

# A Project Phase-I Report on 3 Stage Bank Locker

Avani G. Shahane<sup>1</sup>, Sourabh D. Kamble<sup>2\*</sup>, Amar A. Apake<sup>3</sup>, Omkar A. Patil<sup>4</sup>, Amey D. Khade<sup>5</sup>,  
Snehal D. Deshmukh<sup>6</sup>

<sup>1</sup>Assistant Professor, Dr. J. J. Magdum College of Engineering, Jaysingpur, India

<sup>2,3,4,5,6</sup>Student, Dr. J. J. Magdum College of Engineering, Jaysingpur, India

**Abstract:** The main aim of the paper is to design and implement the 3 Staged based bank locker system using Arudino, Fingerprint and RFID system. Biometrics studies commonly include fingerprint verification. The fingerprint proves to be one of the best module providing excellent security and is also reliable. The present scenario to operate a bank locker is with locks which are physical keys in possession of customer as well as locker manager. This does not satisfy the security protocols. To provide perfect security to the bank lockers and to make it hassle free, this project is being implemented with the help of Arudino Microcontroller, Fingerprint Sensor and RFID Card. This also contains a GSM module which will alert the user of unauthorized access on his provided phone no.

**Keywords:** Arudino Mega, Fingerprint Sensor, GSM module, RFID.

## 1. Introduction

### 1) Literature Review

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## 2. Existing System

The current system is not really that secure and most of time security is neglected. The current system makes use of 2 stage bank locker which include password and RFID reader. There is no biometrics included in this system. The component used in this system are really old and high power consuming. The security measures depends from bank to bank and region to region.

## 3. Proposed System

In this project we propose a Password, Biometric & RFID based secure access which can provide a sophisticated locker system for banks. This system contains keypad, Biometric and RFID module. By using keypad we need to input the pin for 1st stage unlocking purpose. Then using biometric module to open the main door for authorized person. And by using RFID card we grant the access to the authorized person this system offers better solution for the bank security system and it will also alert about the person who tried to open the locker without the permission and proper authentication.

## 4. Methodology

### 1) Problem Definition

Bank lockers are plays important role in today's life and it is considered the safest place to store jewelry, documents, stock certificates and etc. The traditional methods used for most of

banks rely on manual lock and PIN number/ password which are not fully secure. In manual lock systems, whenever a customer uses the locker, he/she should assist by the bank staff. This may lead to waste of time for both the customer and the staff.

The major drawback of such manual locker systems are lack of security because the key can be duplicated. This would lead to theft of the entire valuable possessions in the bank lockers. The password, Personal Identification Number (PIN) or smart cards are used for personal identification to access lockers. Anyhow, the smart cards can be stolen, the password and PIN numbers can be forgotten or might be guessed.

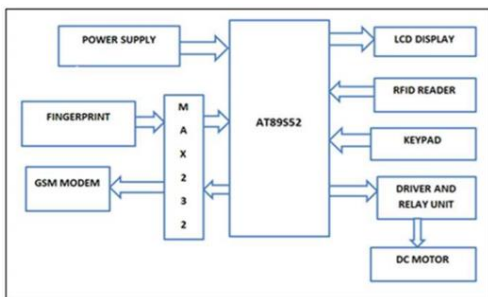
Still many banks struggle to prevent illegal access, intrusions and stopping secret information disclosure. These all become problems of traditional bank lockers and leads to bank robberies. The safety of this lockers need to be ensured and verified through the strong authentication mechanisms in order to restrict the unauthorized access.

### 5. Proposed Experiment Work

The Bank locker system based on two-factor authentication implementation on Arduino Mega 2560 R3 is proposed as shown in the figure 6. The Arduino Mega 2560 controller will be taken action according to Fingerprint scanner GT-511C3 input, once it is verified, Arduino sends SMS details to GSM module in order to send a PIN to owner’s mobile phone, when it receives confirmation through keypad, Arduino sends open signals to Solenoid to provide access to the bank locker system. The Ywrobot relay (5VDC) is used to switch off/on the Solenoid to work with electronic locker system.

I2C real time clock module is used to take the current time and date which is used to be count for session time out regarding one-time password. The PIR and vibration sensors used to detect in case of theft. This system can be extended in future without changing any hardware, just by reprogramming the system it can be enhanced for banks. This system is aimed to overcome the limitation of the existing bank locker system. The existing system can be replaced by designed system that will be provided more security and eliminate time delay in effective manner. The new system will be delivered more security which will be provided almost twice safety as earlier systems.

### 6. System Architecture

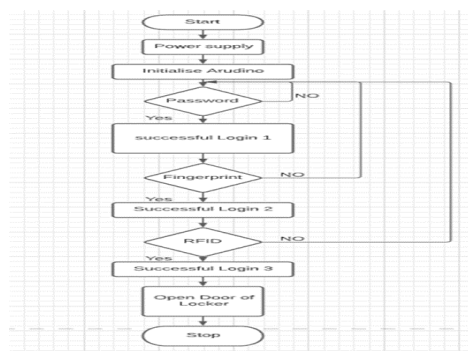


Implementation Tools & Module Developed  
 Hardware Implementation:-

1. *Arudino Microcontroller*:- The Arduino Mega 2560 is

a microcontroller board. It is based on the ATmega2560 which has 54 digital input/output pins. It has 15 PWM pins, 16 analog inputs and 4 UART ports. It is connected to the computer through the USB cable or it can be powered up with the AC to DC adaptor or it can be powered up by the battery. The Arduino microcontroller is implemented with the boot loader. This avoids the use of the external programmer device to the computer for programming. This boot loader provides the true Read-While-Write operation.

2. *4x4 Matrix 16 Key Switch Keypad*:- The keypad has 16 buttons in Matrix form. It is thin and flexible membrane with the adhesive backing. It is compatible and very easy to interface with any microcontroller. Only need 8 microcontroller pins (4-columns and 4-rows) need to be scanned through the key pad. This 4x4 Matrix keypad has chosen for bank locker project to provide a useful human interface component for the people who are using it to enter the inputs to the system.
3. *Cellular GSM module*:- It is a GSM module controlled via AT commands and fully compatible with Arduino Mega. It uses Quad band 850/900/1800/1900 MHz and can be connected to any GSM network with any 2G SIM. Anon. [undated] The Fona GSM module is been chosen for this project in order to send the one-time password to owner’s phone when accessing the bank locker. The less processing time for sending messages adds value to this GSM module
4. *Finger Print Sensor*:- The sensor is a solid-state fingerprint sensor that reliably captures fingerprint information. It is designed to integrate into devices for improved security and convenience. The sensor provides a reliable, quick and user-friendly alternative to passwords, PIN's and other forms of user authentication
5. *EM-18 RFID Reader*:- This module directly connects to any microcontroller UART or through a RS232 converter to PC. Its operating frequency is 125 KHZ. It reads upto 10 cm. there is LED and buzzer for pass indication. RFID module has bridge rectifier and 5v voltage regulator so it can be powered by 9-12 V AC as well as 9 – 15 V DC adaptors.



### 7. Future Work

In addition to this the future scope of this project is to develop smart bank Locker security system based on “FACE”, “IRIS and Retina” Scanning for visual identification of the person.

### 8. Conclusion

Thus, by implementing this Smart Bank locker security system project using RFID, Fingerprint, password and GSM technology safety of every important things stored at bank locker can be guaranteed. Using this smart technology only an authorized person can open the lock and collect his belongings.

This is a low cost equipment, low in power consumption, compact in size, wide operating range, highly secured and reliable stand-alone unique system.

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