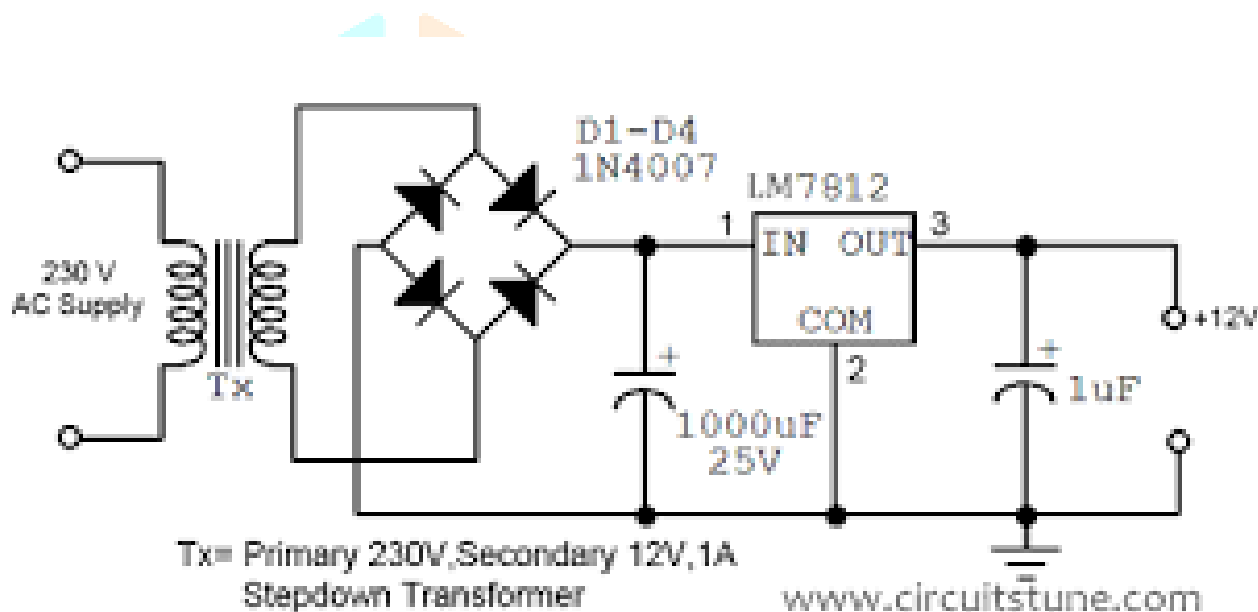
Real Time clock-based home automation in an advance project to control the devices in timely and systematic manner. The devices can be controlled through wireless from other places. Technology of RTC with EEPROM can be record all the working parameters in the devices or appliances. Basically, the project is a concept to bring automation in the industry or home.

All the home appliances will be controlled by mobile app. The appliances in the industry or home will be interfaced with centralized micro controller NODE MCU for the systematic working. The inbuilt RTC and EEPROM technology present the controller will be activated for the operation. The controller is interfaced with WIFI devices to receive the control commands from Wi-Fi shield material (Wi-Fi hotspot). To demonstrate the possibility and effectiveness of this system, the devices such as light switches, power plug, temperature sensor, gas sensor and motion sensors, etc., have been integrated with the proposed home control systems. It employs an

embedded micro – web server in NODE MCU microcontroller, with IP connectivity for accessing and controlling devices and appliances remotely

These devices can be controlled through web-applications or via Bluetooth Android based Smart phone using applications. The future system does not require a dedicated server PC with respect to similar systems and offers a protocol communication to monitor and control the home switching functionality. The operator will be done with Mobile app having Wi-Fi in that enough. If operator wants to switch the Light to turn on or off he needs to switch control button provided in app. Once the Wi-Fi will send the data to Wi-Fi present at microcontroller. As and when the requested was received the microcontroller activates through RTC and EEPROM and as per request received action will be done. In the same way all other appliances can be controlled

