

The background of the slide is a light gray with various abstract, three-dimensional geometric shapes scattered across it. These shapes include cubes, spheres, cylinders, cones, and rings, all rendered in a light gray color with soft shadows, giving them a floating appearance. The title text is centered over these shapes.

Smart Door Lock System

Jeffrey Hamlin V (210701094)

Harini V (210701071)

Abstract

The Smart Door Lock System integrates IoT technology to enhance security and convenience in residential and commercial settings. Utilizing smart locks, sensors, and a central control unit, users can remotely monitor and manage access via smartphone apps or web interfaces, eliminating the need for physical keys. Key features include real-time notifications, customizable access privileges, and remote access control. Advanced security measures like encryption and multi-factor authentication ensure protection against unauthorized access. Additionally, data analytics and machine learning adapt the system to user behaviors, enhancing both security and user experience. Overall, it provides improved security, convenience, and flexibility for diverse applications.





Introduction

Smart Door Lock Systems, propelled by IoT technology, redefine traditional security methods by offering advanced authentication and remote access capabilities. Utilizing digital authentication like biometrics and mobile apps, they eliminate the need for physical keys, enhancing security and convenience for residential and commercial users alike. These systems integrate seamlessly with other smart home devices, creating comprehensive security ecosystems and setting a new standard for modern door security.

By leveraging biometric authentication and IoT connectivity, Smart Door Lock Systems offer unparalleled security and convenience. They replace traditional keys with digital authentication methods, streamlining access control and bolstering security measures. Interconnectivity with other smart home devices ensures a holistic approach to security, positioning these systems as essential components in modern living and workspace security paradigms.

Literature Survey.

- The paper [1] describes as Internet of Things (IoT) technology has advanced, it is now used in practically every element of human existence to improve quality of life. One of the areas that has been greatly touched by the Internet of Things' rapid development is the lock system, which can be controlled by a device or by entering a password to open or close. Since the door is the focal point of the smart home concept, talking about door lock systems becomes fascinating. The paper offers an efficient lock system design that can be used to operate doors without the need for a control to open or close them.
- [2] focuses on IoT has becoming a focal point across various research domains, revolutionizing modern automation and simplifying daily life. Our project, Smart Doors, represents a small yet significant contribution to this transformative landscape. By leveraging IoT technology, our system facilitates seamless door access for users within a specific range. Through the integration of Android software and Bluetooth communication, users can remotely manage door locks using their smartphones, eliminating the need for physical keys and streamlining access control. This project encompasses both software and hardware development, aiming to enhance convenience and security while minimizing the hassle associated with traditional key management.
- This paper [3] presents the development of a biometric authentication-based smart IoT door lock system tailored for the paradigm of smart cities. The system leverages face recognition for access authorization, with an additional provision for passcode-based authentication. By eliminating the need for physical keys or RFID cards, the system enhances user convenience. Furthermore, it includes an email and app-based notification system to collect data and provide real-time alerts and updates to the end user, thereby ensuring security and peace of mind.



Problem Statement

In a rapidly evolving technological landscape characterized by the Internet of Things (IoT), traditional door lock systems face challenges in meeting the increasingly sophisticated security needs of residential and commercial environments. Conventional locks, reliant on physical keys, lack the flexibility, accessibility, and advanced security features demanded by modern users. Therefore, there arises a pressing need to develop a Smart Door Lock System leveraging IoT capabilities to address these shortcomings and provide enhanced security, convenience, and accessibility.

