

MINI PROJECT REPORT
ON
SMART ELECTRIC BOARD

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Bachelor of Engineering
In
Electronics and Telecommunication
By

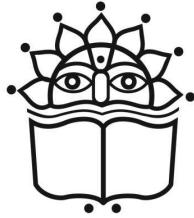
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CERTIFICATE

This is to Certify that the Project Report Entitled

“Smart Electric Board”

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is a bonafied work carried out satisfactorily by them under supervision and guidance and it is submitted towards the partial fulfillment of the requirements of Savitribai Phule Pune University, Pune for the award of degree, Bachelor of Engineering (Electronics and Telecommunication) during the academic year 2021-22.

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ABSTRACT

In order to help maintain comfortable living conditions within a home, home monitoring and automation are utilized. The standards of human's comfort in homes can be categorized into several types. A system can be set to monitor these parameters to help maintain them within an acceptable range. Additionally, making the house smart is to allow for intelligent automatic executing of several commands after analyzing the collected data. Automation can be accomplished by using the Internet of Things (IoT). This gives the inhabitant accesses to certain data in the house and the ability to control some parameters remotely. This paper presents the complete design of an IoT based sensing and monitoring system for smart home automation. The proposed design uses blynk IOT cloud platform for collecting and visualizing monitored data and remote controlling of home appliances and devices. The selected platform is very flexible and user-friendly. The sensing of different variables inside the house is conducted using the NodeMCU-ESP8266 microcontroller board.

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List of Abbreviations

Abbreviation	Meaning
1. SONAR	SOund Navigation And Ranging
2. PSD	Power Spectral Density
3. FT	Fourier Transform
4. EM	Electromagnetic
5. SNR	Signal-to-Noise Ratio

1 INTRODUCTION

1.1 Motivation

An NodeMCU ESP8266 is a really cool piece of hardware to get started with electronics, but one downside to it is needs to be plugged into computer using a serial to USB cable each time you want to upload the code. By using Nodemcu we can connect our device to the internet and controll it via internet which is not possible in other devices we need to use esp8266 module separately for it

1.2 Objective

The main objective of this project is to build a smart home device which can be used to control the home appliances via internet. The home automation device that you build can be integrated with almost all the home appliances and can be used to control them remotely from any part of the world.

3 BLOCK DIAGRAM

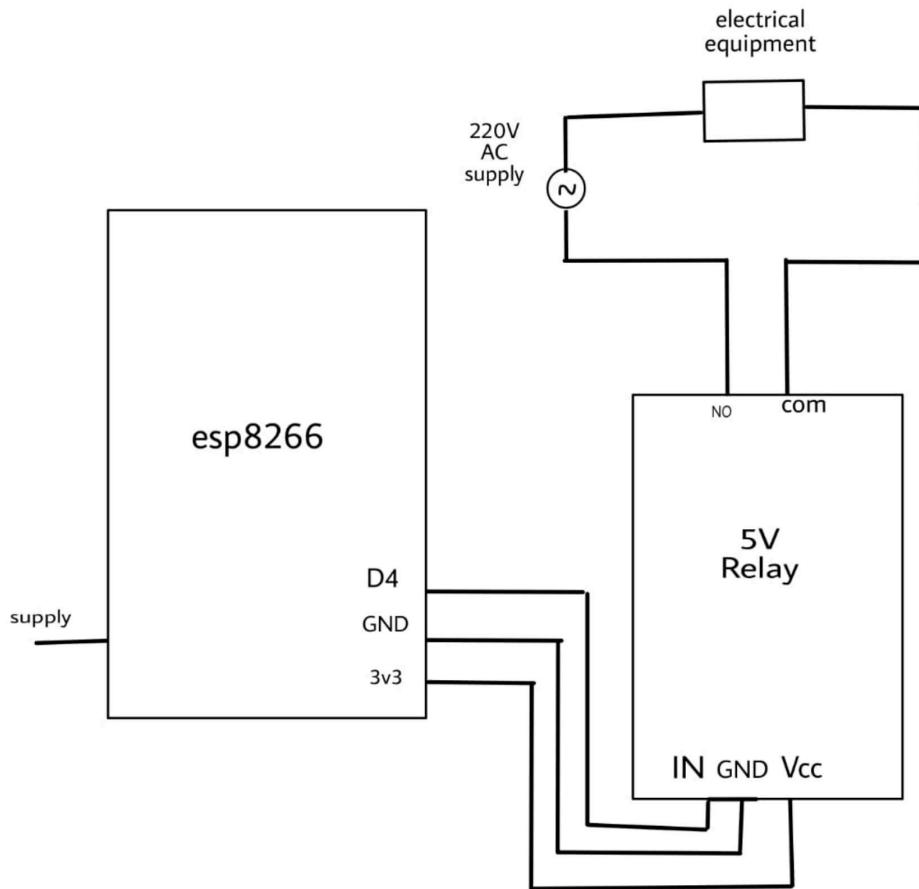


Figure 1: System Block Diagram

Explanation of the block diagram is: Here we have used three pins of Nodemcu ESP8266 whose D4 pin is connected to the IN pin of relay and ground pin of the nodemcuESP8266 is connected to the ground pin of the relay and another 3v3 pin is connected to the Vcc pin of the relay and the electrical equipment is connected between com pin and NO pin of the relay.

