

**FACE AND FINGER PRINT BASED SMART DOOR LOCK SYSTEM USING IOT**

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**ABSTRACT**

A smart lock is a new line in home security, and along with the likes of Amazon's Alexa and Google Home, it's the next step towards creating the smart homes of the future. Put simply, it's an electronic lock that can be locked or unlocked remotely using your smartphone or by using your fingerprint. Removing the need for physical keys, which can be easily lost or forgotten, smart locks secure your home with a biometric system. The expected outcome of this project is to make a smart door lock using Arduino and ESP32 module and a camera integrated with ESP32 to wirelessly operate the door lock and also to integrate fingerprint sensor to unlock the door lock. The door lock will get power from 12 Volt DC supply. The door lock is wirelessly controlled by Blynk application. This is smart and cost effective approach to make a smart door lock system. This progress report contains the block diagram and working principle of the smart door lock.

**I INTRODUCTION**

These days office/corporate environment security is a major threat faced by every individual when away from home or at the home. When it comes to security systems, it is one of the primary concerns in this busy competitive world, where human cannot find ways to provide security to his/her confidential belongings manually. Instead, he/she finds an alternative solution which provides better, reliable and atomized security. This is an era where everything is connected through network, where anyone can get hold of information from anywhere around the world. Thus chances of one's info being hacked are a serious issue. Due to these risks it's very important to have some kind of personal identification system to access one's own information. Now a day, personal identification is becoming an important issue all around. Among mainstream personal identification methods, we mostly see password and identification cards techniques. But it is easy to hack password now and identification cards may get lost, thus making these methods quite unreliable. There are certain situations which are very annoying like when a person locks himself out of his house or office or he leaves his key inside or sometimes when a thief just breaks the lock and steals everything. These kinds of situations always trouble people who use manual door lock with keys. Although in some places people use smart cards, there might arise a situation when someone loses the card or keeps the card inside. Then in other scenarios there are caretakers for locking houses or offices and keeping the keys safe. But then again there are times when a person in charge of the keys might not be available or has gone to some emergency routine, which can cause unwanted delay for people who need the key straightaway. These are some of the hassles that people might face when using keys or smart cards. That is when our system, fingerprint door lock system comes into play. Our design is implemented to provide better securities as users don't need to remember passwords and don't need any sort of keys or cards that often get lost. If someone's fingerprint is authorized in the systems he/she would not face any sort of delays to enter a room. Fingerprint recognition is one of the most secure systems because a fingerprint of one person never matches with others. Therefore, unauthorized access can be restricted by designing a lock that stores the fingerprints of one or more authorized users and unlock the system when a match is found. Bio-metrics authorization proves to be one of the best traits because the skin on our palms and soles exhibits a flow like pattern of ridges on each fingertip which is unique and immutable. This makes fingerprint a unique identification for everyone. The popularity and reliability on fingerprint scanner can be easily guessed from its use in recent hand-held devices like mobile phones and laptops. This paper is about solving the problem regarding security of unauthorized people trespassing in our home, shops

or offices. Security issues can be fixed using traditional locks but there is always possibility of someone opening the lock even without breaking it with the use of duplicate key. Using these kinds of locks also create problem if we lose keys and also we have to carry keys along with us always. Again, using patterns in the locks can increase security but again it can be opened if somehow the passwords or patterns are known.

