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Research Paper for Smart Home Automation System using ESP32 with Blynk, IR Remote & Manual control Relay, IoT Project

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Abstract – This paper presents an idea or a concept for home automation using ESP32 with Blynk, IR remote and manual switch to control 8relays with and without internet and monitor the real time feedback in the Blynk app. Automation of device has a wide scope for this generation as well as in forthcoming generation. In this mobile communication technology is playing a major role in the world of automation. This articles is fully based on low cost and reliable home control monitoring system for accessing and controlling devices and appliances remotely using Android based smart phone application. while using this technology the system improves the living standard at home, reduce human effort, energy efficient and time saving and thus make a smart home. And also it is very helpful for providing support to disable people and fulfill their needs in home and thus they leads a normal life. This propose system consists of Android mobile in using ESP32 with Blynk app, IR remote & Manual control relays. We are a using Wi-Fi technology to monitor the device because of its accuracy, high range and instant connectivity. This module controls the home appliances with a very ease of installation and it is user friendly.

Keywords – ESP32 with IR remote &manual control relays

1.INTRODUCTION-

Home automation is become more beneficial because of its safety and security. Nowadays, home automation become more advance and precise to monitor all the home appliances. Home automation system become energy efficient and highly approachable smart home technique. It involves basic feature to maintain the user satisfaction and comfort**.**

Home automation is a unique system that can control and communication between nearly all aspects of your house. Home automation is a term used to describe the working together of all household amenities and appliances. for example, a centrally microcontroller panel can have the capability to control everything from heating and overall electrical appliances. Home automation can include controlling aspects of our home remotely through a computer or any mobile equipment, programming electronics devices to conditions or scenario or centralizing the control of a variety of appliances in our in to a single control center. It is essential that the different controllable appliances be interconnected and communication with each other. The main purpose of home automation is to control or monitor signals from different appliances or basic services. A smart phone can be used to control or monitor the home automation system.

(a) Proposed system :

This is IoT project, It's to make a simple ESP32 IoT smart home automation using Blynk & IR remote to control 8 relays with and without the internet. With this ESP32 project, It can control 8 home appliances from the smartphone, IR remote, and manual switches. If there is no internet available still it can control the relay module from the IR remote and manual switches.

(b) Proposed system functions :

In this project required following component for this ESP32 home automation system and smart relay module PCB.

- ESP32 DEV KIT V1
- 8-channel 5v SPDT relay module
- TSOP1838 IR receive (with metallic casing)
- Switches or Push Buttons
- Any IR remote

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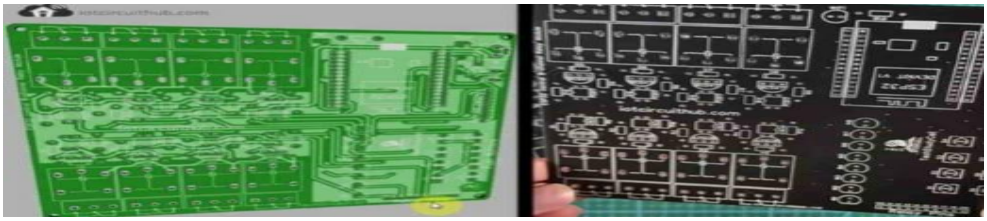
(c) PCB for the ESP32 Projects :



(1)

To give the project a professional look and make the circuit compact, We have designed a PCB for this ESP32 IoT-based home automation project**.** Required components for the Smart relay module PCB

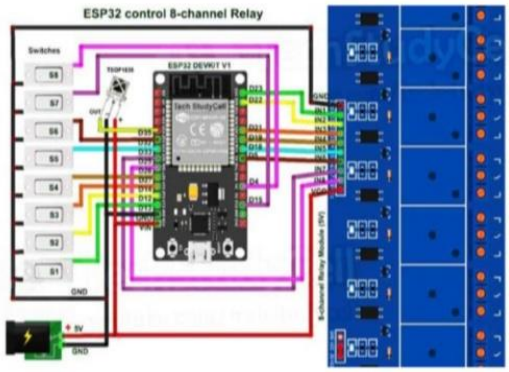
- Relays 5v (SPDT) (8 no)
- BC547 Transistors (8 no)
- PC817 Optocuplors (8 no)
- 510-ohm 0.25-watt Resistor (8 no)
- 1k 0.25-watt Resistors (10 no)
- LED 5-mm (10 no)
- 1N 4007 Diodes (8 no)
- Push Button (8 no)
- Terminal connectors
- 5v DC Supply

