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IOT MINI-PROJECT

SMART DOOR LOCK SYSTEM

REPORT

SUBMITTED BY:

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ABSTRACT:

This project presents the development of a Smart Door Lock System utilizing the Blynk app for remote access and control. The system integrates hardware components with a mobile application, allowing users to conveniently lock and unlock doors from anywhere with an internet connection. Through the Blynk platform, users can monitor door status, receive notifications, and grant access to authorized individuals, enhancing security and convenience.

INTRODUCTION:

Traditional door locking mechanisms often lack the flexibility and convenience required for modern lifestyles. With the advent of IoT (Internet of Things) technology, there's a growing demand for smart solutions that provide remote access and control over essential home systems. The Smart Door Lock System using the Blynk app addresses this need by leveraging the power of IoT to create a secure and accessible door locking mechanism. By connecting a microcontroller-based hardware setup to the Blynk app, users can remotely manage their door locks, improving security and convenience.

OBJECTIVE:

The primary objective of the Smart Door Lock System using the Blynk app is to create a secure and convenient solution for remotely controlling and monitoring door locks. Specifically, the project aims to integrate hardware components with the Blynk platform to achieve the following goals:

1. Enable remote locking and unlocking of doors via the Blynk mobile application.
2. Provide real-time status updates on door lock status, including locked and unlocked states.
3. Implement push notifications to alert users of any unauthorized access attempts or changes in door status.
4. Offer access authorization features to allow users to grant temporary or permanent access to authorized individuals.
5. Enhance security by leveraging encryption protocols and authentication mechanisms to protect user data and prevent unauthorized access to the system.

6. Ensure ease of use and seamless integration with existing door locking mechanisms, making the system accessible to users with varying levels of technical expertise.

EXISTING SYSTEM:

In traditional door locking systems, physical keys or manual mechanisms are typically employed for securing entry points. These systems often lack flexibility and convenience, as users must be physically present to lock or unlock doors. Additionally, there's limited scope for monitoring and managing access remotely.

Existing electronic door lock systems may offer some level of automation and remote control but often require complex installations and are relatively expensive. They might rely on proprietary software or platforms, limiting interoperability and customization options for users.

Overall, the existing systems generally lack the seamless integration, accessibility, and affordability desired for a modern Smart Door Lock System. This underscores the need for a solution like the Smart Door Lock System using the Blynk app, which offers the flexibility of remote access and control through a user-friendly mobile application while utilizing readily available and affordable hardware components.

PROPOSED SYSTEM:

The proposed Smart Door Lock System aims to revolutionize traditional door locking mechanisms by integrating modern IoT technology with user-friendly mobile applications. This system utilizes an ESP32 microcontroller, solenoid lock, relay module, and the Blynk app to provide remote access and control functionalities.

With the proposed system:

➢ **Remote Access and Control**: Users can lock or unlock their doors from anywhere using the Blynk mobile app, eliminating the need for physical keys or manual operation.
➢ **Real-time Monitoring**: The system provides real-time status updates on door lock status, ensuring users are informed about the security of their premises at all times.

- ➢ **Push Notifications**: Users receive push notifications on their mobile devices in case of any unauthorized access attempts or changes in door status, enhancing security.
- ➢ **Access Authorization**: The system allows users to grant temporary or permanent access to authorized individuals, adding flexibility and convenience.
- ➢ **Affordability and Accessibility**: By leveraging readily available hardware components like the ESP32 microcontroller and solenoid lock, the system remains affordable and accessible to a wide range of users.
- ➢ **Customizability**: The Blynk app offers customization options, allowing users to tailor the user interface and functionality according to their preferences.
- ➢ **Ease of Installation**: The system is designed for easy installation, minimizing complexity and technical expertise required for setup.