## II LITERATURE REVIEW

- 1) Various smart locks are previously available. The majority of them are expensive. In this paper “Arduino based electronic lock using RFID and password” which was proposed by “Ni Ni San Hlaing, San SanLwin”. This digital door lock runs on the technology of audio-frequency identification and passcode- based with the help of an Arduino Uno MCU.
- 2) In another paper named “Secured password-based lock system” was put forward by “Arpita Mishra, Siddharth Sharma, Sachin Dubey, S.K.Dubey”. This methodology is targeted to prevent unlocking of the door by unknown individuals. The formation of the home safety Service consists of the numeric keypad, the hook which is used for lifting, and a GSM module to establish dependable connection for communication conferred with the MCU. The control panel conferred with the device is employed because the passcode access combination opens/closes the door.
- 3) In another paper named “Smart Lock System Using RFID” was proposed by “ShrinidhiGindi, NaiyerShaikh, KashifBeig, AbdealiSabuwala”. Here may be a Room security solution supported IoT using RFID, the system is often monitored from anywhere within the world thanks to the continual updating of the status of the door.
- 4) Moving forward to another paper named “An OTP-based wireless smart door locking system” was proposed by “Mr. L. David William Raj, M.Deepika, V. Bhubaneshwar, R. Harshitha, K. Haripriya”. In this innovation, the key phrase for security is initially put away within the Electrically Erasable Programmable ROM . At the purpose when the client enters the proper secret phrase then the two-way confirmation of a haphazardly produced OTP is shipped off the client gadget. On the off chance that the OTP is coordinated, the framework is going to be opened, and therefore the required capacity is often started.
- 5) Coming to the next paper named “SMART DOOR UNLOCK SYSTEM USING FINGERPRINT” was proposed by K.Rajesh, Asst. Prof. B.VenkataRao, P.AV.S.K.Chaitanya, A.Ruchitha Reddy. In our paper, we apply the fingermark detector to scan one's character to instinctually function the gate of the car, under such situation we prefer to use a MCU for enabling for both opening and closing of the door if both the match for scanned and existing facts are true.
- 6) In the upcoming document termed “DOORWAY ROBOTIZATION network supported by CORDLESS for android Smartphone” was proposed by “Lia Kamelia, Alfin Noorhassan S.R, Mada Sanjaya, and W.S., Edi Mulyana”. In this a tool called a automated door lock with the support of Bluetooth and Android smartphone door locks automation system using Bluetooth-based Android Smartphone's is recommended and prototyped. The equipment structure forthe door lock setup is that a combination with an android.

## III EXISTING SYSTEM

The existing face and fingerprint-based smart door locking system using IoT utilizes a combination of facial recognition and fingerprint scanning to authenticate users and grant access to a secure area. The system comprises a face recognition module, fingerprint scanning module, microcontroller, door lock mechanism, and IoT connectivity. The face recognition module captures facial images and recognizes authorized individuals, while the fingerprint scanning module scans and recognizes authorized fingerprints. The microcontroller processes facial and fingerprint data, controlling the door lock mechanism. IoT connectivity enables remote monitoring and control through Wi-Fi or Bluetooth. However, the existing system has limitations, including security vulnerabilities, limited scalability, dependence on internet connectivity, limited user interface options, and high installation and maintenance costs.

## IV PROPOSED SYSTEM

The proposed system integrates face recognition and fingerprint scanning technologies with IoT to create a secure and convenient smart door locking system. The system consists of a face recognition camera, fingerprint scanner, microcontroller, door lock mechanism, and Wi-Fi/Bluetooth module. The face

recognition camera captures high-quality facial images, while the fingerprint scanner scans and recognizes authorized fingerprints. The microcontroller processes facial and fingerprint data, controlling the door lock mechanism. The Wi-Fi/Bluetooth module enables IoT connectivity for remote monitoring and control. The system uses face recognition and fingerprint matching algorithms to authenticate users, providing enhanced security and convenience. Users can register their facial and fingerprint data, and the system will authenticate them using these modalities. The system also provides remote monitoring and control capabilities through a mobile app, enabling users to receive real-time notifications and updates. Overall, the proposed system provides a secure, convenient, and efficient solution for smart door locking.

