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SMART DOOR LOCKING SYSTEM

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Abstract: The Smart Door Locking System is an innovative security solution to enhance safety and user convenience. By utilizing Internet of Things (IoT) technology, and mobile app controls, this system provides an advanced method for accessing doors. Users can unlock doors via smartphones, RFID tag removing the need for traditional keys. Features include time-based access control, real-time notifications for unauthorized entry attempts, and the ability to remotely lock or unlock doors. The system can also be integrated with other smart home devices, creating a fully automated and secure home environment. This system effectively addresses the limitations of traditional locking mechanisms while offering a modern, secure, and user-friendly alternative for residential, office, and commercial spaces.

Keywords: (Smart Door Locking System, ESP32, Arduino IDE, RFID Scanner, Servo Motor, Buzzer, LCD Display, Jumper Wires, Power Bank)

I. INTRODUCTION

The Smart Door Locking System offers a modern approach to securing spaces by replacing traditional keys with advanced technology. This system integrates various technologies, including the Internet of Things (IoT), and RFID (Radio Frequency Identification), to enable keyless and secure entry. The system relies on a ESP32 microcontroller, which is programmed using the Arduino IDE to manage components like the RFID scanner. Access is strictly controlled and granted only to authorized users through RFID tags for identification.

With the rise of smart home solutions, the demand for effective and reliable security systems continues to grow. This smart lock system provides a more secure and convenient alternative to conventional locks by allowing remote access and control over door mechanisms. It improves security by mitigating risks such as key loss or duplication and allows users to monitor and control access in real time. Through IoT integration, this system offers a seamless, modern solution for safeguarding homes, offices, and commercial premises.

Door Locking Violation: Door locking violations occur when unauthorized access attempts are made, bypassing security features like RFID and Mobile Accessing. These violations can trigger alerts, signaling potential security breaches or tampering with the system.

II. ARCHITECTURE

The Smart Door Locking System is designed with a structured integration of hardware, communication, and security features. The hardware layer consists of key components such as the ESP32, which acts as the central controller, an RFID scanner for user authentication, a servo motor to control the locking mechanism, and a buzzer that provides alerts for unauthorized access and status notifications on LCD. A Wi-Fi module (ESP32) for remote connectivity, and a power supply to ensure stable operation.

The communication layer enables data exchange between the system and remote interfaces through Wi-Fi connectivity, allowing users to control the lock via a mobile application.

The application layer provides user interaction and control, featuring a mobile application for remote access, real-time monitoring, and system configuration. It includes time-based access control, which allows entry only authorized cards. It provides notifications, and buzzer alerts to inform users about unauthorized attempts or security breaches.

Additionally, the system can integrate with Blynk mobile application to enhance convenience and security, creating a fully connected and intelligent home environment.

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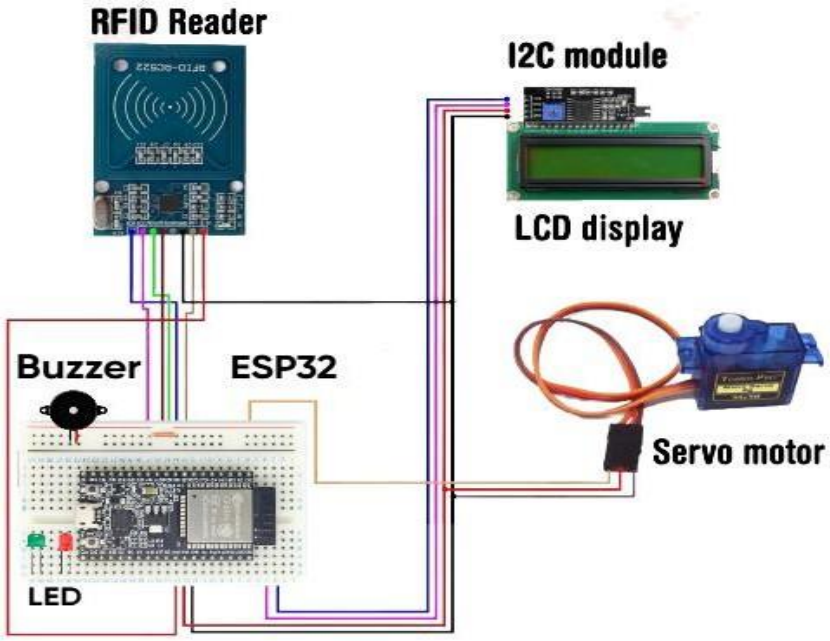