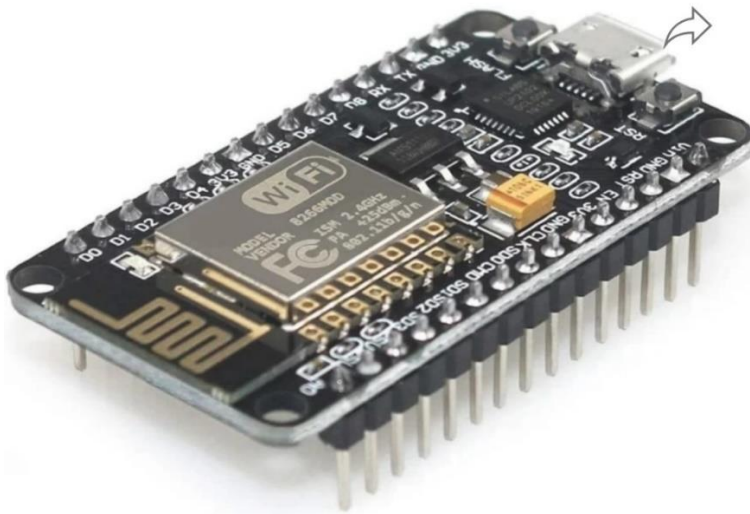
### POWER SUPPLY CIRCUIT:



**Fig.2 Full Wave bridge Rectifier**

Available power is an Ac voltage arrives at 230V. since our electronic circuits require only very minimal voltage and current, we use step down power transformer. Step down transformer is designed in such a way that the input is 230V and output of 12V. Another thing is that electronic circuits operate in DC where as a available output of transformer is Ac of 12V. So rectifier circuit is used to convert AC to DC. Rectifier circuit consists of four diodes formed in bridge fashion so as to convert incoming AC to DC.

Node MCU:



### **NODE MCU ESP8266 Wi-Fi Module**

#### **Description: -**

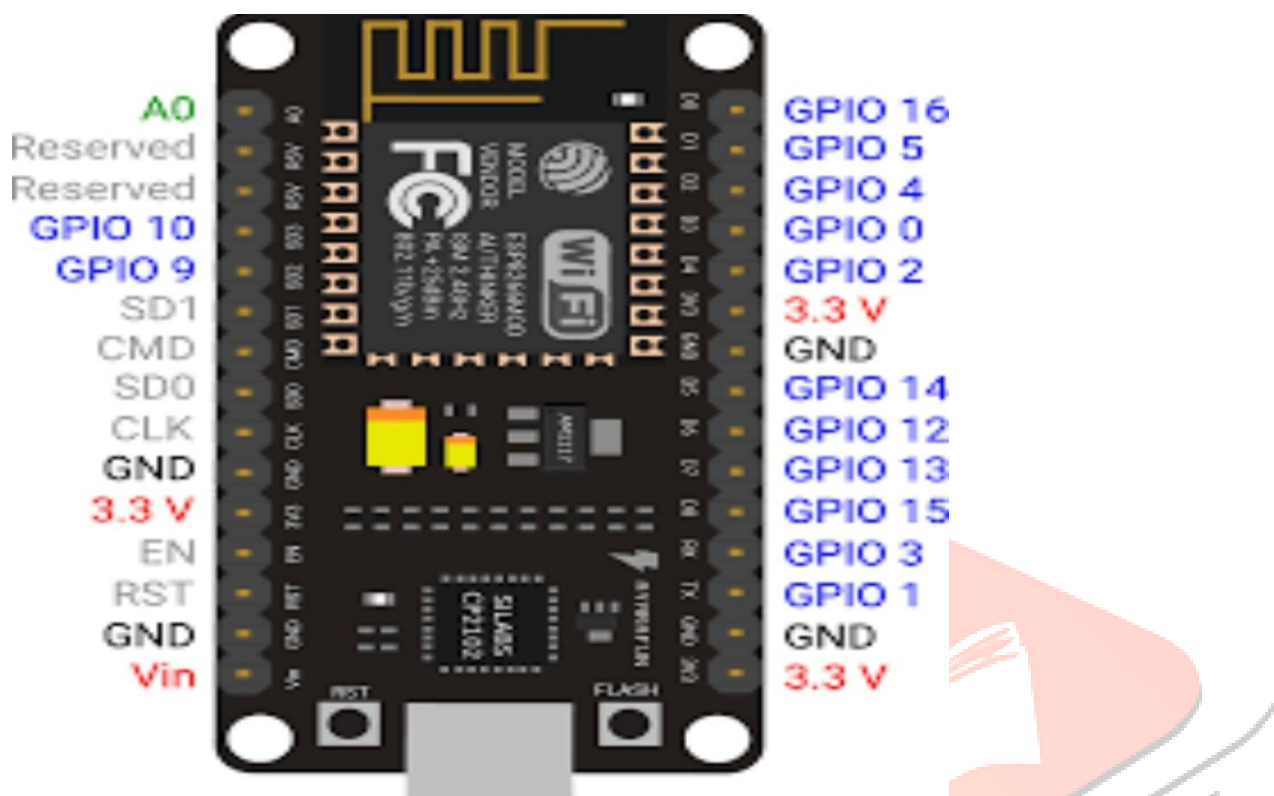
The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, and get about as much Wi-Fi ability as a Wi-Fi Shield offers. The ESP8266 module is an extremely cost-effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area.

Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts. There is almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support.



## Pin Diagram:

Pin Diagram gives complete information related to multiple pins of NODE MCU



Pin Diagram Representation of Wi-Fi module

### Wi-Fi Module Description:

- i. Operating Voltage: 3.3V
- ii. Input Voltage: 7-12V
- iii. Digital I/O Pins (DIO): 16
- iv. Analog Input Pins (ADC): 1
- v. UARTs: 1
- vi. SPIs: 1
- vii. I2Cs: 1
- viii. Flash Memory: 4 MB

ix.SRAM: 64 KB

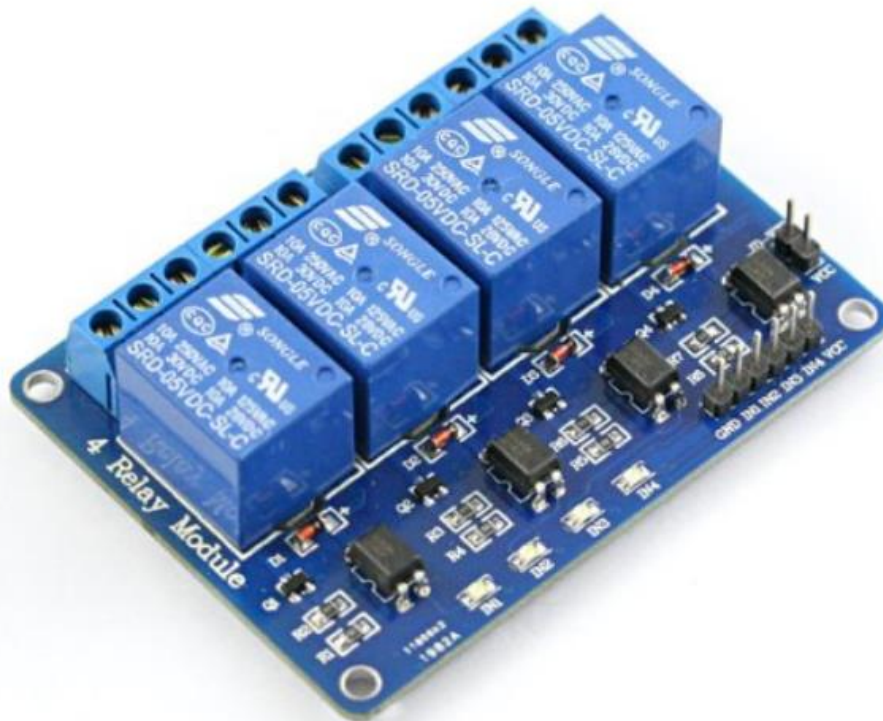
x.Clock Speed: 80 MHz

xi.USB-TTL based on CP2102 is included onboard, Enabling Plug n Play

xii.PCB Antenna

xiii.Small Sized module to fit smartly inside your IoT projects

## RELAY MODULE:



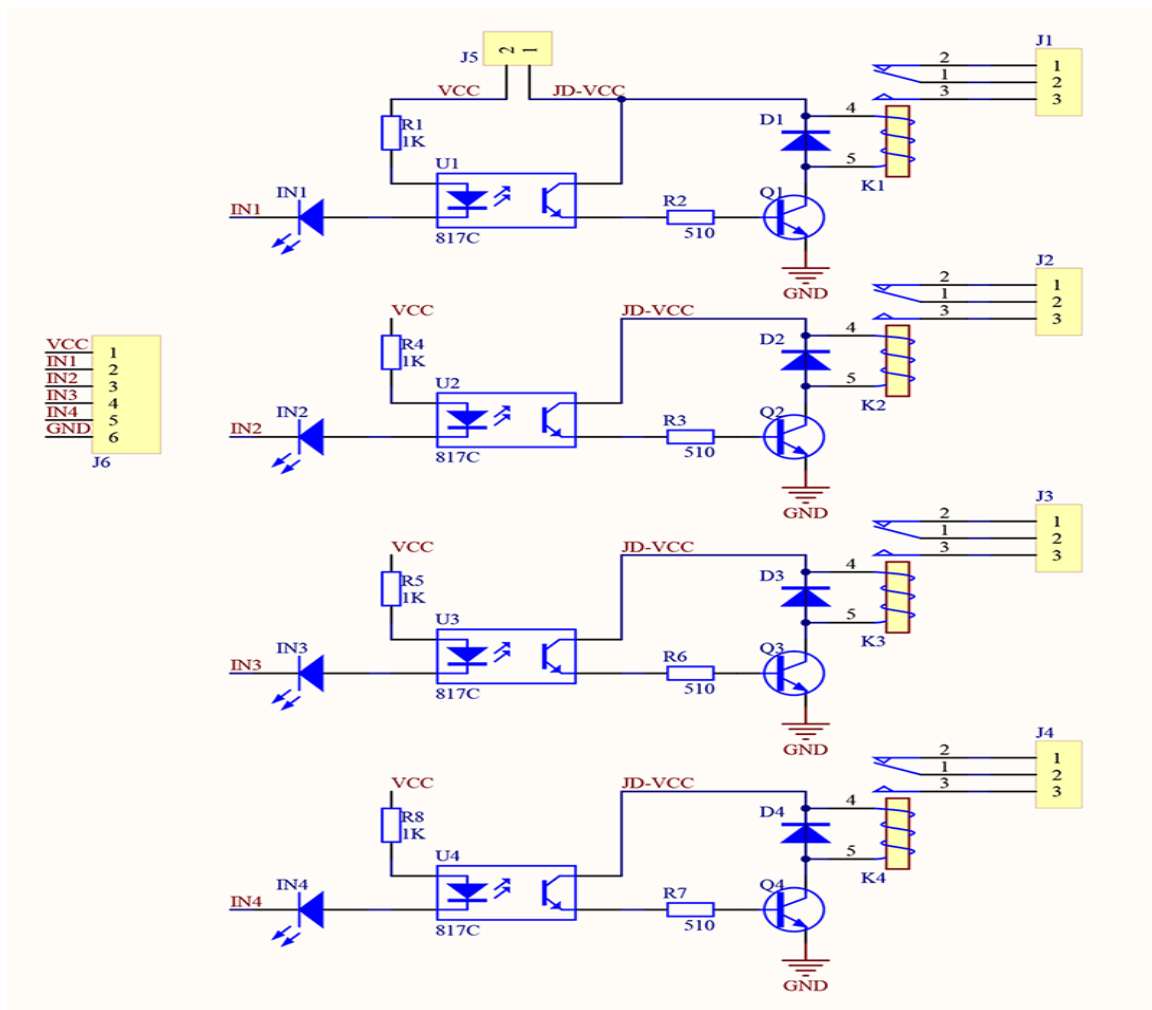