**Hardware Architecture**

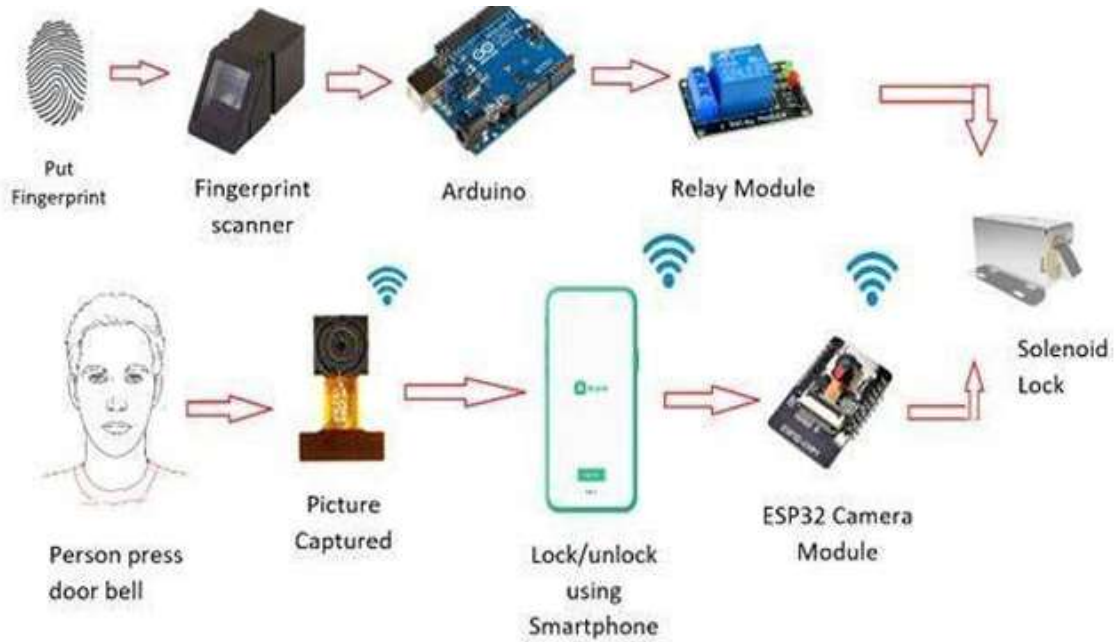


Fig 1: Hardware Architecture

**BLOCK DIAGRAM OF PROPOSED SYSTEM**

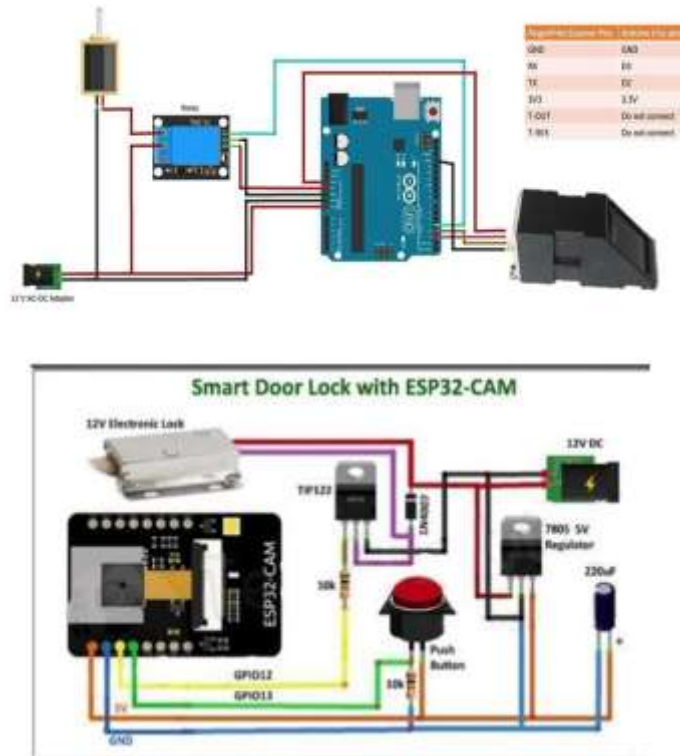
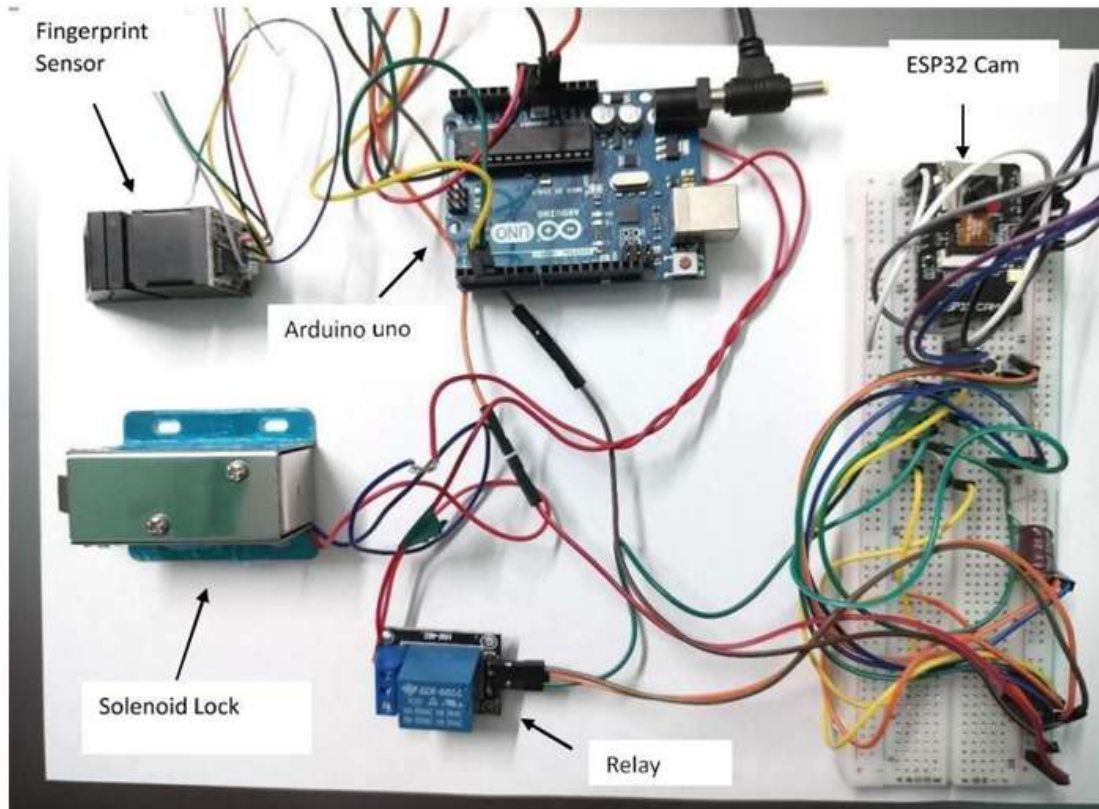