4 CIRCUIT DIAGRAM

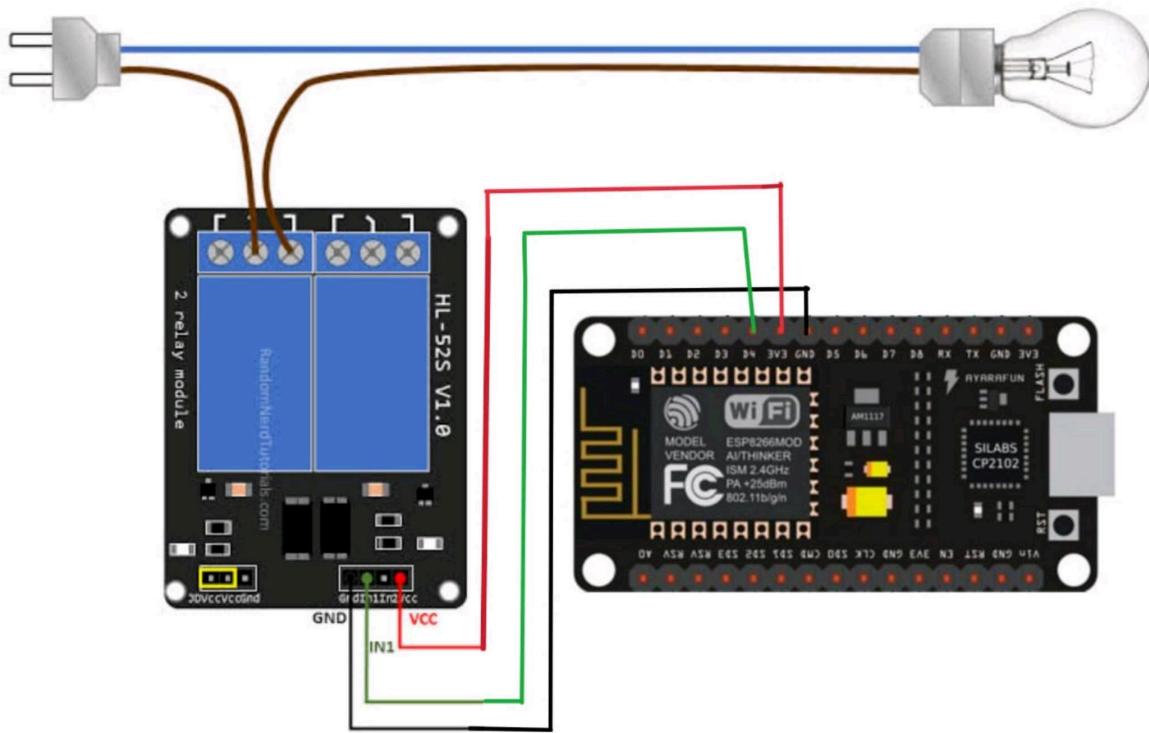


Figure 2: System Circuit Diagram

Explanation of the circuit diagram is: Here we have used three pins of NodeMCU ESP8266 whose D4 pin is connected to the IN pin of relay and ground pin of the nodeMCUESP8266 is connected to the ground pin of the relay and another 3v3 pin is connected to the Vcc pin of the relay and the electrical equipment is connected between com pin and NO pin of the relay. Relay is an electrically operated switch. Generally used relay modules are 5v / 12v. The relay uses an electromagnet to mechanically switch electric appliances. A relay can be operated by a relatively small electric current that can turn ON or OFF a much larger electric current. Using relays is safe as there is no physical contact between NodeMCU and AC devices. Relay is basically act a switch between electrical load and NodeMCU. Relay have two configuration NO (Normally Open) NC (Normally Close). Relay have coil which is energized by 5v, when coil energized switching action takes place, based on NO-NC configuration. If relay is NO configuration then when coil is energized switching action takes place from NO-NC then load will be connected.