### 4 Channel 5 Volt Relay Module

This is a 5v 4-Channel Relay Interface Board, Be Able to Control Various Appliances, And Other Equipment's with Large Current. It Can Be Controlled Directly By Microcontroller Relays are typically used to switch devices which uses a higher voltage than what most microcontrollers such as an Arduino or Raspberry Pi can handle. This particular relay module can control typical household appliance up to 10A. Note: PCB color, or layout may vary slightly. A 5v relay is an automatic switch that is commonly used in an automatic control circuit and to control a high-current using a low-current signal. The

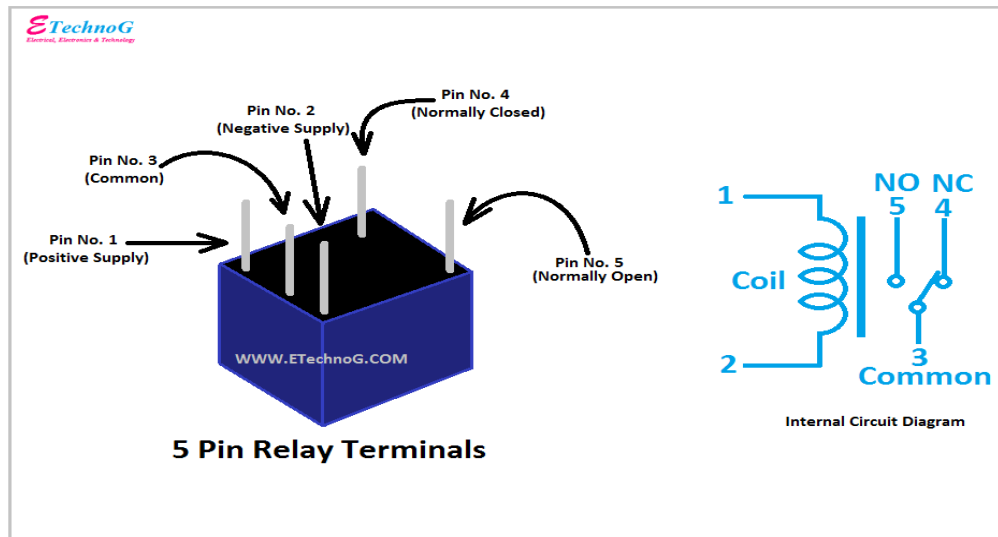


input voltage of the relay signal ranges from 0 to 5V.