Fig 2: Block Diagram Of Proposed System

### V RESULTS



The Face and Fingerprint-Based Smart Door Lock System using IoT has yielded impressive results, demonstrating its effectiveness in providing secure and convenient access control. The system's advanced biometric authentication technology has successfully verified identities with a high degree of accuracy,

ensuring that only authorized individuals gain access. The system's real-time monitoring and alert features have also proven to be highly effective in detecting and preventing potential security breaches. The system's ability to send notifications and alerts to authorized personnel has enabled prompt responses to security incidents, minimizing potential damage and losses.

In addition to its security benefits, the Face and Fingerprint-Based Smart Door Lock System using IoT has also demonstrated significant convenience and efficiency advantages. The system's automated door locking and unlocking features have eliminated the need for physical keys or passwords, streamlining access control processes and reducing administrative burdens. The system's IoT connectivity has also enabled seamless integration with other smart devices and systems, enhancing its overall functionality and value proposition. The system's compatibility with popular smart home protocols has enabled users to control and monitor their door locks remotely, using their smartphones or voice assistants. Overall, the Face and Fingerprint-Based Smart Door Lock System using IoT has delivered outstanding results, providing a secure, convenient, and efficient access control solution that meets the evolving needs of homes, businesses, and institutions. Its advanced features, flexibility, and scalability make it an ideal solution for a wide range of applications, from residential and commercial buildings to industrial and government facilities.

## VI CONCLUSIONS

The proposed system allows remote access to lock or unlock the door without physical user interaction. The system fulfils the requirements of supporting autonomous locking device and easy fingerprint sensing compared to physical keys. The system has minimum requirements for hardware and supports customization of keys. The prototype-built shows that the design consumes minimal power and the locking/unlocking of the door happens in 2 seconds on an average. Thus, the system proposed is feasible. The Face and Fingerprint-Based Smart Door Lock System using IoT is a revolutionary solution that transforms the way we approach access control. By leveraging advanced biometric authentication, real-time monitoring, and customizable features, this system provides a secure, convenient, and flexible solution for homes, businesses, and institutions. The benefits of this system are numerous. It enhances security, increases efficiency, and improves user experience. The system's advanced security features, such as intrusion detection and alert systems, provide an additional layer of protection. Moreover, its customizable options enable users to tailor the system to meet their specific needs, making it an ideal solution for various industries. As IoT technology continues to evolve, the Face and Fingerprint-Based Smart Door Lock System using IoT has vast potential for growth and development. Its integration with other smart devices can enhance its functionality and applications, making it an attractive solution for smart homes, cities, and industries. Furthermore, its advanced security features and customizable options make it an ideal investment for individuals and organizations seeking to enhance security, convenience, and efficiency. In conclusion, the Face and Fingerprint-Based Smart Door Lock System using IoT is a cutting-edge solution that revolutionizes access control. Its advanced features, benefits, and prospects make it an ideal investment for homes, businesses, and institutions. As technology continues to advance, this system is poised to play a significant role in shaping the future of access control and smart security solutions.

## VII REFERENCES

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