

# Fingerprint Bank Lock with Image Capture

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**Abstract:** *The fingerprint based bank locker system is an enhancement to the traditional bank locker system that uses keys. Now keys can easily be copied and made by thieves who know about it. Also the keys must be taken care of and can also be lost due to some negligence. Well fingerprint based bank locker system is here to solve all these issues. The fingerprinted authenticated bank locker system is safe as well as easy to use and maintain. No key handling no need to worry about key getting lost. The system uses fingerprint sensing to read fingerprints and first store registered fingerprints against the bank locker record. Now next time a person scans finger the sensor reads it and compares it with past records. Now if a match is found with existing prints, it sends the match signal to the microcontroller and the controller displays this data on the LCD display. Also the controller drives the driver motor to open the bank locker door and opens it for authorized customers. The door of locker won't open for unauthorized customers. And when door is open one photo is taken by the ESP32CAM module and it is saved in SD card. Later if any loss of assets happened then we can check those photos to check if any unauthorized person has opened bank locker by chance. This system helps to make more secure bank lockers and also gives plus point to security by taking photo of the bank locker accessing person..*

**Keywords:** Fingerprint Module, Intrusion Detector, Microcontroller Motor driver, Memory SD card etc.

## I. INTRODUCTION

Bank is an organization where we keep our cash and different assets. Where there is cash there are cheaters, now days there are more instances of thievery so securing bank has turned out to be critical. With developing advancement in hardware security framework today all manual locks are supplanted by electronic contraptions. These contraptions incorporate different innovations like movement sensor, odour identification, face recognition, Finger print scanning. In this way, we have chosen to present an embedded system for locking which depends on the Finger print scanning. Our task will furnish high level of security with no manual imperfections. Our task fundamentally, is a blend of Implanted Frameworks and Biometrics. An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is designed for a specific function or for specific functions within a larger system. Design engineers upgraded the size and qualities of the microcontrollers, the cost of the item likewise diminished which make it commercial. Basically, embedded system is "Real Time Operating system" which operates immediately without any delay. This paper describes the design and implementation of an Embedded Fingerprint Authentication system with image capturing using Arduino camera and saving photos in SD card for further identification of unauthorized user. The present innovative period is requesting dependable and financially savvy personal authentication system for a vast number of day by day utilize applications where security and security execution of the data is required. Biometrics confirmation strategies in mix with installed embedded system gives a requesting answer for this need.

## II. BLOCK DIAGRAM

Fingerprint is unique and not similar to anybody and using fingerprint can provide more security. Even illiterate people are also capable of using this security method. This method takes less time to be operated by the user. The fingerprint can also be used in forensic departments while catching the suspect who can be a murderer or a thief. Even the zoological experts use the fingerprint technique to check on the animals in the forest that if the animal is dead or alive

by this way they carry on the census of the animals. The new species can also be discovered by using their fingerprint to check on to the new species and the already existing species

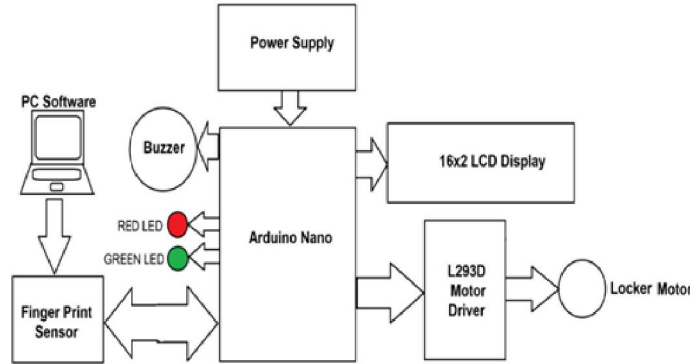


Fig 2: Block diagram of fingerprint bank lock with image capture

Arduino board refers to an open source electronics platform that allows anyone can use to make their own projects. Board and the software used to program it. Arduino is very common now days for engineering purposes. Arduino is also useful for coding work we can add software programming and executes our program through software Arduino[IDE] the arduino was started in 2005 for students it provide low cost and easy way for novices and professional to create devices that interact with their environment using sensor.