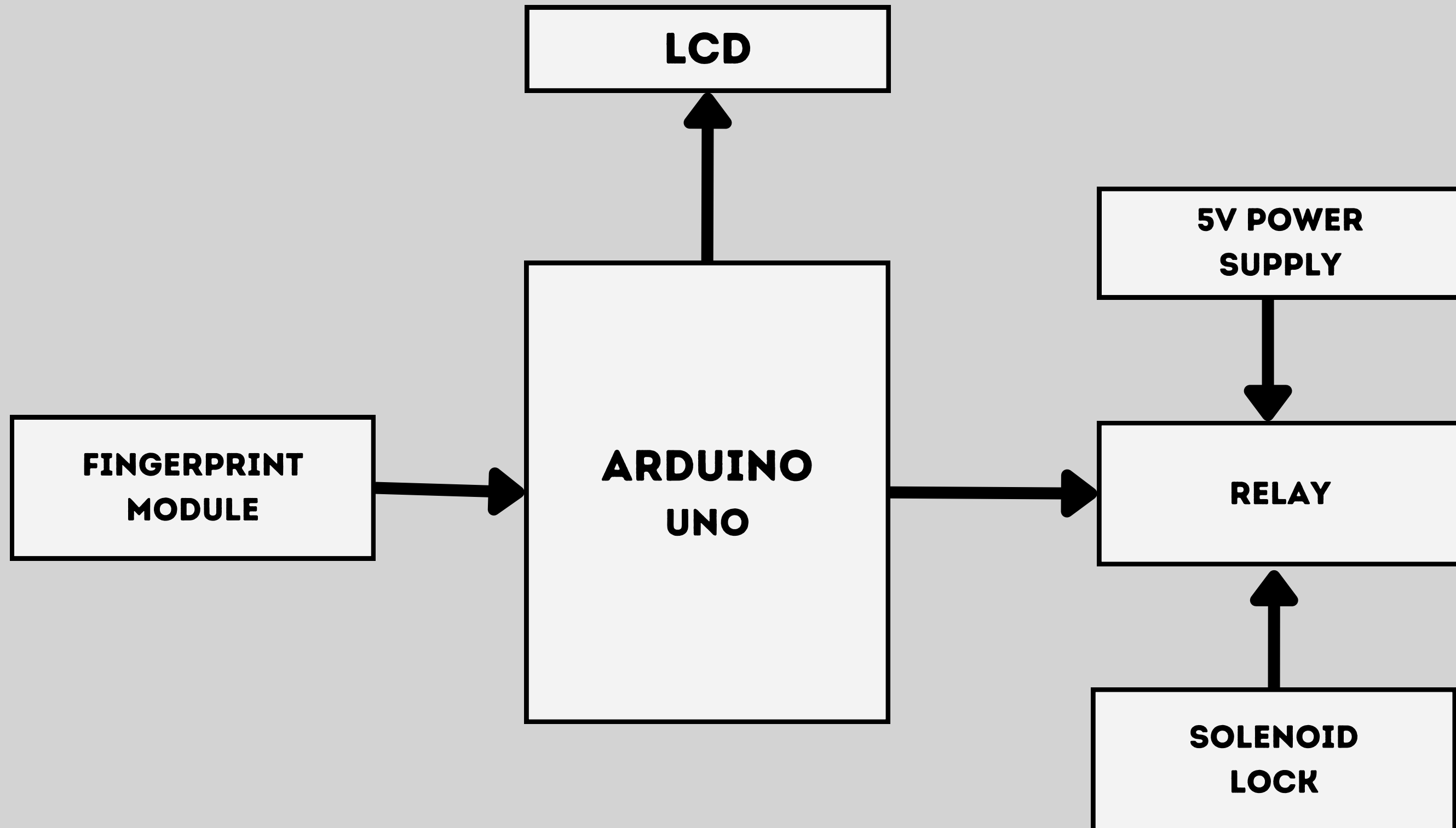
This project aims to design and implement a Smart Door Lock System that integrates IoT technology to revolutionize traditional door security. The system will employ IoT-enabled devices such as smart locks, sensors, controllers, and mobile applications to enable remote monitoring, access control, and authentication. By harnessing the power of connectivity and automation, the Smart Door Lock System will offer users seamless access control, real-time monitoring, and advanced security features, thereby addressing the limitations of conventional door lock systems.



Proposed Work

The Smart Door Lock IoT project utilizes Arduino microcontroller technology and biometric scanning capabilities to revolutionize traditional door security. At its core, the system employs biometric sensors, such as fingerprint scanners or facial recognition modules, interfaced with Arduino boards to authenticate users securely. Upon user verification, the Arduino microcontroller triggers actuators controlling the locking/unlocking mechanisms of the door. Additionally, the system integrates IoT principles to enable remote access and control via a mobile application or web interface. Users can remotely monitor door status, authenticate themselves using biometric scans, and grant access to authorized individuals from anywhere with an internet connection. Robust security measures, including encryption of communication channels and secure storage of biometric data, safeguard the system against unauthorized access or tampering. Through thorough testing and validation, the system ensures reliability, performance, and adherence to stringent security standards, ultimately providing users with a seamless, secure, and convenient door access solution for residential and commercial applications.

System Architecture



Methodology, Results & Discussions

The development of a biometric authentication-based smart IoT door lock system tailored for the paradigm of smart cities involved several key steps. Firstly, fingerprint recognition technology was integrated to enable user authentication, achieved through implementing algorithms for fingerprint scanning and verification. In parallel, a passcode-based authentication method was incorporated, providing users with an alternative means of access through a keypad interface. Hardware development encompassed assembling components such as the fingerprint scanner, keypad interface, locking mechanism, and IoT connectivity module. On the software front, firmware for the microcontroller, user interface for configuring access settings, and algorithms for fingerprint recognition and passcode validation were developed.

The discussion section explores the project's core aspects, focusing on authentication methods, security considerations, user experience, and integration with smart city infrastructure. By comparing biometric (fingerprint) authentication with passcode-based methods, the discussion evaluates their effectiveness in balancing security and user convenience. Addressing security concerns, the section proposes measures to mitigate vulnerabilities like spoofing or brute force attacks. Furthermore, it examines user acceptance factors and the system's potential role within broader smart city frameworks, envisioning its integration with surveillance systems and emergency response protocols to enhance urban safety and efficiency. Overall, the discussion underscores the project's contributions to advancing secure and user-friendly access control solutions within the context of smart city initiatives.



Conclusion

In conclusion, the development of the biometric authentication-based smart IoT door lock system represents a significant step forward in enhancing security and convenience within smart city environments. By integrating fingerprint recognition technology alongside passcode-based authentication, the system offers a robust and user-friendly means of access control. Through rigorous evaluation of security measures and considerations, potential vulnerabilities have been identified and addressed, ensuring the system's resilience against unauthorized access attempts. Moreover, the project emphasizes the importance of user acceptance and experience, aiming to streamline access processes while maintaining high levels of security. Looking ahead, the system holds great potential for integration with broader smart city infrastructure, contributing to the creation of safer and more efficient urban environments.

