



Smart Device Transformation System for Overcoming Challenges in IOT using Different Security Concerns

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ABSTRACT:

This paper affords a concept or an idea for domestic automation of the use of ESP32 with Blynk, IR remote, and guide transfer to govern 4-relays with and without a net and reveals the real-time comments inside the Blynk app. Automation of gadgets has a huge scope for this era in addition to the impending era. In this cellular communicate generation is gambling a first-rate position inside the global of automation. This article is absolutely primarily based on low-value and dependable domestic management tracking structures for getting access to and controlling gadgets and home equipment remotely through the usage of Android-primarily based telephone applications. While using this technology the system improves the living standard at home, reduces human effort, is energy efficient and time-saving, and thus makes a smart home. Also, it very helps disabled persons to receive support and meet their needs in the home so they can live regular lives. The components of the suggested system are an Android phone running ESP32 with the Blynk app, an IR remote, and manual control relays. Wi-Fi technology is being used to keep an eye on the device because of its precision, long range, and immediate connectivity. This module controls the home appliances and is very simple to install and use.

Keywords: Sensor ESP32, Blynkapp, Sensor security, Smart automation and IOT

INTRODUCTION

The term "Internet of Things" (IoT) refers to a network of connected physical objects, including furniture, vehicles, home appliances, and other objects. The goal of IoT is to make it possible for these gadgets to communicate with one another and with cloud-based systems, allowing for real-time observation, management, and analysis of the physical environment [1]. IoT is used in a wide range of industries, including healthcare, manufacturing, transportation, agriculture, and smart cities. By revealing patterns in the behaviour of physical systems and enabling more automated and efficient operations, it has the potential to fundamentally alter the way we live and work [2]. Although the idea of the Internet of Things has been around for a while, it has recently gained ground and viability thanks to technological developments like wireless communication, cloud computing, and artificial intelligence. Healthcare, transportation, agriculture, manufacturing, and home automation are just a few of the many industries where the Internet of Things has applications. IoT gadgets can range in size from a wearable fitness tracker to a smart metropolis. They are highly convenient for users because they can be controlled remotely via smartphones, tablets, or voice assistants. However, there are worries regarding privacy, security, and data management as a result of the rise in connected devices [5]

SENSORS USED FOR HOME SMART AUTOMATION

Many types of sensors were used in this field some of them used for our houses in different automation which can refer to the use of technology to control and automate household appliances and systems. Some common devices used in home automation include

Smart Thermostat: A smart thermostat allows you to control the temperature in your home remotely using your smartphone or voice commands. It is used to learn your preferences and adjust the temperature accordingly, saving energy, time, money and space.

Smart Lighting: Smart lighting systems allow you to control your lights remotely, create schedules, and even adjust the brightness and colour of your lights.

Smart Locks: Smart locks provide an additional layer of security by allowing you to lock and unlock your doors remotely, monitor who enters and exits your home, and even provide temporary access codes for guests.

Smart Home Security Systems: Smart home security systems include cameras, motion sensors, and alarms that can be monitored and controlled remotely. They can alert you in case of any suspicious activity and provide peace of mind when you're away from home.

Smart Plugs: Smart plugs allow you to control the power supply to your devices remotely. They can turn off appliances when they're not in use, monitor energy usage, and even create schedules.

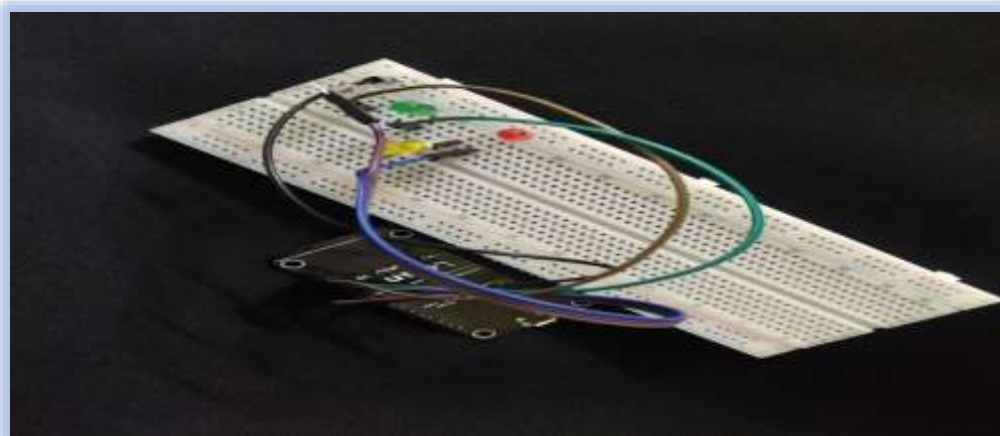
Smart Speakers: Smart speakers like Amazon Echo or Google Home are voice-controlled devices that can connect to other smart home devices, allowing you to control them using voice commands.



