

Wireless Home Appliance Control using IoT

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ABSTRACT

This paper explains how with the help of mobile phone WiFi one can control various home appliance or devices. This paper is explaining How to control designed circuit of two bulbs wirelessly but according to ones need one can connect any device (sensors, Appliance etc, upto 8) to NodeMCU and can gain wireless control over it, With the help of this paper one can implement circuit and connect it with NodeMCU, Program it accordingly with the help of Arduino and control device with the help of a Smartphone. This paper is mostly helpful to those who want to work on it as their project as practical implementation in homes requires certain changes.

Keywords

Wireless Control, Internet Of Things, NodeMCU, Home Automation, Home Appliance Control, Wireless device Control

1. INTRODUCTION

There are Various kinds of Automation System, According to application they are categorized as Industrial Automation, Building Automation, Autonomous Automation, Home Automation etc. Home Automation, Simply means process which controls and operate your home devices/ Appliances by a certain control system, Where there is no or less human intervention and doing it with the help of wireless technology make it wireless home appliance control System. There are various wireless method too which help achieve the same like through Smartphone Application, Through Radio Frequencies, Or Implementing Home Automation system over Cloud using IOT etc, There are many ways here we will discuss Home Automation under WiFi

2. IDEA AND IMPLEMENTATION

In this we will explain the idea on which we have build the system and how we have implemented it.

2.1 System Concept

Connecting devices to NodeMCU to gain WiFi Connectivity over them, Programming NodeMCU accordingly to control them over local network.

2.2 Major Components Brief

Components one should be familiar with before implementing system. The system design is shown on Fig 1.

1) NodeMCU: Open Source Internet Of Things Platform. It runs on Espressif system's ESP 8266 WiFi SoC and its hardware is based on ESP-12 Module.

2) Relay: It's basically switch to control current flow but itself is operated electrically by the help of electromagnet to mechanically operate switch. It is used whenever it is necessary for a circuit to be controlled by low power signal.

3) PCB: Printed Circuit Board, boards which electrically connects and mechanical support electronic components using conductive tracks on copper laminated sheets.

4) Circuit Design: Process of working on physical layout of electronic components which are required to achieve a desired output.

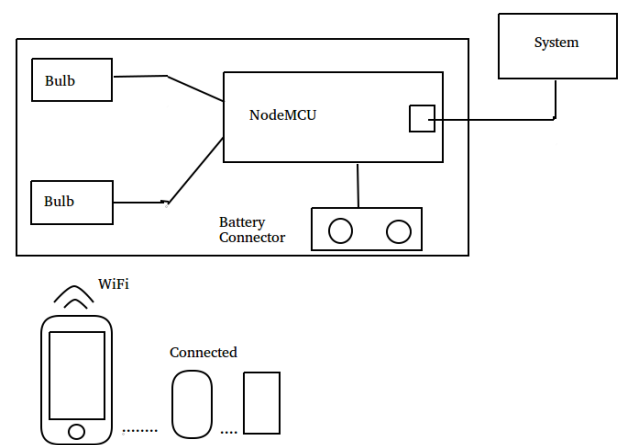


Fig 1. System Design

3. IMPLEMENTATION

Implementation starts with collection of required items.

3.1 Hardware Required

- Power Supplier
- Power Jack
- Relay +12V, 10 A
- Power LED
- USB Connector
- Diode 1n4007
- Transistor 2N2222/BC547
- Resistor 220-230 ohm
- AC Bulbs
- Zero size PCB/ Cu clad glass epoxy
- NodeMCU WiFi Module
- SmartPhone

3.2 Software Required

- Ardiuno

4. CIRCUIT DESIGN

Here is the design which is to be implemented on PCB to light bulbs. This may change according to device/ Appliance connected.

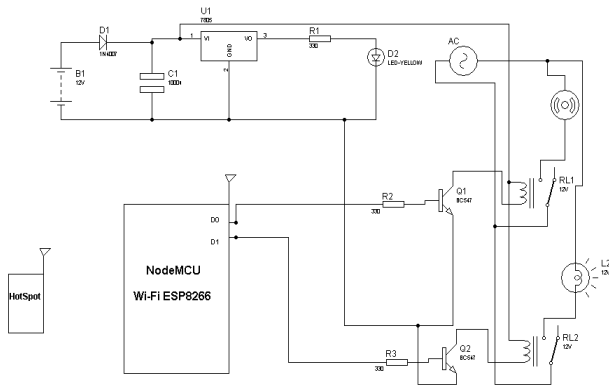


Fig 2. Circuit Design

Implement this design on a PCB board. If you don't know how to do that you can surf net for that as there are various open tutorial available which explain this in a pretty well way.

