Biometric Fingerprint and Keypad-Based Security System for Enhanced Door Lock Access Control

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ABSTRACT

The main aim of this project is to develop and implement a security system for door locks utilizing fingerprint and keypad technology. This exercise can be performed indoors, particularly in businesses and homes. Only verified and authenticated individuals are permitted to access the documents or funds from the lockers in this system. This security system features a dual authentication technique employing fingerprint recognition and a keypad. In this system, the initial individual registers their fingerprint by employing the switch enrollment and switch identification capabilities. Upon a fingerprint match, a four-digit code will be sent to the mobile application for the individual to input into the LCD via a keypad detecting system. Upon approval of the individual, the ARDUINO UNO microcontroller will facilitate the opening of the door. Upon matching the ID. Subsequently, a sequence of four-digit codes will be sent to the specified individual's mobile application to facilitate access. This system can produce a log that documents the check-in and check-out activities of each user. The fingerprint-based door locking system is an enhancement over the traditional key-operated door locking system. Individuals with expertise in keys can easily replicate and fabricate them. Moreover, it is essential to meticulously keep and secure the keys, as they can often be misplaced or lost due to carelessness. A biometric fingerprint door locking system is offered to resolve these issues. The fingerprint-authenticated door locking mechanism is secure and user-friendly, necessitating minimal maintenance. The controller activates the motor driver to disengage the door and permit entry to approved users. Unauthorized clients cannot access the locker door.

Key Words: Fingerprint Sensor, Keypad, Arduino UNO, LCD, Buzzer, IoT Module

1. INTRODUCTION

The fingerprint-based Door locker system is an improvement over the conventional Door locker system that relies on keys. Thieves with knowledge of keys can now effortlessly duplicate and create them. Furthermore, it is imperative to properly maintain and safeguard the keys, as they can also be misplaced or lost as a result of negligence. A biometric door lock system that uses fingerprints is available to address these problems. The fingerprint-authenticated door locker system is both secure and user-friendly, requiring minimal maintenance. The system utilizes fingerprint detection technology to scan and save registered fingerprints in the Door locker record. Next time a person scans their finger, the sensor will read it and compare it with previous records. Once a match is detected with the existing fingerprints, a signal is sent to the micro-controller. If the fingerprint identification is correct, the controller will transmit a four-digit code and show this information on the LCD.

Additionally, the controller operates the driving motor to initiate the opening of the Door exclusively for authorized consumers.

Unauthorized clients are unable to open the locker door. In reality, individuals prioritize the security of their valued possessions such as currency, vital records, and so on. The door lockers provide the highest level of security for storing items. Fast-evolving technologies enable customers to implement high-security systems using electronic identification alternatives. The identification technologies encompass many systems such as Door Lockers, ATMs, intelligent cards, user IDs, password-based systems, and more. However, regrettably, these systems lack protection against hacker attacks, theft, and instances of forgotten passwords. We are deploying a Door locker security system that utilizes fingerprint and password authentication, offering a more efficient and dependable security solution compared to older systems. In this fast-paced and competitive environment, ensuring security for one's personal belongings manually is a challenge that humans struggle to address. Instead, he discovers a solution that can offer comprehensive security as well as automation. In the pervasive network society, where individuals may readily get their information at any time and from any location, people are also confronted with the peril that others can effortlessly retrieve the same information at any time and from any location. At present, personal identification relies on the use of passwords, 4-digit Personal Identification Numbers (PINs), or identification.

Nevertheless, cards are susceptible to theft, while passwords and numbers are vulnerable to being guessed or forgotten. In this fast-paced and competitive world, ensuring security for one's personal belongings is a top priority. However, humans often struggle to find manual methods to achieve this. Instead, he discovers a solution that can offer comprehensive security as well as automation. In the pervasive networked world, where individuals may effortlessly retrieve their information at any time and from any location, they are also confronted with the vulnerability that others can readily access the same information at any time and from any place.