IMPLEMENTATION -

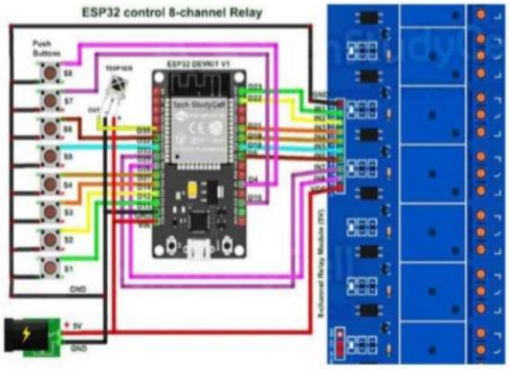
(a) Working process in project :

This is IoT project, It's make a ESP32 IoT smart home automation using Blynk & IR remote to control 8 relays with and without internet. With this ESP32 project, It can control 8 home appliances from the smartphone, IR remote, and manual switches. If there is no internet available still it can control the relay module from the IR remote and manual switches. With this Iot-based smart home system, If the ESP32 connected with Each other Wi-Fi then it can also monitor the real-time feedback of the relays in the Blynk app. If the Wi-Fi is available the ESP32 with automatically connect with the Wi-Fi.

(b) Circuit of the IOT Projects using ESP32:



(2) Circuit of ESP32 IoT project with Switch (Latched)



(3) ESP32 IoT projects with Push-button (Not Latched)

The circuit is very effortless, It's applied D23, D22, D21, D21, D19, D18, D5, D25 & D26 GPIO to control the 8-channel relays modual. And the GPIO D13, D14, D27, D33, D32, D15, D4 connected with switches to control the relay module manually.The output pin of the IR receiver is connected with D35. It is used the INPUT PULLP function in arduino IDE instead of using the pull up resistors with each switch. As per the source code, when the control pins of the relays module receive LOW signal the relay will turn on and the relay with turn off for the HIGH signal in the control pin. It's used a 5v amp mobile charge to supply the circuit. If want to use push buttons instead of switches, then we have to connected the push buttons across the GPIO pins and GND pin as shown in the above circuit.

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ESP32 home automation using Blynk app. the set up the Blynk app ESP32 Iot projects in create a new project Blynk app. Enter the project name and choose the device as "ESP32 DEV Board". The connection type will be Wi-Fi then tap on create. The adding Button widgets in Blynk app
Now to control the 8-channel relay module we have to add 9 button widgets in the Blynk app.

(c) Steps to add buttons in the Blynk App :

- Open the project in the Blynk app.
- The tap on that button and output pin – V1 & mode - switch. It can also give any name to that button. We have used an active low relay module, so to turn ON the relay it has to send 0 and 1 to turn OFF the relay.
- In a same way create buttons with V2, V3, V3, V4, V5, V6, V7, V8 pins to control the relays.
- For the last button select in the pin v9 & mode-PUSH. It will this button to turn off all the relays.

Program ESP32 with Arduino IDE :

- Update the Preferences –> Aditional boards Manager URLs: https://dl.espressif.com/dl/package_esp32_index.json, http://arduino.esp8266.com/stable/package_esp8266com_index.json
- Then install the ESP32 board.

The Codes for this ESP32 IoT Projects :

- First, we have to upload the **Code for Getting HEX codes** to ESP32 and connect the IR receiver with GPIO-35
- Code_IR_Button_HEX_Code.ino

```
1. #include <IRremote.h>
2.
3. int IR_RECV_PIN = 35;
4.
5. IRrecv .irrecv(IR_RECV_PIN);
6. decode_results results;
7.
8. void setup()
9. {
10.  Serial.begin(9600);
11.  irrecv.enableIRIn(); // Start the receiver
12. }
13.
14. void loop()
15. {
16.  if (irrecv.decode(&results))
17.  {
18.Serial.println(results.value, HEX); //print the HEX code
19.  irrecv.resume();
20.   }
21. }
```

- After that, open the serial monitor, select the baud rate at 9600.
- Now, We have to press all the remote buttons (one by one) which we want to use to control the relays.
- Now, save all the HEX codes. We have modify the main code with these HEX codes.

