



Design and Development of Smart Branched Switch for Home Automation system.

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ABSTRACT: Home automation refers back to the computerized and digital manage of family features, activity, and appliances. In general, it means you can easily control the utilities and features of your home via the Internet to make life more convenient and secure, and even spend less on household bills and designing a home automation system is not that much difficult now a days, because of improvement in computing devices and Wireless Network, to IoT-Based Smart micro-controllers to Achieve Home Automation with Voice Detection and Control. The major goal of this project is to design a smart home automation system using an ESP32 and NodeMCU being managed through any Android OS smart phone. Modern Residential are steadily shifting from traditional switches to centralized control systems, involving control of appliances remotely. Today's, smart appliances in the Internet of things can track the data and share it with other objects present on the network, by doing that this object can collaborate and take a intelligent decisions on their own. Humans have a tendency find alternatives around them to carry out their work efficiently. Services provided in IoT also needed to be made capable of providing similar or alternate objects that matches with user requirements, current context and previous knowledge without any human intervention. As technology advancing daily it is becoming inevitable that every object in the room can be controlled by the phone or voice command. At a present time, automated systems are much more preferred than their regular manual counterpart. Traditional switches of regular households are getting replaced by the automated systems. Today's generation is advance and they are going for more efficient way of controlling the appliances than your conventional switch. We are implementing Internet of Things (IOT) in much effective way for monitoring the regular house conditions by sensors and other devices. Architecture of home automation is based on the NodeMCU (ESP32), Web service mobile application and programmable relays.

IndexTerms – Automation, NodeMCU, ESP32, IOT, Blynk, Android App, Home Automation, Lab Automation, voice command.

I. INTRODUCTION

The main objective of this project is to design and develop a home automation system using an NodeMCU (ESP32) board and controlling it which mobile application and voice control system. Modern households are shifting from conventional switches to a centralized control system using their mobile phones, involving a digital switch. Ever wondered of a situation where you could just control your home appliances to work as you need just by using your voice command? Those days are gone where you have to be billionaire like Tony Stark or a Bruce Wayne to have an automated house though they are fictional. In this project we are going to see how can we make a fully automated house using a easily available board in the market like ESP32. You can follow this even if you have no prior knowledge Programming and Electronics or NodeMCU. So, let's start our journey of home automation using a mobile application and voice command. Home Automation is technology that makes it easy for you to control lighting of your house, thermostat or air conditioner. Controlling home appliances with your phone or voice command can simplify your daily lifestyle. It can save energy manage electricity or equipment or notify you if someone else using your house for crashing on top of it you can also custom set to your own personal preference. This project focuses on wireless home automation system. It is easy to modify existing homes with traditional control switches and there is no need to do the wiring a ripping up of the carpet or drilling holes in the walls. Each used technology has its own distinct features and importance that makes them more useful for the applications they are used in, while all can be found in usual home automation installation.

II. COMPONENTS REQUIRED

- A. ESP32 can run on extreme temperature condition ranging from -40°C to $+125^{\circ}\text{C}$. ESP32 can dynamically remove external circuit and adaptable to different environment. It works mainly with mobile devices, wearable electronics and other IoT appliances, it achieves all of it on ultra-low power consumption with few software that works on it. ESP32 is highly-integrated with sensors like antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. MCU adds many functionalities and adaptability to your applications with minimal PCB requirement. It also has an interface with other systems to provide Wi-Fi and Blue-tooth functionality through its SPI / SDIO or I2C / UART interfaces.
- B. Relay is an electrical switch used operating appliances. It has multiple set of an input terminals for a digital signal or multiple control signals, and a multiple set of operating contact terminals.
- C. Bread board is a used for creating base for prototyping of electronics. Originally the word bread board is referred to a literal board, a polished piece of wood that is used for slicing bread. In Seventies the solder-less breadboard is also called breadboard because available and now a days the term "breadboard" is commonly used to refer to these too. Because the solder-less breadboard does now no longer require soldering, it is much more reusable.
- D. Blynk is a platform with IOS and Android apps to handle micro-controllers such as ESP32, ESP8266, Arduino, Raspberry Pi and likes board on the internet. It's a virtual dashboard where you can create and design a graphical user interface for your ideas by simply drag and drop widgets which means it is a simple tool to operate. Blynk works over the Internet. This way that the hardware you pick out need to have the ability to connect with the internet. Some of the boards, older boards like Arduino Uno require an Ethernet or Wi-Fi Shield to connect, while others are already Internet- enabled: like the ESP32, Raspberry Pi with Wi-Fi, Particle Photon or Spark Fun Blynk Board. But even in case you don't have a shield, you can connect it over USB to your System (it's a little more complicated for beginners). What's amazing, is that the number of hardware that works with Blynk is large and will keep on increasing. The Blynk App is a well-developed interface builder.
- E. IFTTT is a freeware web-based online service that operates on chain of simple conditional statements called applet and is triggered by modification that occur within other web services such as Googles and Microsoft's etc. For example, an applet could send an e-mail if the user tweets using a hashtag, or rather copy a photo from Facebook to a user's archive if anyone tags a user in a photo. In addition to the web application, the service runs on the on iOS and Android. Triggers are the "this" a part of an applet. This are the gadget that trigger the action. For example, from an RSS feed, you could get hold of notification based on a key-word or phrase. Actions are the "that" a part of an applet. They are the output that cause from the input of the trigger. Applets (previously called as recipes) are the predicates created from Triggers and Actions.
- F. Arduino IDE (Integrated Development Environment) is a cross-platform software this is written in features from C and C++. It is used for writing and add packages to Arduino compatible boards, however also, with the assist of 3rd party cores, different seller development boards.