Smart TVs: Smart TVs allow you to access streaming services and internet content directly on your TV without the need for an additional device. Overall, these devices are designed to make your home more convenient, secure, and energy-efficient [4].

ESP32:

Espressif Systems created the ESP32, a system-on-a-chip (SoC) microcontroller that is inexpensive and low-power. It features Wi-Fi and Bluetooth connectivity and is based on the Xtensa LX6 CPU, a dual-core processor with a clock frequency of up to 240 MHz. Due to its many features and capabilities, ESP32 is a popular choice for Internet of Things (IoT) applications. The following are some of ESP32's features: Bluetooth 4.2 BLE (Bluetooth Low Energy) and Wi-Fi 802.11 b/g/n protocols are both supported by the ESP32. Because of its ability to link to many systems and networks, it is appropriate for Internet of Things applications. CPU with two cores: The dual-core CPU in the ESP32 offers greater processing power and supports multitasking. Low power consumption: ESP32 has several power-saving capabilities, including fine-grained clock gating, dynamic voltage and frequency scaling, and a sophisticated power management system. As a result, battery-powered gadgets can use it. ESP32 has 12-bit analog-to-digital converters (ADCs), which enable it to measure analogue signals like temperature, humidity, and light intensity. Multiple peripherals are supported by ESP32, including SPI, I2C, UART, PWM, and a number of others. This makes interacting with other gadgets and sensors simple. Security characteristics: ESP32 is appropriate for safe IoT applications since it has a number of security features like secure boot, flash encryption, and cryptographic hardware acceleration [5]. In general, ESP32 is a strong and adaptable microcontroller that is perfect for Internet of Things projects. The Arduino IDE, Micro Python, and other programming environments can be used to program it.



MODULE IMPLEMENTATION

To create a home smart automation system, we are using an ESP32, breadboard, and relay module, you can follow these basic steps:

Gather your components: ESP32 board Described in (3.1.1) Breadboard described in (3.1.3) Relay module Described in (3.1.5) Jumper wires Described in (3.1.7) Power supply

Connect the ESP32 to the breadboard:

Insert the ESP32 board into the breadboard. Connect the 3.3V and GND pins on the ESP32 to the respective power rails on the breadboard.

Connect the relay module to the breadboard:

Insert the relay module into the breadboard. Connect the VCC and GND pins on the relay module to the respective power rails on the breadboard.

Connect the ESP32 to the relay module:

Connect a jumper wire from a digital pin on the ESP32 to the IN pin on the relay module.

Connect the devices to the relay module:

Connect the devices you want to control (such as lights, fans, or appliances) to the relay module. Connect the live wire of each device to the common (COM) pin on the relay module. Connect the neutral wire of each device to the neutral (NC) pin on the relay module.

Power up the system:

Connect the power supply to the breadboard.

Code the ESP32:

Write code to control the digital pin connected to the relay module.

Use the Arduino IDE or any other programming environment that supports ESP32.

The code should include logic to turn on or off the relay module depending on the state of the digital pin.

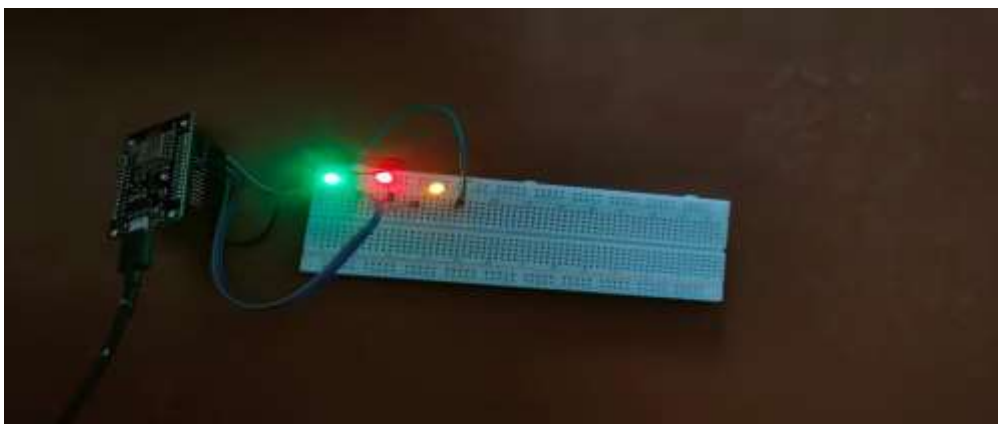
Test the system: Upload the code to the ESP32 and test the system.