A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit.



## Connection Diagram of 4 channel 5-volt module



### Relay Module Description:

1. Relay LED: with different colors codes
2. 4 SPDT Relay channels 5V DC, 10A, 250V AC
3. PCB parameters: FR4 / 1.5mm / two layers / metalized holes / solder mask / extra PCB openings for better voltage isolation / doubled high voltage tracks
4. Power supply: from USB port
5. Current consumption: 400 mA

## Software Information

Programming Node MCU ESP8266 with Arduino IDE The Node MCU Development Board can be easily programmed with Arduino IDE since it is easy to use. Programming Node MCU with the Arduino IDE will hardly take 5-10 minutes. All you need is the Arduino IDE, a USB cable and the Node MCU board itself. You can check this Getting Started Tutorial for Node MCU to prepare your Arduino IDE for Node

Step to connects NODE MCU with Blynk application:

1. Uploading Blynk example to Node MCU
2. You should get Auth Token in the Blynk App.
3. Go to the Project Settings (nut icon).
4. `char auth[] = "Your Auth Token";`
5. Your Wi-Fi credentials.
6. Set password to "" for open networks.
7. `char ssid [] = "Your Network Name";`
8. `char pass [] = "Your Password";`

## Uploading first program:

Once Arduino IDE is installed on the computer, connect the board with the computer using the USB cable. Now open the Arduino IDE and choose the correct board by selecting Tools>Boards>NodeMCU1.0 (ESP-12E Module), and choose the correct Port by selecting Tools>Port. To get it started with the Node MCU board and blink the built-in LED, load the example code by selecting Files>Examples>Basics>Blink. Once the example code is loaded into your IDE, click on the 'upload' button given on the top bar. Once the upload is finished, you should see the built-in LED of the board blinking.

## CREATE BLYNK ACCOUNT:

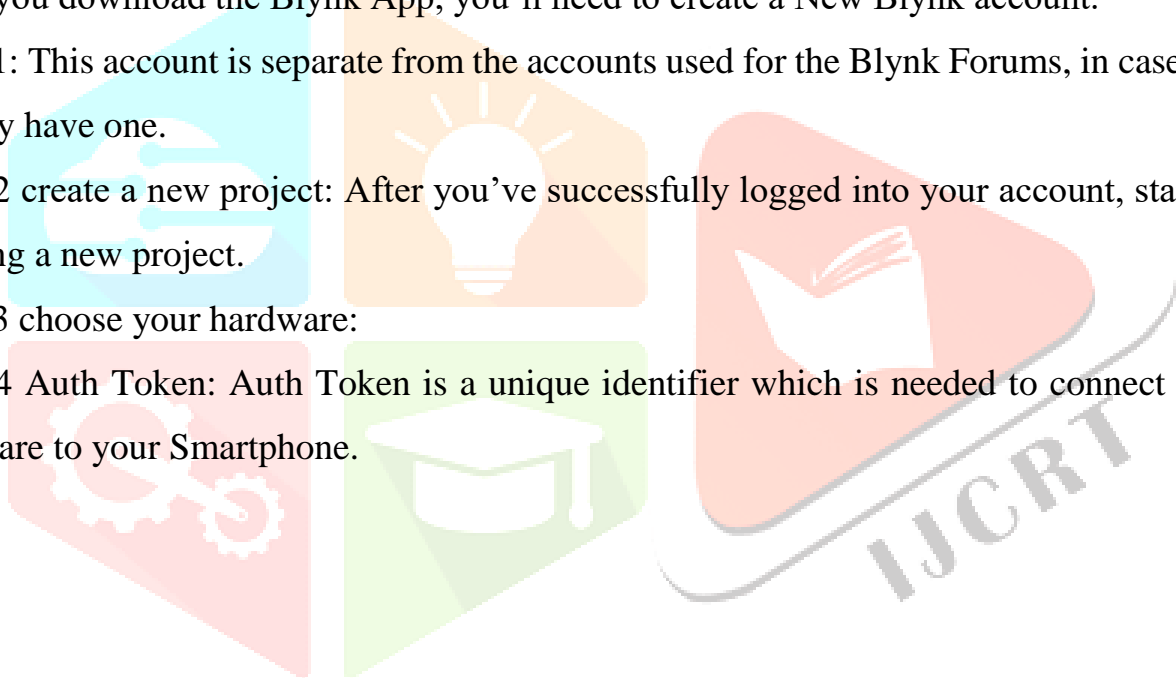
After you download the Blynk App, you'll need to create a New Blynk account.

