

# Embedded Systems Based Intelligent Bank Locker Security System

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## Abstract

Nowadays, security plays a big role, notably in homes, companies, and banks. This article uses embedded systems to design a bank locker security system. The Global System for Mobile (GSM) and Radio Frequency Identification (RFID) technologies are the foundation of this system. Only honest people are permitted to retrieve money or gold from bank lockers. It is created by fusing RFID and GSM technologies, allowing for real-time activation, authentication, and validation of the user and door unlocking for safe access to bank lockers. GSM and passive RFID are safer than other technologies. A microcontroller, RFID reader, GSM modem, keyboard, and a liquid crystal diode make up this system (LCD). This system employs a dual password protection scheme to ensure that only legitimate individuals can get funds from bank lockers.

**Keywords:-** GSM, Microcontroller, RFID, Bank Locker Security, LCD

## 1. Introduction

In the current world, the majority of people's top concern is safety. Some people will attempt to steal from banks, homes, and places of business. The majority of people will install a series of locks or an alarm system to combat this security concern. Various types of sensors are used by alarm systems that are sold on the market. The sensor is capable of detecting a variety of transformations that are taking place in the environment, and the transforms are processed to generate an alert in accordance with the pre-set value. This system might not always work well.

This paper uses RFID and GSM technology to offer safety in bank lockers. As compared to other systems, this system is more immune. Only authorized individuals are permitted to unlock the bank locker using a GSM-based RFID access control system.

A coil or antenna, a transponder with an RF tag, and a transceiver with a decoder make up an RFID system. Special data is electrically programmed into it. Based on frequency bands, various types of RFID systems are available. Low- frequency (30-500 kHz), mid-frequency (900 kHz- 1500MHz), and high-frequency (2.4-2.5GHz) RFID frequencies are all employed. Compared to active tags, these passive tags are less expensive and lighter.

Currently, GSM is a mobile phone technology used in Europe that operates at a frequency of 900 MHz's This

common SIM 300 GSM module, a triband GSM/GPRS solution with an industry-standard interface, is used. It uses less electricity while providing data, voice, and fax services.

Using the PIC platform, the design and implementation of a GSM-based digital door lock security system [1] are discussed. A gear motor was utilized to lock and unlock the doors using a 5-digit password. In order to detect the illegal infiltration, a warning message was issued to the present cellphone numbers after three consecutive unsuccessful tries to enter the proper password. For the purpose of implementing and demonstrating the suggested method, a 3D scaled model of a house with a door driven by a gear motor was built. The control installation was handled through a separate arrangement.

In RFID Security based on Internet of Things (IOT) [2], the idea of establishing an autonomous network using common things to produce in-person services is covered. This led to the development of numerous new applications utilized in logistics, home automation, and other fields. For these applications, a high level of privacy and security is necessary. The finest IOT application enablers are RFID systems. It presents a critical study of the previous work in order to safeguard the security of diverse RFID deployment applications. This constructive criticism serves as a road map for our paper's attempt to offer an RFID network security solution. The goal of home automation systems in the near future is "Full Home Control," which is explored by the Smart GSM Based Home Automation System [3]. In this study, home automation technology that uses a GSM modem to manage household appliances is evaluated and put into practice. The GSM protocol's feature, which enables remote control of the target system from a non-residential location using frequency bandwidths, is the main focus of the proposed research project.

An Introduction to RFID Technology [4] provides a thorough overview of the technology and its uses. RFID is a new generation of wireless communication technology with numerous potential uses. Retailers, banks, traffic management companies, exhibition companies, and logistic suppliers are all using this new technology to improve their goods and services. As a result, it offers opportunities and presents difficulties for RFID researchers[5]. In this paper, we offer a succinct overview of RFID applications and make some recommendations for promising areas for further research.

## 2. Proposed System

The two step verification process is shown in FIG.1. The RFID Tag must first be scanned by the user; if it matches the registered one, "enter the password" is then displayed on the LCD Display. When the password is entered correctly, the LCD displays "Password ok" before the locker opens and the GSM [6] notifies the user that the "locker opened!! When the user wants to close the locker after using it, he must enter the password again. If it matches the registered one, the locker closes and shows "password ok Locker closing," and the GSM notifies the user that the "locker closed!". The GSM will send the user a message that reads "Theft Alert!!" and the LCD will display "Wrong card" if an unauthorized user tries to open the locker.