Turn the devices on and off using the ESP3

IMPLEMENTATION IN SMART CITY and SMART HOME

Install sensors and equipment: Fit buildings and residences with sensors and equipment that can keep an eye on things like occupancy, temperature, and energy use. To manage lighting, heating, and cooling systems, these sensors can communicate with a platform for a Smart City, ensure privacy and security: Privacy and security are essential components of any smart city implementation. Make sure the data is secured and safeguarded and that the home automation platform is secure. **Give instruction and assistance:** To guarantee that inhabitants and building owners are at ease with the new technology and can utilize it efficiently, provide training and support. To ensure optimum effectiveness and cost savings, the Smart city system should be continuously monitored and optimized.

WORKING MODULE



ADVANTAGES OF HOME SMART AUTOMATION AND SECURITY CONCERN

It can assist with the greater smart manipulation of houses and towns through cellular devices. It offers protection for the character and improves security. We can spend much less time on responsibilities with the aid of using automating them. Even though we are far from our actual location, information is still readily available and constantly updated. In order to use electricity efficiently, electric devices are directly connected to and communicate with a controller computer, such as a cell phone. There won't be any pointless use of electrical equipment as a result. IoT apps can offer personal help by reminding you of your daily plans. Because it detects any ability risk and signals users, it's far more useful for safety. One included generation which could pick out a vehicle crash or different coincidence on the street is GM OnStar, for instance. If a coincidence or crash is discovered, it calls the government proper away. IoT gadgets join and interact with one another, executing quite a few features without requiring human involvement, and this minimizes human work. Real-time affected person care may be furnished extra correctly without a doctor's visit. It allows them to make choices and supply care primarily based totally on high-quality to be had evidence. Security concerns in the Internet of Things (IoT) are significant due to the increasing proliferation of connected devices. IoT security issues can have serious consequences, including data breaches, privacy violations, and even physical harm. Here are some common security concerns in IoT: Device Authentication and Authorization: Many IoT devices lack strong authentication and authorization mechanisms, making them vulnerable to unauthorized access. Attackers often exploit weak or default passwords. Data Encryption: Inadequate data encryption can expose sensitive information to eavesdropping and interception. Proper encryption of data both in transit and at rest is crucial. Firmware and Software Updates: IoT devices often run on outdated or unpatched software, leaving them vulnerable to known exploits. Regular firmware and software updates are essential to address security vulnerabilities. Physical Security: Physical tampering with IoT devices can compromise their security. Secure physical enclosures and tamper detection mechanisms are needed for critical applications. Network Security: Insecure communication protocols and inadequate network segmentation can lead to network attacks and breaches. IoT devices should use secure communication methods and be isolated from critical networks—privacy Concerns: IoT devices collect vast amounts of personal data. Inadequate privacy protection can lead to unauthorised data collection and potential misuse. Transparent data collection and user consent mechanisms are essential. Denial of Service (DoS) Attacks: IoT devices can be recruited into botnets and used in DoS attacks. Ensuring the devices have measures to prevent this is crucial.

CONCLUSION

In conclusion, using ESP32, a breadboard, and a 4-channel relay to automate your home is a great approach to make it smarter and more effective. The advancement of doing smart and using smart technology is time time-saving option and smart work for our future generation. With this configuration, you may use a smartphone app or voice commands to remotely operate a number of household equipment and appliances. Powerful microcontrollers like the ESP32 can interface with a variety of sensors, modules, and gadgets. Before deploying your circuits, you may easily prototype and test them on a breadboard. The 4-channel relay is perfect for controlling lighting, fans, television, radio, air conditioner, and other appliances since it lets you turn on and off many items at once. Overall, anyone interested in smart home technologies will find home automation utilizing an ESP32, breadboard, and a 4-channel relay to be a practical and affordable option. It can boost your quality of life overall, help you conserve energy, and increase security. It may be said that home automation is a unique category of equipment that uses additional effort to regulate home appliances. Additionally, we explored methods and potential applications of home automation in this essay while also demonstrating how it is produced. We also discussed the potential use of new technology in the future that would lessen the need for human labor. And we've developed a device of that kind that is small in size, affordable, capable of carrying out more tasks, durable, and more receivers of distant signals. The purpose of this study paper is to develop a tool that improves human lifestyle while saving electricity. smart city - By implementing this technology it can be useful for a person who has to walk at night, this type of sensor can be programmed to turn on automatically using the type of sensor if there is any human detection on that region. Evening 6 - This type of technology can be programmed so that the lights can be turned on automatically in the evening time when the sky turns darker. This type of technology can be placed in public places where people often gather in huge. this can be implemented in places like parks, beaches etc. The development of home automation is the project's intended objective, under the suggested plan. Through this project, a control system for home appliances such as fans, lights, tube lights, air conditioners, and bulbs has been developed. This project's goal is to provide us with a smart automated and affordable project, among other things. We have also covered information about the Arduino Uno, Bluetooth controller, and relay module in this essay. Details regarding their efforts are provided. The benefit of home automation has also been explored in addition to its components.

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