BLOCK DIAGRAM:

CIRCUIT DIAGRAM:

27 5
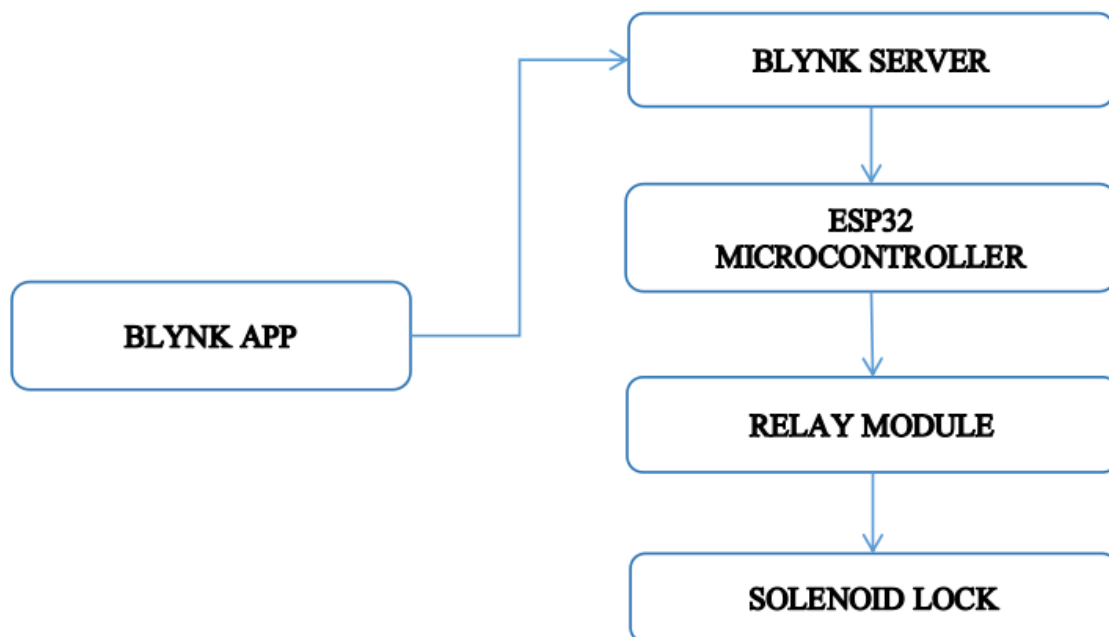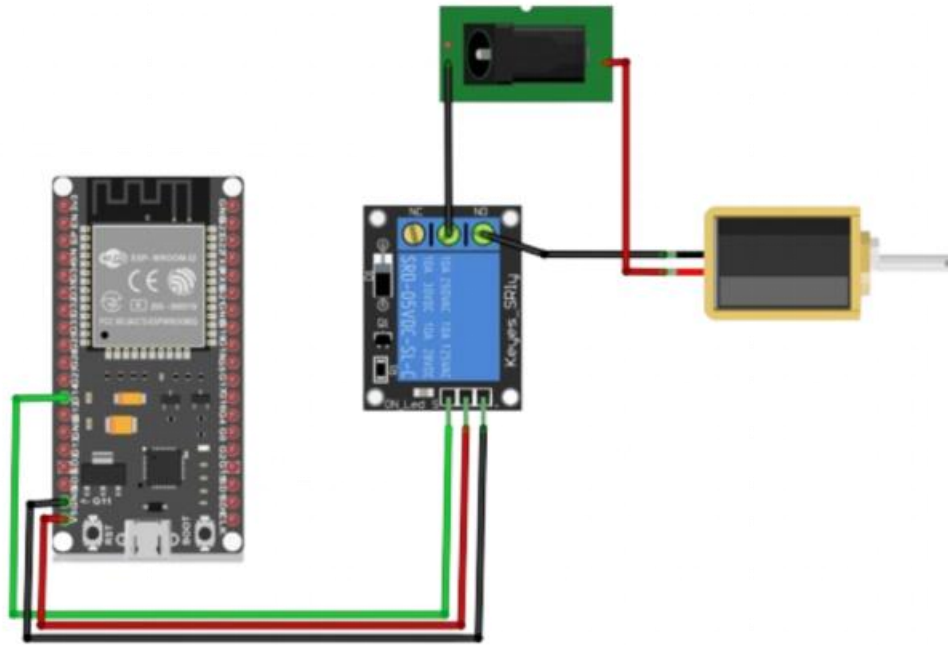
WORKING MODEL:

Creating a working model for the Smart Door Lock System using ESP32, solenoid lock, relay, and the Blynk app involves several steps. Here's a basic outline of the prototype:

❖ **Hardware Setup:**

- ESP32 Setup: Connect the ESP32 microcontroller to your WiFi network and ensure it's capable of running the Blynk firmware.