(c) It's modify the main code for IoT project:

- Now, open the main code in Arduino IDE.
- It's enter the following Wi-Fi credential and authentication token in the code: Code C++

```
1. #define AUTH "AUTH TOKEN"            // Enter Auth Token.
2. #define WIFI_SSID "WIFI NAME"        //Enter Wifi Name
3. #define WIFI_PASS "WIFI PASSWORD"    //Enter wifi Password
```

- Auth Token sent by Blynk at "**AUTH TOKEN**"
- WiFi Name at **"WiFi Name"**
- WiFi Password at **"WiFi Password"**
- Code C++

```
1. case 0x80BF49B6:  relayOnOff(1);  break;
```

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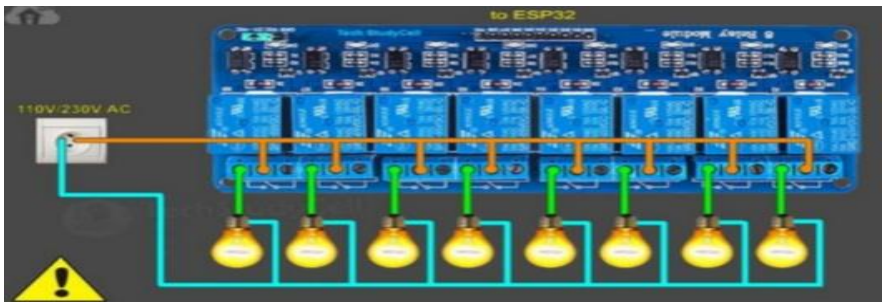
2. case 0x80BFC936: relayOnOff(2); break;
3. case 0x80BF33CC: relayOnOff(3); break;
4. case 0x80BF718E: relayOnOff(4); break;
5. case 0x80BFF10E: relayOnOff(5); break;
6. case 0x80BF13EC: relayOnOff(6); break;
7. case 0x80BF51AE: relayOnOff(7); break;
8. case 0x80BFD12E: relayOnOff(8); break;
9. case 0x80BF3BC4: all_SwitchOff(); break;

- For this ESP32 project, we have need 9 HEX codes.
- Copy paste the HEX code after 0x.
- After doing these changes, go to Tools and select the board as "DOIT ESP32 DEVKIT V1" and the proper PORT in Arduino IDE.
- Then will be click on the upload button to program the ESP32 board.

(d) Connect Home Appliances with Relay Module:



(4)

- Connect the home appliances with the relay module as per the circuit diagram.
- Take proper safety precaution, while working with high voltage.
- Now, turn on the 5V DC supply and 110V/220V AC supply.

(3) ESP32 CONTROL RELAY WITH BLYNK APP -

If the ESP32 is connected with Wi-Fi, then we could control the relay module with Blynk App. We could control, monitor the current status of the relays from anywhere in the world from the Blynk App.
When the internet comes back, the ESP32 will fetch the previous state of the switches from the Blynk IoT server and accordingly turn on and off the relays.

(4) ESP32 CONTROL RELAY WITH IR REMOTE -

We could always control the appliances from the IR remote. If the ESP32 connected with Wi-Fi then it will send real-time feedback to the Blynk server.

(5) CONTROL RELAYS WITH SWITCHES OR PUSH BUTTONS -

We could also manually control the appliances from the switches. If the ESP32 connected with Wi-Fi then it will send real-time feedback to the Blynk server.

(6) CONCLUSION -

In a this paper, an internet based smart home system that can be controlled upon user authentication. is proposed and implemented. The home automation using iot has experimentally proven to work by connecting effortless appliances to it. The designed system instigates a process according to the user's. requirements. The android based smart home app communicates with ESP32 with Blynk app, IR remote and manual control relays.

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