III. CIRCUIT DIAGRAM

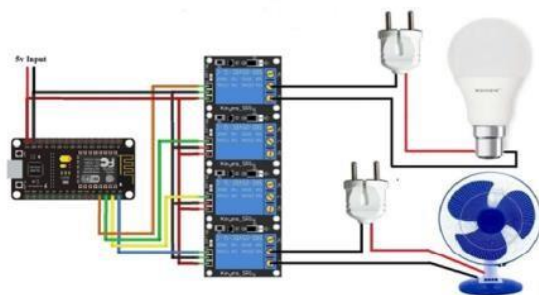


Fig. 1. Circuit Diagram

The Home automation is working with NodeMCU ESP32 controller and the command is given through the Blynk android software in a cellular-smartphone the usage of the Wi-Fi network. The NodeMCU ESP32 as in-built Wi-Fi module and the gadgets linked with home automation. Both Wi-Fi is hooked up with an authentication token. For demonstration on this undertaking DC equipment and electricity deliver are used, NodeMCU Vin and Ground had been given to voltage deliver both micro-USB additionally electricity deliver could be given. Digital Pins D0, D1 are linked to relay IN1, IN2 respectively and VCC and Ground of relays linked parallel to Vin and ground. For home equipment connection will be linked to output pins holder of relays. A smart home automation machine is an automating the majority of digital and electric functions with in a house. It makes use of a aggregate of hardware and software program to allow manage and control over home equipment and gadgets inside a house. Home automation now no longer most effective refers to lessen human efforts however additionally electricity performance and time saving. Here we're appearing domestic automation through the usage of ESP32-Wi-Fi SoC and Blynk Play store App.

IV. CODE

```
# define BLYNK_PRINT Serial
# include <ESP32WiFi.h>
charauth [ ] = "xxxx-xxxxxxx"
// auth token from Blynk app.
charssid [ ] = "name of your network " ;
charpass [ ] = "password of your network " ;

void setup()
{
    Serial.begin(9600);
    digitalWrite(D0, HIGH);
    digitalWrite (D1, HIGH);
    Blynk.begin(auth, ssid, pass);
}
void loop()
{
    Blynk.run() ;
}
```

IV. RESULTS AND DISCUSSION

The Home Automation System is working with NodeMCU ESP32 controller and the command is given via way of means of the Blynk utility in a cellphone the usage of the Wi-Fi community. The NodeMCU ESP32 has a built in Wi-Fi module and the gadgets related with Home Automation System. Both Wi-Fi is attached with an authentication token. The coronary heart of today 's challenge is the Wi-Fi enabled board that desires no advent to the ESP32 primarily based totally NodeMCU development board. It is an open-source free to use platform for growing Wi-Fi primarily based totally embedded structures and it's far primarily based totally at the famous ESP32 Wi-Fi module, walking the NodeMCU firmware. NodeMCU become born out of the choice to conquer the restrictions related to the primary variations of the ESP32 module which become now no longer like-minded with breadboards. It hard to power or even harder to program. The NodeMCU board is straightforward to use. Low fee and that fast endeared it to the coronary heart of makers and it's far one of the maximum famous forums today. For this challenge channel relay modules are brought to the ESP32 board. The challenge float includes the manipulate of NodeMCU' s GPIO from a website on any tool related at the identical community because the board. The popularity of the GPIO ' s manipulates the coil of the relays and reasons the relay to exchange among typically open (NO) and typically close (NC) circumstance relying at the kingdom of the GPIO, for that reason correctly turning the related appliance "ON" or "OFF". Now the operation is long gone via way of means of giving deliver both Micro USB or VIN, GND. It can perform via way of means of Blynk utility in cellular smartphone, Android or iPhone via way of means of guide and through Google Assistant with voice. The Hardware is nicely operated in keeping with our action.

V. ACKNOWLEDGEMENT

The Home automation the usage of Internet of Things has been experimentally validated to paintings satisfactorily with the aid of using connecting easy home equipment to it and the home equipment had been efficiently managed remotely via internet. The designed gadget now no longer most effective video display units the sensor records like temperature, gas, light, movement sensor however additionally actuates a manner consistent with the requirement. For example, the transfer receives dark. It additionally shops the sensor parameters withinside the cloud (Gmail) in a well-timed manner. This will assist the consumer to examine the situation of numerous parameters withinside the domestic whenever anywhere. The domestic automation the usage of Internet of Things has been experimentally validated to paintings satisfactorily with the aid of using connecting easy home equipment to it and the home equipment had been efficiently managed remotely via Internet. Home automation is undeniably a aid which could make a domestic surroundings automated. People can manipulate their electric gadgets through those domestic automation gadgets and installation controlling movements via cellular. In destiny this product can also additionally have excessive capability for marketing. Further it is able to be tested from pc as opposed to cellular telephones for controlling home equipment of any massive locations like industries, hospitals, establishments etc., centrally.

VI. REFERENCES

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