- Relay Module Connection: Connect the relay module to the ESP32 GPIO pins. The relay will control the solenoid lock.

- Solenoid Lock Connection: Connect the solenoid lock to the relay module. The solenoid lock should be wired in a way that it can be locked or unlocked when the relay switches on or off.

❖ **Software Setup:**

- Blynk App Configuration: Create a new project in the Blynk app and add a Button widget to control the door lock. Obtain the authentication token for your project.

- ESP32 Firmware: Write the firmware for the ESP32 using the Arduino IDE or another suitable development environment. Use the Blynk library to connect the ESP32 to the Blynk server and handle communication with the app. Write code to respond to button presses in the app by toggling the relay on or off.

- Upload Firmware: Upload the firmware to the ESP32 microcontroller.

❖ **Testing:**

- Power On: Power on the ESP32 and ensure it successfully connects to the WiFi network.

- Blynk App Testing: Open the Blynk app and test the button widget. Press the button to toggle the lock and verify that the relay switches on and off accordingly.

- Physical Testing: Connect the solenoid lock to the relay and physically test the door locking and unlocking functionality.

CODE:

```
#define BLYNK_TEMPLATE_ID "TMPL3GT29u5oh"
#define BLYNK_TEMPLATE_NAME "Door lock"
#define BLYNK_AUTH_TOKEN "s74K2rPheDYVeMRZ0Dth6xsWJVmK0s33"
#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>


char auth[] = "s74K2rPheDYVeMRZ0Dth6xsWJVmK0s33";
char ssid[] = "Redmi Note 9";
char pass[] = "shruthi04";

const int relayPin = 4;

BlynkTimer timer;

void setup()
{
  Serial.begin(9600);
  pinMode(relayPin, OUTPUT);
  digitalWrite(relayPin, LOW); // Start with the door locked
  Blynk.begin(auth, ssid, pass);
}
```

```cpp
void loop()
{
  Blynk.run();
  timer.run();
}

BLYNK_WRITE(V0) { // Virtual pin for locking the door
  int lockValue = param.asInt();
  if (lockValue == 1) {
    unlockDoor();
  } else {
    lockDoor();
  }
}

void lockDoor()
{
  Serial.println("Locking door...");
  digitalWrite(relayPin, LOW);
  delay(1000);
  Serial.println("Door locked");
}

void unlockDoor()
{
  Serial.println("Unlocking door...");
  digitalWrite(relayPin, HIGH);
  delay(1000); // Allow time for the door to unlock
  Serial.println("Door unlocked");
}
```
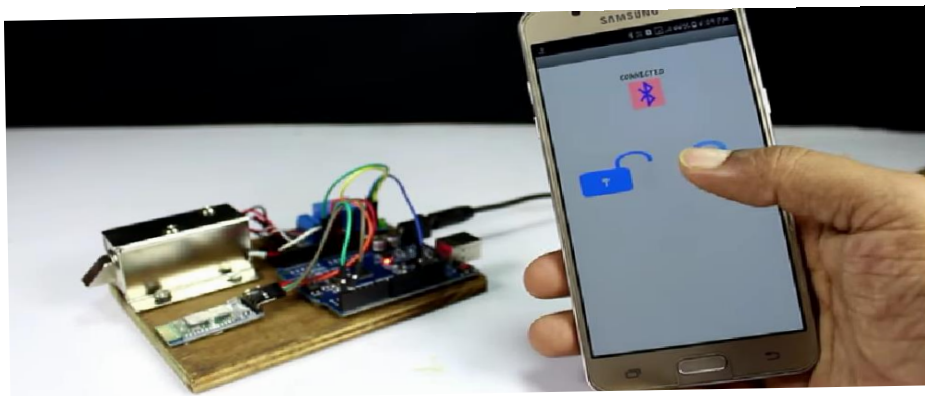
OUTPUT:

ADVANTAGES:

★ **Convenience:** Users can remotely control and monitor their door locks from anywhere using the Blynk app, eliminating the need for physical keys or manual operation.

