

ABSTRACT

SMART LOCK SYSTEM

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INTRODUCTION:

The proliferation of IoT (Internet of Things) technologies has led to the development of innovative solutions for enhancing security and convenience in everyday life. One such application is the Smart Door Lock System, which offers remote access and control over door locking mechanisms through a mobile application.

This paper presents the design and implementation of a Smart Door Lock System integrated with the Blynk app. The system utilizes an ESP32 microcontroller interfaced with a relay module to control the locking mechanism of the door. The Blynk app serves as the user interface, enabling users to remotely lock and unlock the door from anywhere with an internet connection.

The key components of the system include the ESP32 microcontroller, relay module, electric door strike, and the Blynk mobile application. The ESP32 microcontroller is programmed to establish a Wi-Fi connection and communicate with the Blynk cloud server. Through the Blynk app, users can authenticate themselves and send commands to the ESP32 to control the door lock status.

The system architecture ensures secure communication between the Blynk app and the ESP32 microcontroller, utilizing authentication tokens and encrypted data transmission. Additionally, the Blynk app provides features for real-time monitoring of the door lock status, sending notifications upon door lock/unlock events, and granting temporary access permissions to authorized users.

EXISTING SYSTEM:

There are several existing systems for smart door locks available on the market. These systems typically offer various features such as remote access, keyless entry, integration with smart home platforms, and multiple user access levels. Here are some examples:

1.August Smart Lock Pro: August Smart Lock Pro is a popular choice that offers keyless entry, remote access via a smartphone app, and integration with voice assistants like Amazon Alexa, Google Assistant, and Apple HomeKit. It can be installed on most existing deadbolts, making it a convenient option for retrofitting.

2.Schlage Encode Smart WiFi Deadbolt: Schlage Encode Smart WiFi Deadbolt offers built-in WiFi connectivity, allowing you to control and monitor your lock remotely without the need for an additional hub. It features keyless entry, a touchscreen keypad, and compatibility with Amazon Alexa and Google Assistant for voice control.

3.Yale Assure Lock SL: The Yale Assure Lock SL is a sleek and stylish smart lock with keyless entry via touchscreen keypad or traditional key. It supports integration with smart home platforms like Amazon Alexa, Google Assistant, and Apple HomeKit, enabling remote access and voice control.

4.Kwikset Kevo Smart Lock: Kwikset Kevo Smart Lock utilizes Bluetooth technology for keyless entry and can be controlled via a smartphone app. It offers features like eKeys for granting temporary access to guests and integration with select smart home systems.

5.Nest x Yale Lock: Developed in partnership between Nest and Yale, this smart lock integrates seamlessly with the Nest ecosystem. It offers keyless entry, remote access, and activity alerts, allowing users to monitor and control their door lock from anywhere.

6.Samsung SmartThings Hub and Locks: Samsung's SmartThings ecosystem includes smart locks that can be controlled through the SmartThings app. These locks offer features like remote access, PIN code entry, and integration with other SmartThings-compatible devices.

7.Danalock V3: Danalock offers a range of smart locks with features such as Bluetooth connectivity, remote access, and compatibility with various smart home platforms. Their locks can be controlled via smartphone apps and support features like auto-locking and unlocking.

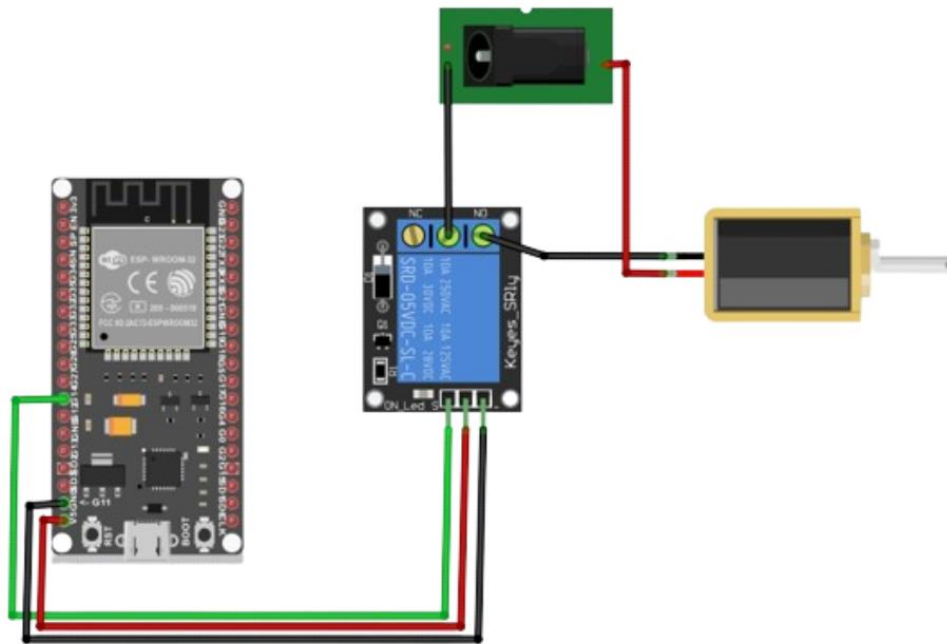
PROPOSED SYSTEM:

The proposed system for a smart door lock using the Blynk app encompasses several key components and functionalities to ensure seamless integration, enhanced security, and user-friendly operation. Here's an outline of the proposed system:

- ❖ **Smart Door Lock Hardware:** The system begins with the installation of a smart door lock equipped with IoT capabilities. This lock should be compatible with the Blynk platform, allowing for seamless communication and control via the Blynk app.
- ❖ **Blynk App Integration:** Users will download and install the Blynk app on their smartphones or tablets. The app serves as the primary interface for controlling the smart door lock, providing features such as remote locking/unlocking, access management, and real-time notifications.
- ❖ **User Authentication:** To ensure secure access to the Blynk app and the smart door lock, users will be required to authenticate themselves using login credentials or biometric authentication methods supported by their mobile devices.
- ❖ **Remote Access Control:** Through the Blynk app, users can remotely lock or unlock the door from anywhere with an internet connection. This feature provides convenience and flexibility, allowing users to grant access to guests, service providers, or family members without the need for physical keys.
- ❖ **Access Management:** The Blynk app enables users to manage access permissions by creating and distributing virtual keys or access codes to authorized individuals. Users can grant temporary or permanent access, set access schedules, and revoke access privileges as needed.
- ❖ **Real-time Notifications:** The smart door lock system sends real-time notifications to users' smartphones whenever the door is locked, unlocked, or if there are any unauthorized access attempts. This feature enhances security and provides users with peace of mind, especially when they're away from home.
- ❖ **Data Security and Privacy:** The proposed system prioritizes data security and privacy, implementing encryption protocols and secure authentication mechanisms to safeguard sensitive information transmitted between the Blynk app and the smart door lock.
- ❖ **Scalability and Expandability:** The smart door lock system using the Blynk app is designed to be scalable and expandable, accommodating future upgrades, additional

features, and integration with emerging technologies to meet evolving user needs and preferences.

BLOCK DIAGRAM:



Explanation:

- 1) **ESP32:** The ESP32 microcontroller acts as the main control unit of the system. It handles the logic and processing of commands for the smart door lock.
- 2) **Relay:** The relay is controlled by the ESP32. It serves as an interface between the low-voltage signals from the ESP32 and the high-voltage 12V solenoid. The relay switches the high-voltage current on and off based on the commands from the ESP32.
- 3) **Solenoid:** The solenoid lock is the physical mechanism that locks or unlocks the door. It is powered by the 12V battery and is controlled through the relay.
- 4) **12V Battery:** The 12V battery serves as the power source for both the solenoid and the relay. It provides the necessary voltage to operate the solenoid lock and drive the relay.

CONNECTIONS:

Here are the connections for the smart door lock system ,

ESP32 Connections:

- Connect GPIO pins of ESP32 to the control pins of the relay module. These pins will be used to control the relay.
- Connect the ESP32 to a power source, usually through a voltage regulator if required.

Relay Connections:

- The relay module typically consists of input pins (control pins) and output pins (relay switches).
- Connect the control pins of the relay module to the GPIO pins of the ESP32.
- Connect one terminal of the relay switch (output pin) to the positive terminal of the 12V battery.
- Connect the other terminal of the relay switch (output pin) to one terminal of the solenoid lock.

12V Solenoid Connections:

- Connect the other terminal of the solenoid lock to the ground (negative terminal) of the 12V battery.

Battery Connections:

- Connect the positive terminal of the 12V battery to the power input of the relay module.
- Connect the negative terminal of the 12V battery to the ground (GND) of the ESP32 and the ground terminal of the relay module.

APPLICATIONS:

A smart door lock system using the Blynk app can offer convenience, security, and remote control capabilities. Here are some potential applications for such a system:

- **Home Security:** Control access to your home remotely, allowing you to lock and unlock your door from anywhere using your smartphone. You can receive

notifications whenever the door is opened, providing peace of mind when you're away.

- **Guest Access:** Grant temporary access codes to guests, service providers, or Airbnb guests. These codes can be set to expire after a certain period, ensuring that access is only granted when needed.
- **Integration with Home Automation:** Integrate your smart door lock with other smart home devices, such as lights, thermostats, or security cameras. For example, you can set up a "Goodnight" routine that locks the door, turns off the lights, and adjusts the thermostat with a single tap in the Blynk app.
- **Keyless Entry for Family Members:** Each family member can have their own unique access code, eliminating the need for physical keys and providing a convenient way to enter the home.
- **Remote Monitoring:** Check the status of your door lock remotely, ensuring that it's properly locked when you're away from home. If you forget to lock the door, you can do so remotely using the Blynk app.
- **Activity Logs:** Keep track of who enters and exits your home by reviewing the activity logs in the Blynk app. This can be useful for security purposes or for monitoring the comings and goings of family members.
- **Emergency Access:** In case of an emergency, you can remotely unlock the door for authorized individuals, such as neighbors or emergency responders, using the Blynk app.
- **Integration with Voice Assistants:** If your smart door lock system supports it, you can integrate it with voice assistants like Amazon Alexa or Google Assistant. This allows you to lock or unlock your door using voice commands through the Blynk app.
- **Vacation Mode:** Set your smart door lock to vacation mode when you're away for an extended period. This can automatically adjust access permissions and notify you of any suspicious activity.
- **Energy Savings:** By integrating your smart door lock with other home automation devices, you can optimize energy usage based on whether anyone is home or not. For example, you can automatically adjust the thermostat when the door is locked or unlocked.

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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