

Smart Switch Board

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Abstract: Smart Switch Board is an advanced electrical control panel that incorporates intelligent features and connectivity capabilities to enhance convenience, energy efficiency, and home automation. Like traditional switchboards, which simply enable manual control of electrical devices it also integrates with various smart home technologies and offers remote access and automation functionalities. We have designed a webpage to control our smart switch board all over the internet also in that webpage we implemented a hand recognition model to control switches through web camera.

Keywords: 8-channel relay, two-way switches , a webpage with remote access

I. INTRODUCTION

A Smart Switch Board is all about an electrical Switch board available in our home containing smart features. SmartSwitch Bord offers manual ON/OFF control of home appliances and IoT-enabled control using a web page. It gives access to the user how to control home appliances like manual control or control with mobile/laptop over the internet. The switch board is designed in such a way that the User is able to control home appliances with hand gesture control and buttons available on the webpage

The web page is hosted on the render cloud platform it contains HTML, CSS, JS and Python program that run using the flask api the backend data is control using the firebase platform that can communicate the node mcu used in smart switch board using the internet

II. LITERATURE REVIEW

Sr. No.	Author	Paper Title	Year	Finding
1	Mr.Kalyan Chenumalla,Mr. Srikanth Gottam, Mr. Prashanth Kusuma, Ms. P. Bhavya	Google Assistant Controlled Home Automation	2019	The idea behind Google assistant-controlled home automation is to control home devices with voice. On the market there are many devices available to do that, but making our own is awesome
2	Ms. Anjali Shrivastav	ESP 32 base Automation	2019-20	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.
3	Mr. Vaibhav Malav1,Mr. Raushan Kumar Bhagat2,Mr. Rahul Saini 3, Mr. Udit	Research paper on Bluetooth based Home Automation using Arduino	2020	This paper designs and implements a simple and efficient UAV system for packages delivery.
4	Archana Benkar, Abhishek duduskar, Shivani Gandhamwar, Prof. P. A. More	Research paper on Gesture-Based Smart Switch	2019	The project aims at making old/dum electric appliances smart for controlling remotely for easy and touchless/contactless operations via software operations

5	Mr.Kalyan Chenumalla, Mr. Srikanth Gottam, Mr.Prashanth Kusuma, Ms. P. Bhavya Shri	Development of Smart Switch for Household Appliances Using Web-Based Technology	2021	The idea behind Google assistant-controlled Home automation is to control home devices with voice
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III. METHODOLOGY