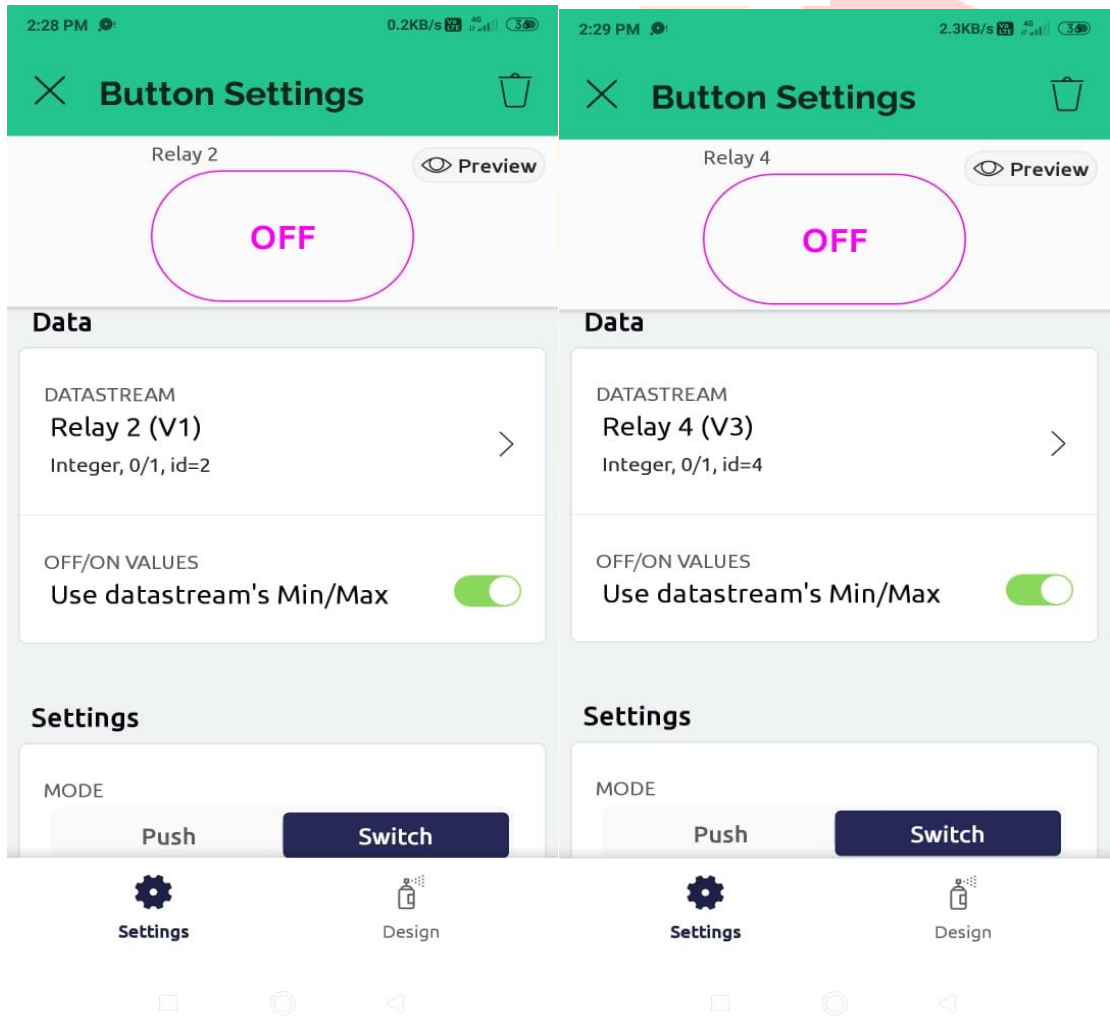
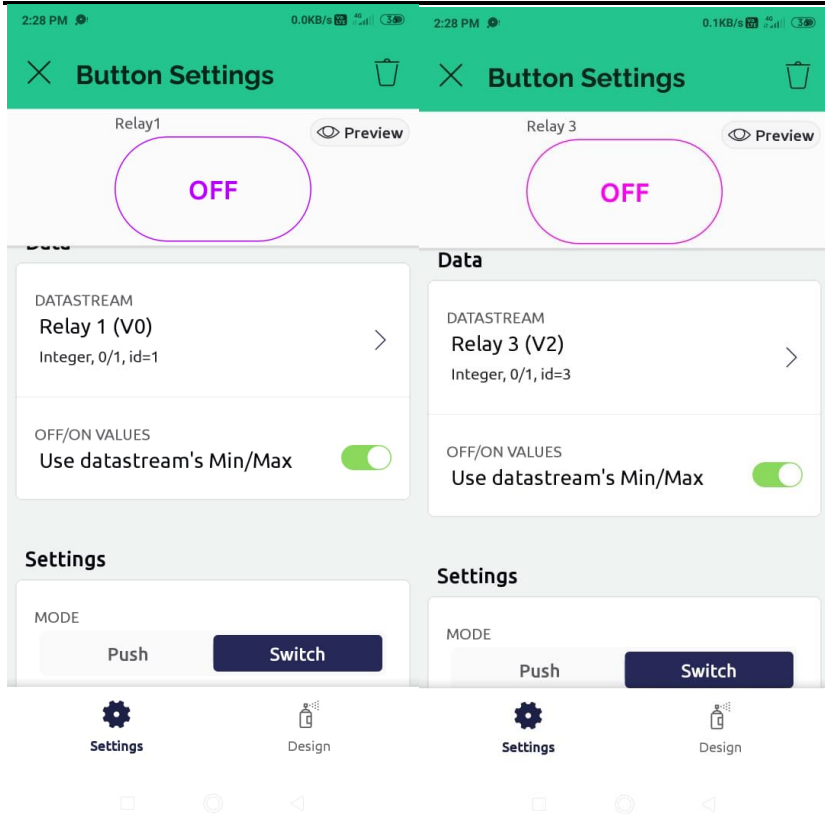
Step: 1: This account is separate from the accounts used for the Blynk Forums, in case you already have one.