Servo motor – servo motor is a rotary actuator or linear actuator that allow for precise control of angular or linear position ,velocity and acceleration.it consist of suitable motor coupled to a sensor for a position feedback servo motor are used in application such as robotics,cnc machinery or automated manufacturing.

16x2 LCD DisplayIt is a 16x2 electronic display module which uses liquid crystal to produce a visible display. It can Power supply For power supply we have used a Step-Down Transformer that has regulated to 12v power supply. The components on the project such as fingerprint module, servomotor and lcd screen, etc. they require only up to max 12v and they also work sufficient on 5v power supply.

**III. CIRCUIT DIAGRAM AND WORK**

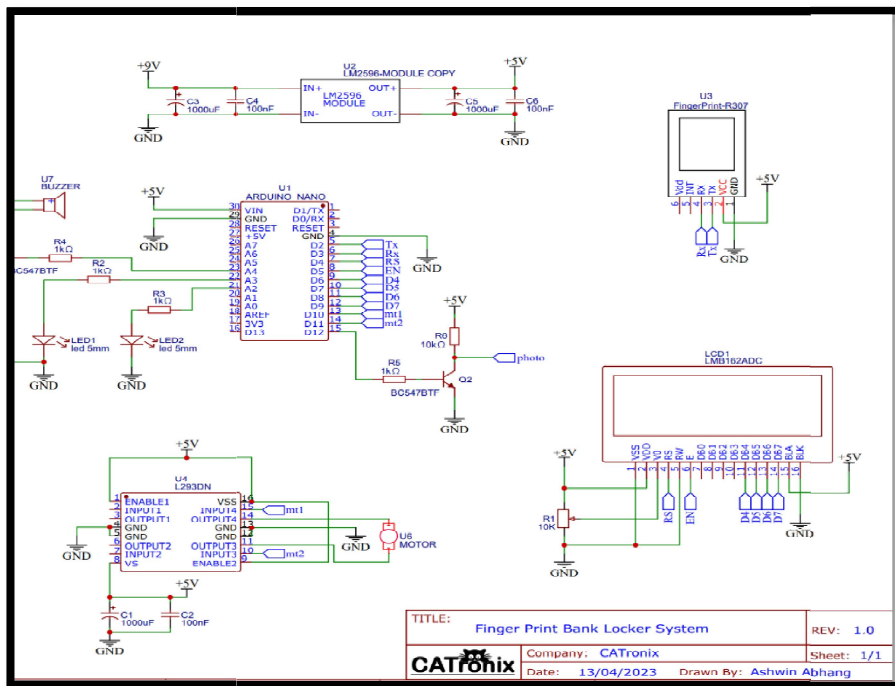


Fig 2: Circuit diagram of fingerprint bank lock with image capture

**IV. FINGERPRINT IDENTIFICATION**

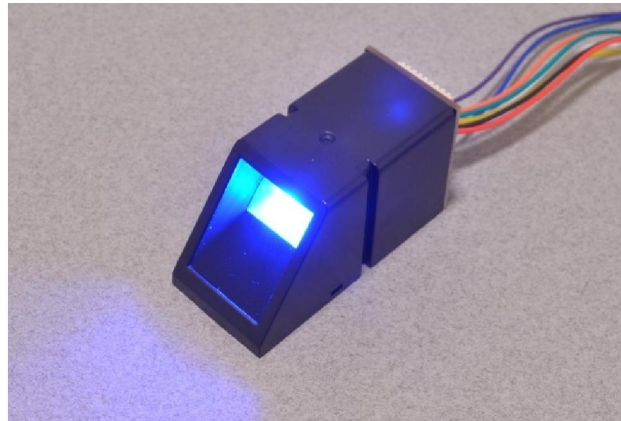


Fig 3:Fingerprint identification

R307 Fingerprint Module consists of an optical fingerprint sensor, high-speed DSP processor, high-performance fingerprint alignment algorithm, high-capacity FLASH chips, and other hardware and software composition, stable performance, simple structure, with fingerprint entry, image processing, fingerprint matching, search and template storage, and other functions.