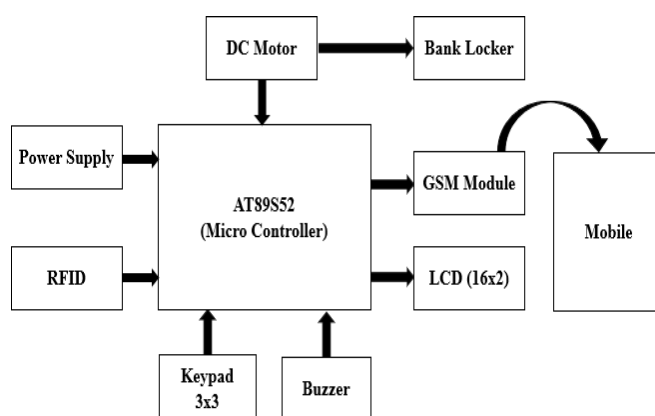
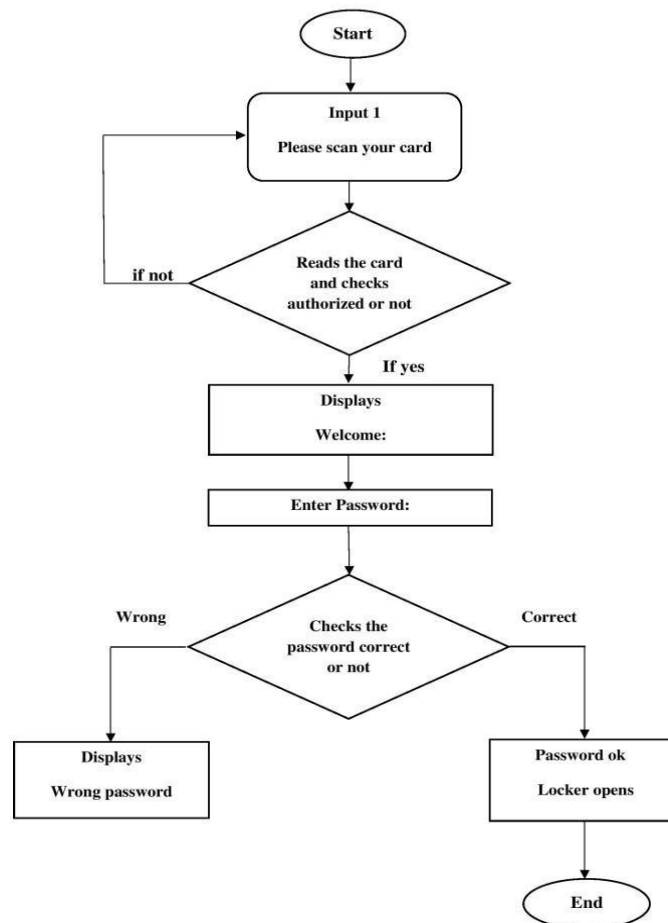


FIG 1: Block Diagram of Bank Locker System

### 3. Flow Chart

The flowchart for the bank locker security system is shown in FIG. 2. The user must first register his or her information and choose a locker password. When a user needs to access a locker, they must first scan an RFID tag. If their ID matches the registered ID, the system proceeds to the next step, which displays "Welcome Batch 5," prompts them to enter a password, and when they enter it correctly, the door opens and a message letting them know the locker is open is sent to their registered mobile number via GSM.

In order to close the locker, the user must enter their password once more, and a message notifying them that the locker is closed is delivered to their mobile device [7]-[8].



**FIG 2: Bank Locker Security System Flow Chart**

### 4. Hardware Setup

The hardware setup is shown in FIG.3 and the connections are as follows., Microcontroller AT89C52 Pin 2.4, Pin 2.5, Pin 2.6, Pin 2.7, P0.7,P0.6 are connected to LCD pins RS, Enable, D4, D5, D6, D7. Microcontrollers P1.0 to P1.6 are connected to Keypad [9]-[11] R1, R2, R3, C1, C2, C3, C4. Microcontrollers P3.0, Pin 20, Pin 40 are connected to TX, GND, VCC Pins. And microcontrollers P3.1 is connected to RX pin since we have to transmit the data to the user so we have to connect microcontrollers Transmitter pin to GSM Receiver pin. Microcontrollers [12]-[14] P3.2, P3.3 are connected to L293D Pin2 and Pin7 and the output pins of motor1 which is meant for opening purpose is connected to Pin3 of L293D and for closing purpose the motor [15] is connected to Pin 6 of L293D.



FIG.3 Hardware set up for Bank Locker Security System.

## 5. Experimental Results

LCD display when the power is ON.



Asking the user to scan the RFID Tag.



When the RFID Tag matches to the registered Tag then LCD Displays:

“WELCOME: BATCH 5”



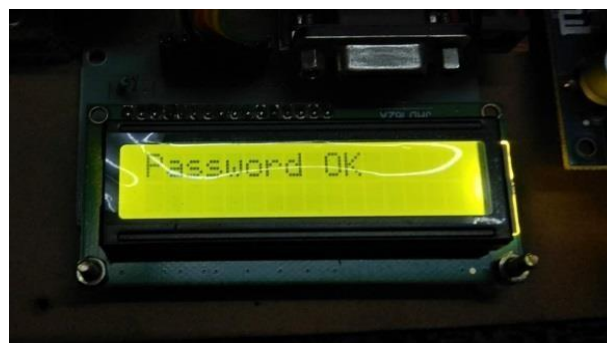
The User is asked to Enter Password



when password is entered



If the entered password matches the registered password, then LCD Displays "Password OK".



Password has to be given to close the Locker



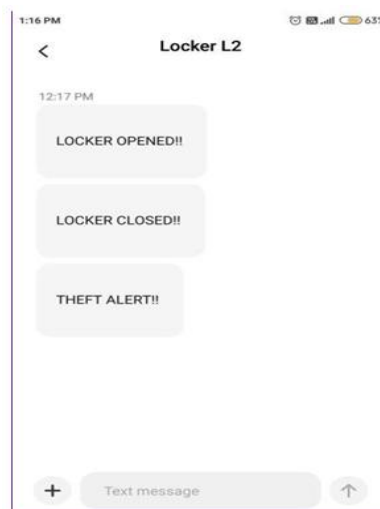
When password is matched then locker is closed



When the Unauthorized user tries to open the locker Displays "Wrong Password".



Messages sent by GSM to the user:



## 6. Conclusion And Future Scope

In this paper, we've used passive RFID and GSM to construct a bank locker security system. It is a cost-effective, power-efficient, small, standalone system. Only authorized users are able to access the system thanks to the microcontroller, whilst unauthorized users are unable to do so.

We can put this proposal into action by integrating face recognition software, which can offer great security, and fingerprint scanners, which can be utilized in biometric locker systems at workplaces.

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