3.1 Block Diagram

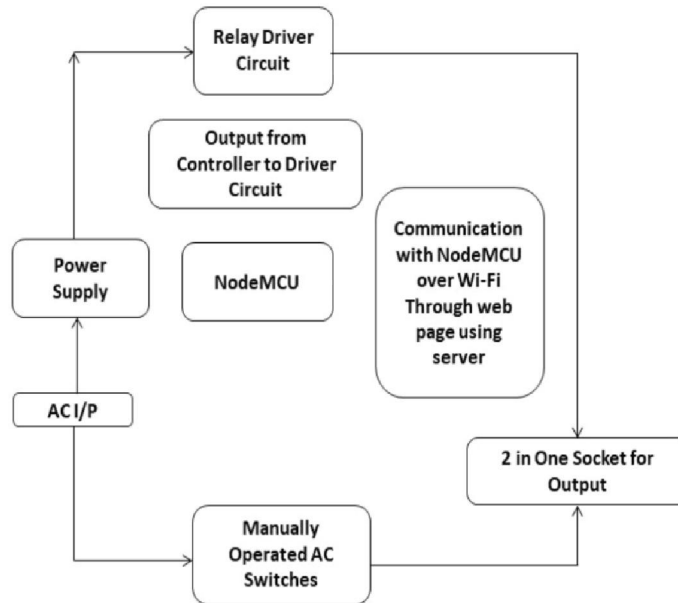


Figure 1: Smart Switch Board block diagram

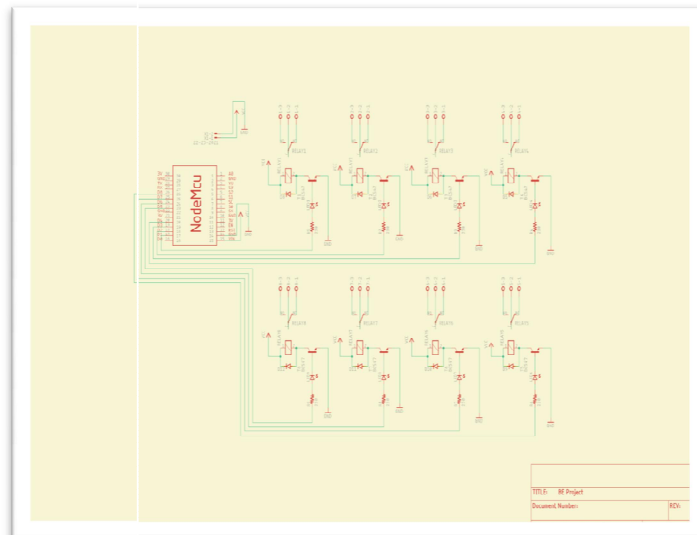


Figure 2: Circuit Diagram

3.2 Algorithm

Start

The program starts when click on the link(the program was created with flask api and hosted on render)

Web Page Display on the Screen With 8 buttons for controlling switches and one bottom for Hand gesture detection(It contain HTML,CSS,JS and Python program)

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On clicking each button data is sent to the backend server firebase and on-off switches on the switch board with the help of internet

If the user wants to control through hand detection click on the bottom button

With the help of the Python open cv program we can detect hand fingers of both hands and control switches with the help of Firebase

End.

3.3 Flowchart

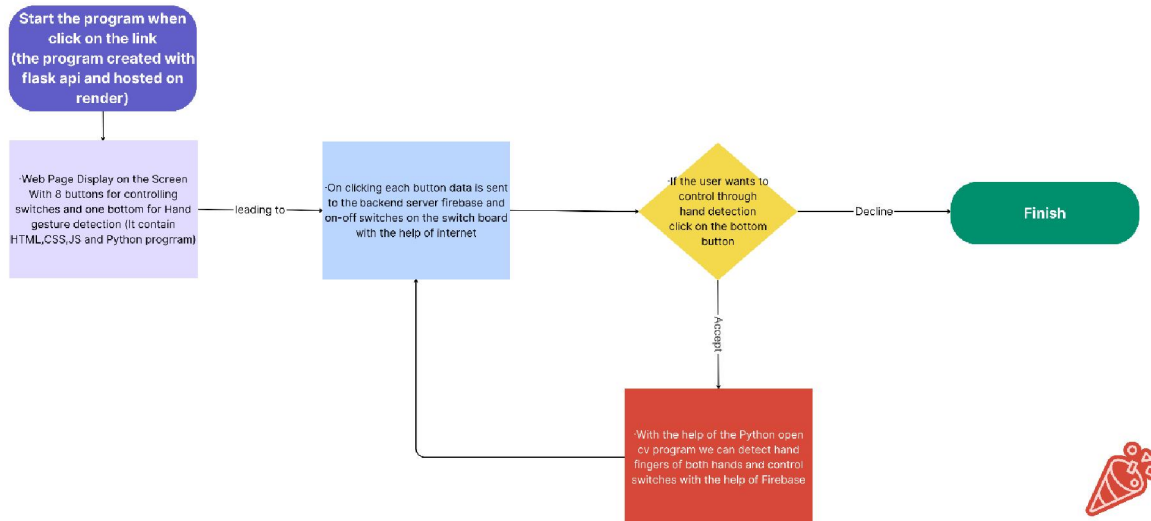
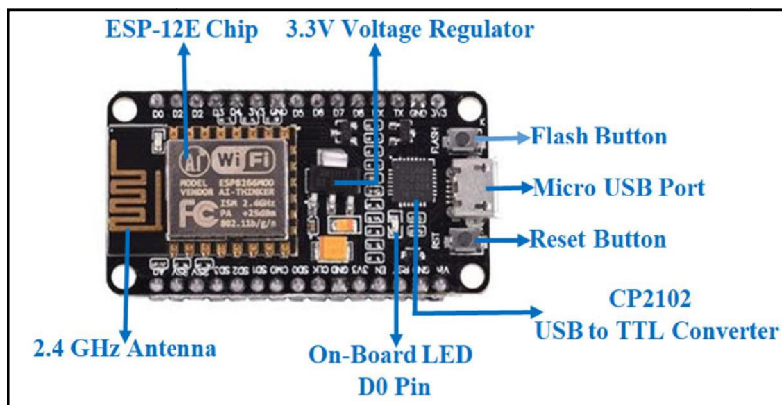