5 SELECTION OF COMPONENTS AND CALCULATIONS

Component List			
Sr. No.	Component Name	Specification	Calculation
1	ESP8266	Small Sized module to fit smartly inside your IoT projects	
2	RELAY 5V	It includes 5-pins, designed with plastic material.	
3	AC PLUG	The plug pins are 4.5 mm in diameter, line and neutral are on centres 19 mm apart	
4	220V AC TO 5V DC CONVERter	Regulating 12V DC into 5V DC using Voltage Regulator.	
5	AC SOCKET	connect electric equipment to the alternating current (AC)	
6			
7			

5.1 Component Details

5.1.1 ESP8266

The ESP8266 is a very user-friendly and low-cost device to provide internet connectivity to your projects. The module can work both as an Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making the Internet of Things as easy as possible. It can also fetch data from the internet using API's hence your project could access any information that is available on the internet, thus making it smarter. Another exciting feature of this module is that it can be programmed using the Arduino IDE which makes it a lot more user-friendly.

5.1.2 RELAY 5V

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have

any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

5.1.3 220V AC TO 5V DC CONVERTER

In many electronics projects, we see that there is a requirement of fixed-voltage power supply, fixed means no fluctuation in voltage. The output of any circuit fully depends on input voltage supply and it should be constant. We use the voltage regulator to regulate the voltage supply which maintains constant supply. 220/230v ac to 12v/5v/6v DC Regulated Power DC converter Bridge Rectifier as required.

Ac power is easily available at anyone mostly, DC source is not easily available and if available there is not more time availability of continuity and at a time it is necessary to Recharge. AC to DC makes the great stability of power supply and not required to Charge again. So it is more usable and more availability of voltage and current than battery.

- Converting from AC to DC is not an easy way. AC has different characteristics with respect to DC, and more risky to humans and any living thing.

8 CONFIGURATION OF ARDUINO IDE FOR NODEMCU ESP8266

Explanation of System Testing Procedures are expected.

8.1 Installing Arduino IDE Software—

Install Arduino IDE software from the link <http://www.arduino.cc/en/main/software>

After installing Arduino IDE icon is created on the Desktop

8.2 Adding ESP8266 Board Manager—

First go to the file tap then into that go to the preference then In the Additional

Boards Manager enter below URL.http://arduino.esp8266.com/stable/package_esp8266com_index.json

8.3 Adding ESP8266 Board Package and Selecting Board

Now open the tools in that select Board: “Arduino/Genuino Uno” and click on the Boards Manager as shown in the figure The Boards Manager window opens, scroll the window page to bottom till you see the module with the name ESP8266. Once we get it, select that module and select version and click on the Install button. When it is installed it shows Installed in the module as shown in the figure and then close the window.

8.4 Selecting ESP8266 Arduino Board

To run the esp8266 with Arduino we have to select the Board: “Arduino/Genuino Uno” and then change it to NodeMCU 1.0 (ESP-12E Module) or other esp8266 modules depending on what you have .This can be done by scrolling down, as shown in the figure

8.5 Connecting ESP8266 to the PC

Now Let's connect the ESP8266 module to your computer through USB cable as shown in the figure. When module is connected to the USB, COM port is detected eg: here COM5 is shown in the figure.

9 CONFIGURATION OF BLYNK CLOUD PLATFORM

Blynk is a full suite of software required to prototype, deploy, and remotely manage connected electronic devices at any scale: from personal IoT projects to millions of commercial connected products. With Blynk anyone can connect their hardware to the cloud and build a no-code iOS, Android, and web applications to analyze real-time and historical data coming from devices, control them remotely from anywhere in the world, receive important notifications, and much more...

So first of all, we go to the browser and open the blynk cloud. Here you can create your new account. Just logged into your account. A new dashboard will be opened.

Here we click on a new template, write the name of our project. And here you can select your hardware like esp8266. ESP8266 means NodeMCU Series. Here you can write your project description and it's done.

So, our project dashboard has been opened. In the info tab an important part of the blynk project. The Template ID and Device name. We have to write it to our Arduino program.

In the metadata tab, where you get all the information about your project like device name, device owner, location, etc.

Now, we go to the DataStream tab. Here you define your method, how you are going to use the hardware, like through digital or analog pins directly or through virtual pins.

So click on the new datastream, and select the virtual pin. Now write the name of your virtual pin-like led. We take the V0 pin as our virtual pin and the integer as data type. After it, click to create. So here our virtual pin has been created. And in the event tab, it's displayed online and offline.

Now In the web dashboard, we drag and drop the switch widget to our dashboard. And click on the setting. Here choose the datastream source as LED (V0). Click on the Save button.

At last in the mobile dashboard, you can download the app for your smartphone. Finally, click on the Save button.

9.1 Install Blynk Libraries

Blynk Library establishes communication between your hardware, Blynk Cloud and Blynk Apps.