Figure 1

III. IMPLEMENTATION

The implementation of the Smart Door Locking System using RFID and Blynk involves a combination of hardware and software components to enable secure and remote access control. The system utilizes an RFID module (MFRC522) to authenticate users through RFID tags or cards, eliminating the need for traditional keys. An ESP32 processes authentication data and controls an Servo motor to lock to grant or deny access. The system is integrated with Blynk, a cloud-based IoT platform, allowing users to monitor and control the door lock remotely through a mobile application. The Blynk app provides real-time notifications of entry events, logs access history, and enables remote unlocking and locking via Wi-Fi. To enhance security, encrypted communication is used between the microcontroller and the Blynk server. The system is designed for residential and commercial applications, ensuring convenience and improved security while minimizing the risks associated with traditional locking mechanisms.

A. MICROCONTROLLER

Acts as the brain of the system, processing input signals and controlling output actions such as locking or unlocking the door.

B. RFID SCANNER

The RFID Scanner is used to verify the identity of authorized users. The RFID scanner reads RFID tags.

C. LOCK MECHANISM

A physical locking mechanism controlled by a microcontroller lock and unlocks the door based on an authentication process.

D. USER INTERFACE (MOBILE/PC APP)

Allows users to interact with the system, controlling access remotely and receiving real-time notifications.

E. COMMUNICATION MODULE (WI-FI)

Enables communication between the system components, allowing remote access and control via the internet or local networks.

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F. POWER SUPPLY (BATTERIES AND POWER BANK)

The smart door lock system is powered by batteries for portability and backup. Additionally, a power bank can be used to provide a continuous power supply, ensuring uninterrupted operation even during power outages.

G. ARDUINO IDE

The integrated development environment used to program and configured the ESP32 microcontroller, making it the central controller for the system's operations.

H. BUZZER

An alert device that alerts for unauthorized access, and confirms lock actions.

I. LED

Led Indication for card verification and alert.

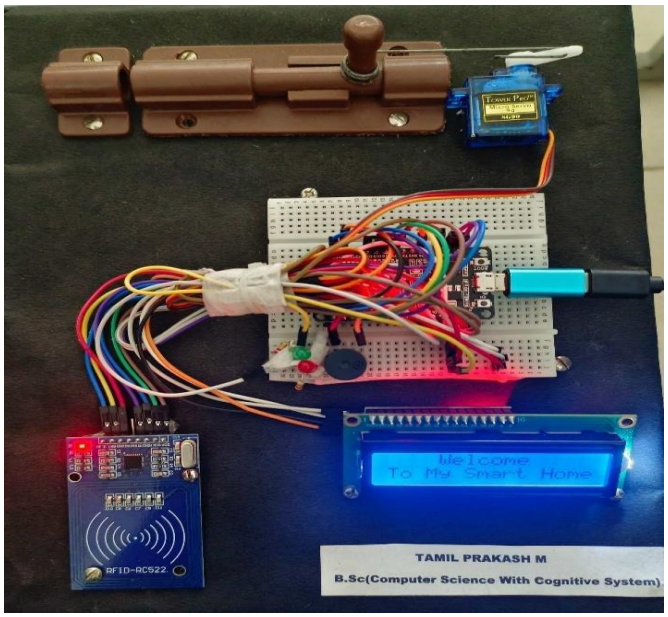

Figure 2

IV. CONCLUSION

The RFID-based Smart Door Locking System, integrated with the Blynk IoT platform, offers a secure, efficient, and user-friendly approach to access control. By leveraging RFID technology, users can authenticate themselves swiftly and without physical keys, reducing the risks associated with lost or duplicated keys. The Blynk platform enables remote access management, allowing users to lock or unlock doors from any location while receiving instant notifications about access events. This enhances both security and convenience, making it a suitable solution for residential, office, and commercial use. With encrypted communication and cloud-based data storage, the system ensures safe and reliable access control. By overcoming the limitations of traditional locks, this smart locking mechanism provides a modern and connected security solution.

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