To get this done on a PCB certain machines like dremel and soldering iron etc are required so you should also look for a lab where you can work on this and when you are done with PCB printing and soldering you can program NodeMCU with the help of Arduino.

5. PROGRAM

Here is the program which you have to write in NodeMCU as a firmware. It will have web pages which you will be able to see when you run your system and want to control devices.

```
#include <ESP8266WiFi.h>
#include <WiFiClient.h>
#include <ESP8266WebServer.h>
#include <ESP8266mDNS.h>
int outputpin= 0;
MDNSResponder mdns;
// Replace with your network credentials
const char* ssid = "ESPServer";
const char* password = "esp@12345";
float celsius, fah;
String webString="";
String webPage = "";
String web="";
int pin1 = D0;
int pin2 = D1;
void setup(void){
webPage += "<h2>ESP8266 Web Server new</h2>";
webPage += "<p>";
Device1<a
href="\device1ON\"><button>ON</button></a>&nbsp;<a
href="\device1OFF\"><button>OFF</button></a></p>";
webPage += "<p>Device2
<a href="\device2ON\"><button>ON</button></a>&nbsp;<a
href="\device2OFF\"><button>OFF</button></a></p>";
pinMode(pin1, OUTPUT);
digitalWrite(pin1, LOW);
pinMode(pin2, OUTPUT);
digitalWrite(pin2, LOW);
delay(1000);
```

```
Serial.begin(115200);
WiFi.begin(ssid, password);
Serial.println("");
if (mdns.begin("esp8266", WiFi.localIP())) {
Serial.println("MDNS responder started");
}
server.on("/", [](){
server.send(200, "text/html", webPage);
});
server.on("/device1ON", [](){
server.send(200, "text/html", webPage);
digitalWrite(pin1, HIGH);
delay(1000);
});
server.on("/device1OFF", [](){
server.send(200, "text/html", webPage);
digitalWrite(pin1, LOW);
delay(1000);
});
server.on("/device2ON", [](){
server.send(200, "text/html", webPage);
digitalWrite(pin2, HIGH);
delay(1000);
});
server.on("/device2OFF", [](){
server.send(200, "text/html", webPage);
digitalWrite(pin2, LOW);
delay(1000);
});
server.begin();
Serial.println("Congrats Boss, Your HTTP server started");
}
void loop(void){
server.handleClient();}
```

6. CODE EXPLANATION

1. Set hotspot name and password for security.
2. Set pin 0 and pin 1 of NodeMCU to control bulbs.
3. Make different functions to control bulbs (ON/OFF).
4. There are already built in functions in Arduino we have used them to control hardware.
5. Set output 0 initially so that device may only turn on when you want.
6. Set delay time in between for practical usage.

7. SYSTEM EXECUTION

Once you have added your program you can connect NodeMCU to power supply through battery or by USB Connector by connecting it with your laptop or desktop and connect bulbs to AC supply and follow the steps mention over here

1. Name your phone's hotspot and password as ESPServer and esp@12345 respectively.
2. Open Arduino > Open written program > click on the arrow on the extreme right, IP will display on Screen.
3. Connect another Smartphone to your ESPServer Hotspot.
4. From the connected phone open browser and surf the same IP you saw.
5. Web page will appear with four buttons.
6. You can Control bulbs by the help of those virtual switches.

8. CONCLUSION

This paper help people to handle devices by using IOT. This paper only explains simple implementation of circuit with two bulbs but one can expand it according to ones choice and need, you just have to design different circuit according to your chosen appliance or device and minor changes in firmware programming of NodeMCU. This paper is mostly helpful for those who want to implement this in their project, which simply control bulbs, which is enough to explain the concept of Internet Of Things and to make people aware to this new emerging technology.

9. REFERENCES

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