The R307 fingerprint module has two interface TTL UART and USB2.0, USB2.0 interface can be connected to the computer; RS232 interface is a TTL level, the default baud rate is 57600, can be changed, refer to a communication protocol; can And microcontrollers, such as ARM, DSP and other serial devices with a connection, 3.3V 5V microcontroller can be connected directly. Needs to connect the computer level conversion, level conversion note, embodiments such as a MAX232 circuit.

**V. IMAGE CAPTURING**

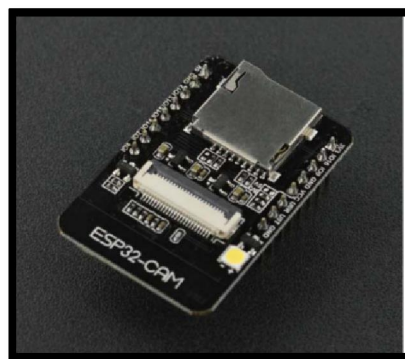


Fig 4: Image capturing

ESP32-CAM is a low-cost ESP32-based development board with onboard camera, small in size. It is an ideal solution for IoT application, prototypes constructions and DIY projects. The board integrates

WiFi, traditional Bluetooth and low power BLE , with 2 highperformance 32-bit LX6 CPUs. It adopts 7-stage pipeline architecture, on-chip sensor, Hall sensor, temperature sensor and so on, and its main frequency adjustment ranges from 80MHz to 240MHz. Fully compliant with WiFi 802.11b/g/n/e/i and Bluetooth 4.2 standards, it can be used as a master mode to build an independent network controller, or as a slave to other host MCUs to add networking capabilities to existing devices ESP32-CAM can be widely used in various IoT applications. It is suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications

### VI. ADVANTAGES

- Easy to use and requires no special training or equipment.
- Fingerprint is unique for every person it cannot be imitated or fabricated it is not same in the case of twins also.
- High accuracy in terms of security.
- No manual errors.
- No false intrusion
- Safe as well as easy to use and maintain.

### VII. APPLICATIONS

**In offices** - To do this, the lock scans and saves each tenant's fingerprint. The lock will then use a person's fingerprint as the access credential whenever someone attempts to open the door, and will unlock if the fingerprint is a match

**In bank lockers** - Fingerprint module is used for authorized person to unlock the bank locker. Once a Fingerprint is scanned it sends a OTP to the registered mobile number. If it matches the locker may unlock.

For used in identification

Cash caring vehicle

### VIII. RESULT

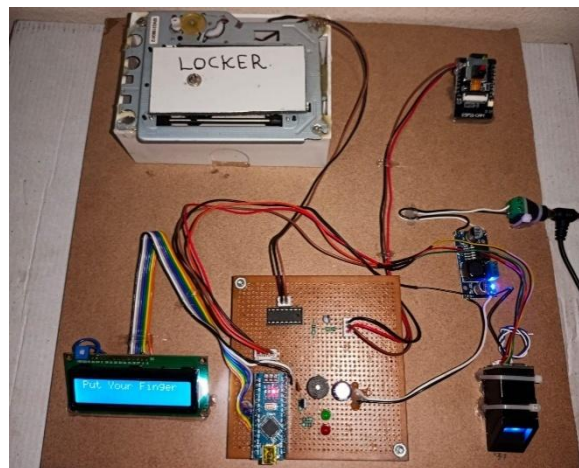


Fig 5: Result

After the implementation of project, it did as well as we required to be there was no any security flaw during its use. The fingerprint verification and image capturing were simultaneous in a such a manner that there is no quiet much or less delay during their workings.

### IX. CONCLUSION

Image capturing and Fingerprint. It is a a security system is proposed by using low cost, low in power conception, compact in size and standalone system. The microcontroller compares the fingerprints scanned by it with its flash memory. If these fingerprints are correct, the microcontroller provides necessary control signal to open the bank locker otherwise the door remains locked and image is saved in SD card after capturing. The proposed system can be used in other places such as offices and diamond jewellery shop

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