Figure: Smart Switch Board Web page block diagram

3.4 Hardware Details

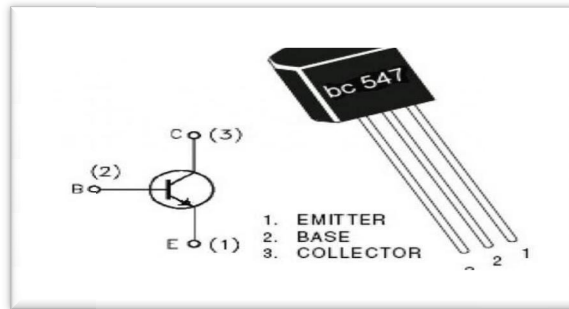
NodeMCU ESP8266



NodeMCU ESP8266 On Chip Peripherals

The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IOT projects.

Transistor BC 547



Transistor BC 547

The BC547 transistor's main function is as a switch for managing the current flow to the relay module. The transistor's base can work as an electronic switch by being connected to a microcontroller, allowing or halting the current to turn on or off the relay. This gives the microcontroller exact control over how the relay module operates, which in turn controls how electrical items attached to the Smart Switch Board are switched on and off.

5v Relay



5v Relay

A gadget that enables you to operate a high voltage or current circuit with a low voltage or current signal is a 5V relay with BC547, 1N4007 diode, LED, and 100-ohm resistor. An electromagnet inside the relay changes a group of contacts to make or break a connection in the high voltage or current circuit when it is powered up. The relay coil is driven by the BC547 transistor. When a low voltage signal is delivered to the transistor's base, which is conducting current to the relay coil, the transistor energises the coil and causes the contacts to switch. To prevent voltage spikes caused by the relay coil when it is de-energized, a 1N4007 diode is attached across the coil. The transistor is protected from damage by the diode, which enables the coil's stored energy to safely dissipate. To show when the relay is activated, an LED is wired in series with a 100-ohm resistor. The LED will turn on to visually demonstrate that the circuit is active when the relay coil is activated. This 5V relay with a BC547, 1N4007 diode, LED, and 100-ohm resistor is a flexible and useful component that can be utilised in a variety of applications where low voltage control of high voltage or current circuits is required.

Diode 1N4007



Diode 1N4007

The 1N4007 diode, a crucial part of the Smart Switch Board project that serves a number of functions in the circuit. The 1N4007 diode's main use is as a component for protection. Relays and solenoids are examples of inductive loads, and when their current is abruptly cut off, these components may produce voltage spikes or back electromotive force (EMF).

Led



Led

LEDs are frequently employed in electronic systems to offer visual feedback and status indication. LEDs can be used in the Smart Switch Board project to show whether linked electrical devices are on or off.

100 ohm resistor



100ohm resistor

The 100-ohm resistor, which has multiple functions in the circuit, is a crucial part of the Smart Switch Board project. When attaching LEDs to the circuit, the 100-ohm resistor can be utilized as a current-limiting resistor

Two-way Switch



Two Way Switch

The three terminals in Two Way Switch are usually named COM, L1 and L2, but sometimes the terms COM, 1 Way and 2 Way are also used. In one position, the COM and L1 terminals are connected, while in the second position, the COM and L2 terminals are connected. This type of connection is typically called a “Break before make” design, as the

first connection has to be broken before making the second connection. This is in contrast to a regular two-terminal switch, which is just a make-or-break device

Two in one socket



Two-in-One Socket

Two in one Socket is one type of socket used in electrical Switch board form where we take AC 230V output. The two-in-one socket is a crucial component utilized in the Smart Switch Board project. This part provides ease and effective power distribution by combining two outlets into a single unit

IV. CONCLUSION

For home applications, this project is an efficient project and has a low cost. By using this method, we can control the home appliances using mobile phones and also a manual mode. This is a cost-effective project and easy to use as well as manual switches. By using the Home automation technology the most important thing is to increase the efficiency and decrease the efforts

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