Theft is a significant concern in today's society, particularly in locations such as offices and other public areas. It is crucial to ensure the protection of our documents and valuable items. Therefore, we have chosen to develop a highly functional security system that will be accessible to all individuals. By means of the project, we can provide users a high level of security. In addition, there is a password that the user must provide to the Door before entering the locker room. If the user misplaces the key, it poses a significant security threat. There are numerous individuals with criminal intent in our vicinity who possess the ability to either skilfully or aggressively breach our lockers, resulting in potential loss of our belongings. To address this issue, we are developing a security system. A significant number of door lockers fail to ensure complete user safety. The fingerprint door locker system We have the capability to effortlessly incorporate multiple fingerprints into the system, allowing us to include the fingerprints of our family members as nominees. In the event of an accident resulting in a finger injury or cut, it is possible to utilize an alternative fingerprint, such as a nominated fingerprint or a fingerprint from another hand. If we are not at home and we need immediate access to important documents or belongings, our family members can also utilize our lockers. This approach is quite distinctive as an alternative to retaining keys or safeguarding them. Biometric devices are advanced, highly secure gadgets used for identification and authentication purposes.

2. PROPOSED SYSTEM

- LCD Display and Buzzer Feedback: The system communicates with the user through an LCD display, providing feedback and instructions. It also employs an integrated buzzer for audible acknowledgement during authentication attempts.

- Android Application is used for the identification of the fingerprint and generates the four-digit PIN if the fingerprint is authorized.

- DC Motor-Driven Locking Mechanism: The system ensures secure door access through an efficient and reliable DC motor-driven locking mechanism, allowing access only to authorized users.

- Smart Door locks are electromechanical devices that provide a locking and unlocking mechanism, often supplemental to a traditional lock. The password-enabled door-locking system can be used for households, offices etc. This system demonstrates a Password-based Door Lock System using Arduino, wherein once the correct code or password is entered, the door is unlocked.
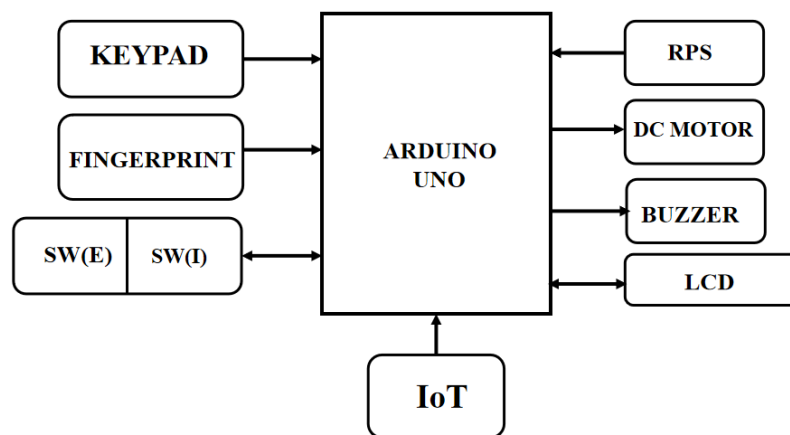

Figure 1: Block Diagram

3.2 WORKING

In the project, the Two-step authorization is done by using fingerprint and keypad technology. The Regulated Power Supply (RPS) is the main power supply to the whole circuit. Fingerprint is used for the fingerprint recognition of the finger of the person. The keypad is used to enter the four-digit code to enter which is visible on the LCD screen. The Liquid Crystal Display (LCD) is the main block of the circuit which displays every single moment of the whole device. The SW(E) and SW(I) is used for Switch Enrolment of the Fingerprint and the Switch Identification is for the identifying of the finger after enrolment. And the Buzzer is the device which makes a Buzz sound when any Unauthorized access tries to Authenticate. IoT module is the WiFi module which makes the whole device work through the mobile application. And the Arduino UNO which is the Micro-controller used for interfacing of Hardware and Software tool.

4. CONCLUSION

To conclude, the Project of Two-step Authorized Smart Door Lock System using IoT is a significant advancement in ensuring the safety and efficiency on any of Our assets. As, in today's world theft of our assets and any valuable things or any authorization of unauthorized persons for any permission to enter home or offices are becoming very unsatisfactorily. So to overcome these problems the device two-step authorized smart door lock system which is based on fingerprint and keypad technology which will always be secure. And this is also based upon an Android Application which makes the WIFI connection between Mobile and IOT device which is used to send messages of Four-digit Code and Wrong Authorization of Unauthorized access to the mobile application. This proactive approach allows for only authorized users whose fingerprints are previously enrolled.

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