Step: 2 create a new project: After you've successfully logged into your account, start by creating a new project.

Step: 3 choose your hardware:

Step: 4 Auth Token: Auth Token is a unique identifier which is needed to connect your hardware to your Smartphone.





## Program Data For Wi-Fi Module ESP8266 for interfacing with Blynk IOT

```
/*New Blynk app with Home Automation
  https://srituhobby.com
*/

//Include the library files
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

//Define the relay pins
#define relay1 D0
#define relay2 D1
#define relay3 D2
#define relay4 D3
#define BLYNK_AUTH_TOKEN "S-cyh3IvRS1xfcwI5ynG00AdDKDnVD9i" //Enter your blynk auth
token
char auth[] = BLYNK_AUTH_TOKEN;
char ssid[] = "Galaxy Note 10";//Enter your WIFI name
char pass[] = "22222222";//Enter your WIFI password

//Get the button values
BLYNK_WRITE(V0) {
  bool value1 = param.asInt();
  // Check these values and turn the relay1 ON and OFF
  if (value1 == 1) {
    digitalWrite(relay1, LOW);
  } else {
    digitalWrite(relay1, HIGH);
  }
}

//Get the button values
BLYNK_WRITE(V1) {
  bool value2 = param.asInt();
  // Check these values and turn the relay2 ON and OFF
  if (value2 == 1) {
    digitalWrite(relay2, LOW);
  } else {
    digitalWrite(relay2, HIGH);
  }
}

//Get the button values
BLYNK_WRITE(V2) {
  bool value3 = param.asInt();
```



```
// Check these values and turn the relay3 ON and OFF
if (value3 == 1) {
    digitalWrite(relay3, LOW);
} else {
    digitalWrite(relay3, HIGH);
}
}

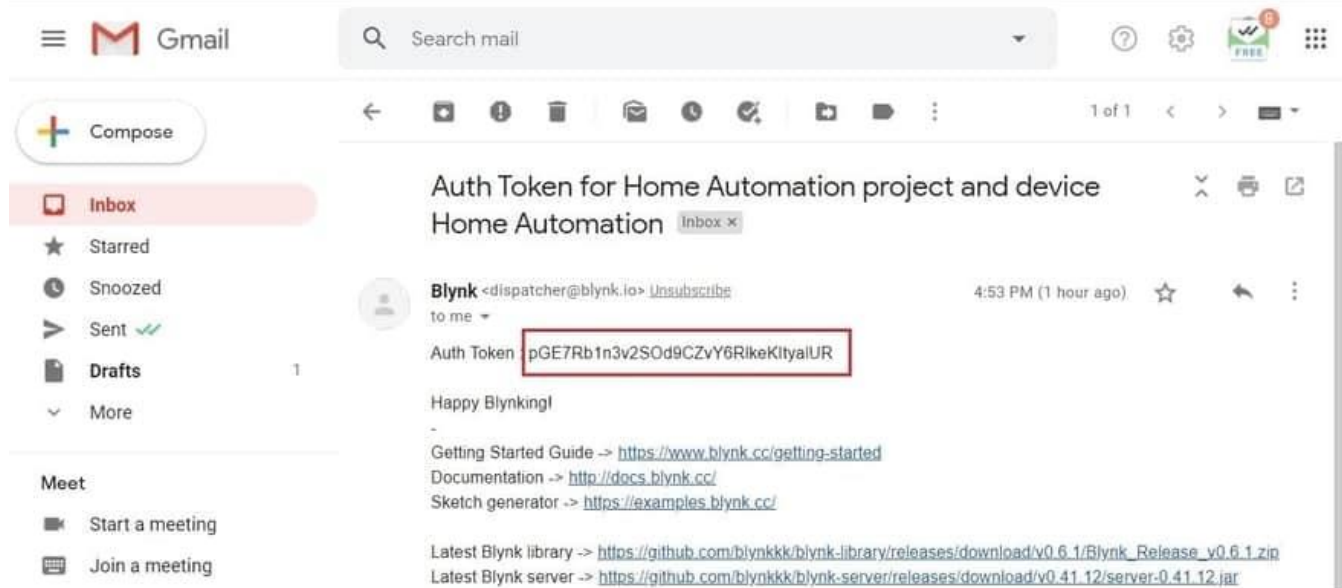
//Get the button values
BLYNK_WRITE(V3) {
    bool value4 = param.asInt();
    // Check these values and turn the relay4 ON and OFF
    if (value4 == 1) {
        digitalWrite(relay4, LOW);
    } else {
        digitalWrite(relay4, HIGH);
    }
}

void setup() {
    //Set the relay pins as output pins
    pinMode(relay1, OUTPUT);
    pinMode(relay2, OUTPUT);
    pinMode(relay3, OUTPUT);
    pinMode(relay4, OUTPUT);

    // Turn OFF the relay