★ **Enhanced Security:** Real-time status updates and push notifications alert users to any unauthorized access attempts or changes in door status, ensuring prompt action and enhancing overall security.

★ **Flexibility:** The system allows for access authorization, enabling users to grant temporary or permanent access to authorized individuals with ease.

★ **Affordability:** Leveraging readily available and cost-effective hardware components like the ESP32 microcontroller, solenoid lock, and relay ensures that the system remains affordable for a wide range of users.

★ **Customizability:** The Blynk app offers customization options, allowing users to tailor the user interface and functionality according to their preferences and needs.

★ **Ease of Installation:** Designed for easy setup, the system minimizes complexity and technical expertise required for installation, making it accessible to users with varying levels of technical proficiency.

★ **Compatibility:** The use of widely available components ensures compatibility with a variety of devices and operating systems, enhancing accessibility and usability.

APPLICATIONS:

The Smart Door Lock System has a wide range of applications across various sectors. Here are some notable examples:

♦ **Residential Security:** Protecting homes and apartments, providing homeowners with convenient and secure access control.

♦ **Commercial Buildings:** Enhancing security in offices, warehouses, and other commercial spaces, allowing for efficient management of employee and visitor access.

♦ **Hospitality Industry:** Managing access to hotel rooms, Airbnb properties, and vacation rentals, offering guests convenient check-in/check-out experiences while ensuring security.

- ♦ **Education Institutions:** Controlling access to classrooms, dormitories, and administrative offices, improving campus security and streamlining access management for students and staff.

- ♦ **Healthcare Facilities:** Securing access to patient rooms, laboratories, and sensitive areas within hospitals and clinics, ensuring privacy and safety of patients and medical staff.

- ♦ **Government Buildings:** Safeguarding government offices, embassies, and military installations, implementing strict access control measures to protect classified information and personnel.

- ♦ **Industrial Sites:** Securing access to factories, power plants, and manufacturing facilities, preventing unauthorized entry and ensuring worker safety.

- ♦ **Retail Stores:** Managing access to retail stores, warehouses, and storage areas, preventing theft and unauthorized access to merchandise and inventory.

FUTURE ENHANCEMENT OR SCOPE:

Future enhancements for the Smart Door Lock System could include integrating biometric authentication for added security, implementing voice control for hands-free operation, and incorporating geofencing technology for automatic door locking/unlocking based on user proximity. Additionally, advanced access control features like time-based restrictions and data analytics capabilities for access tracking and reporting could further enhance the system's functionality. Continuously improving the mobile app interface and exploring integration with home automation platforms would also be beneficial for expanding the system's usability and interoperability.

CONCLUSION:

In conclusion, the integration of a smart door lock system with the Blynk app offers a myriad of benefits, blending convenience, security, and control seamlessly into daily life. By harnessing the power of IoT technology, this innovative solution transforms traditional door locks into intelligent access control systems, providing users with unprecedented flexibility and peace of mind.

With the Blynk app, users can remotely manage and monitor their door locks from anywhere with an internet connection. Whether it's unlocking the door for a guest, receiving real-time alerts about unauthorized access attempts, or integrating with other smart home devices for automated routines, the possibilities are endless.

Furthermore, the Blynk app facilitates easy setup and customization, allowing users to tailor the smart door lock system to their specific needs and preferences. From granting temporary access codes to guests to setting up personalized routines and integrating with voice assistants, the intuitive interface empowers users to harness the full potential of their smart home ecosystem.

In essence, the smart door lock system using the Blynk app represents a paradigm shift in home security and access control. By combining cutting-edge technology with user-centric design, it delivers a seamless and intuitive user experience while enhancing the safety, convenience, and efficiency of modern living.

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