There are few ways to install Blynk Library for Arduino IDE:

- 1-Using built-in library manager in Arduino IDE
- 2-Installing Blynk library as ZIP file in Arduino IDE
- 3-Manually install Blynk Library

1. Install Blynk Library using built-in library manager in Arduino IDE

To install a new library into your Arduino IDE you can use the Library Manager . Open the IDE and click to the "Sketch" menu and then Include Library-Manage Libraries. Then the Library Manager will open and you will find a list of libraries that are already installed or ready for installation. Search for Blynk library and in the version selection choose the latest version to date Finally click on Install and wait for the IDE to install the new library. Downloading may take time depending on your connection speed. Once it has finished, an Installed tag should appear next to the Bridge library. You can close the library manager. You can now find the new library available in the Sketch Include Library menu.

2. Install Blynk as ZIP file in Arduino IDE

Blynk library is available as a downloadable ZIP. Starting with Arduino IDE version 1.0.5, you can install 3rd party libraries in the IDE.

Download Blynk Library by clicking the button: Do not unzip the downloaded library, leave it as is.

In the Arduino IDE, navigate to Sketch-Include Library- Add .ZIP Library. At the top of the drop down list, select the option to "Add .ZIP Library". Return to the Sketch- Include Library menu. You should now see the library at the bottom of the drop-down menu. It is ready to be used in your sketch. The zip file will have been expanded in the libraries folder in your Arduino sketches directory. The Library will be available to use in sketches, but with older IDE versions examples for the library will not be exposed in the File-Examples until after the IDE has restarted.

3. Install Blynk library manually

Download the latest Blynk-Release-vXX.zip file from the GitHub page:

Unzip the Blynk-Release-vXX.zip archive. You will notice that archive contains several folders and several libraries. Copy all of these libraries to your sketchbook folder of Arduino IDE.

To find the location of your sketchbook folder, go to top menu in Arduino IDE:

Windows: File → Preferences

Mac OS: Arduino → Preferences

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To find the location of your sketchbook folder, go to top menu in Arduino IDE:

Windows: File → Preferences

Mac OS: Arduino → Preferences

10 CODE OF THE PROJECT

```
// Fill-in information from your Blynk Template here
#define BLYNK_TEMPLATE_ID "TMPLI_AttCDQ"
#define BLYNK_DEVICE_NAME "NodeMCU"
#define BLYNK_FIRMWARE_VERSION      "0.1.0"
#define BLYNK_PRINT Serial
#define APP_DEBUG
#include "BlynkEdgent.h"
BLYNK_WRITE(v0)
{
    if(param.asInt()==1){
        digitalWrite(2,HIGH);
    }
    else{
        digitalWrite(2,LOW);
    }
}
BLYNK_CONNECTED()
{
    Blynk.syncVirtual(v0);
}
void setup()
{
    pinMode(2,OUTPUT);
    Serial.begin(115200);
    delay(100);
    BlynkEdgent.begin();
}
void loop() {
    BlynkEdgent.run();
}
```

Figure 6: CODE

Connect to wifi

Scan QR code

Quick start Device

Click on “Connect to wifi” option.

Now, power up your NodeMCU IoT board. and Click on ready.

It starts searching for nearby blynk devices. you will get the popup that shows new blynk device detected, click on join. It's getting the device information.

after it will ask to connect to wifi, provide the wifi credentials and done.so this is how we connect our NodeMCU to blynk cloud.

1-Go to files tab

2-Then go to the examples

3-In the option inside go to the blynk library

4-Then inside it click on the blynk.Edget tab this will include all the files required to the interfacing of the nodemcu with blynk

6-Then we will make some changes to the file as shown in above fig

10.1 CONNECTING NODEMCU ESP8266 to WIFI Without code using blynk

So, open and login to the app. Click on add new device and It displays the 3 options:

Connect to wifi

Scan QR code

Quick start Device

Click on “Connect to wifi” option.

Now, power up your NodeMCU IoT board. and Click on ready.

It starts searching for nearby blynk devices. you will get the popup that shows new blynk device detected, click on join. It's getting the device information.

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11 CONCLUSION

11.1 Conclusion

The home automation system has been experimentally proven to work satisfactorily by connecting sample appliances to it and the appliances were successfully controlled from a wireless mobile device. We learned many skills such as soldering wiring the circuit and other tools that we use for this project and was able to work together as a team during this project. The Bluetooth client was successfully tested on a multitude of different mobile phones from different manufacturers, thus proving its portability and wide compatibility. Thus a low-cost home automation system was successfully designed, implemented and tested.

Note:Do not include wikipedia, google in your references

References

- [1] blynk cloud platform documentation- <https://docs.blynk.io/en/>
- [2] Arduino documentation- <https://www.arduino.cc/>
- [3] Instructables.com- <https://www.instructables.com/>

Table 1: BILLS OF MATERIAL