    digitalWrite(relay1, HIGH);
    digitalWrite(relay2, HIGH);
    digitalWrite(relay3, HIGH);
    digitalWrite(relay4, HIGH);

    //Initialize the Blynk library
    Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
}

void loop() {
    //Run the Blynk library
    Blynk.run();
}
```



From above when you click on “Email All” an authentication token will be sent to your mail address. This token is very important as it is required in the program/code. So open your email ID & check for the token.

## CONCLUSION:

This project gives the basic knowledge of IOT, where all the appliances are controlled and can also update the status of the device. ESP8266 is very useful in IOT smart home. where it is cost efficient, security, power is saved, compact in design and its performance is reliable. Mainly used for aged people, handicapped where all the devices are easily control when the users are in out of town. The convenience is increased by accessing wherever and saves our valuable time, cost. ESP8266 would be no longer burned by the users heating bill and also it is cheap in cost for our home automation.

**REFERENCES:**

- [1] R. S. Ransing and M. Rajput, "Smart home for elderly care, based on Wireless Sensor Network," Nascent Technologies in the Engineering Field (ICNTE), 2015 International Conference on, Navi Mumbai, 2015, pp. 1-5.
- [2] Ayyappa Reddy.K, Nagarjuna Reddy.T.V, Vamsi Krishna.T.V, Rajesh Babu "Arduino based digital fuel gauge and vehicle monitoring SYSTEM. International Journal of Trend in Scientific Research and Development (IJTSRD).
- [3] C. Felix and I. Jacob Raglend, "Home automation using GSM," Signal Processing, Communication, Computing and Networking Technologies (ICSCCN), 2011 International Conference on, Thuckafay, 2011, pp. 15- 19.
- [4] R. A. Ramlee, M. A. Othman, M. H. Leong, M. M. Ismail and S. S. S. Ranjit, "Smart home system using android application," Information and Communication Technology (ICoICT), 2013 International Conference of, Bandung, 2013, pp. 277-280.

