



Bank Locker Security System using RFID and GSM technology

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Abstract --- The main goal of this paper is to design and implement a bank locker security system based on RFID and GSM technology which can be organized in a bank, secured offices and homes. In this system only an authenticated person can recover money from the locker. We have implemented a bank locker security system based on RFID and GSM technology containing door locking mechanism which can activate, authenticate, and validate the user and unlock the door in real time for bank locker secure access. The main advantage of using RFID and GSM is more secure than other systems.

This system consists of microcontroller, RFID reader, GSM modem, keyboard, and LCD. In this system the RFID reader reads the id number from passive tag and sends it to the microcontroller. It then sends SMS request to the authenticated person mobile number, the authenticated person enters both the password through the keyboard which was already given to the user during the time of registration and the one received from the microcontroller i.e. one time password(OTP). The microcontroller will verify the passwords. If these two passwords are matched the locker will be opened otherwise it will be remain in locked position. This system is more secure than other systems because two passwords required for verification. This system also creates a log containing check-in and check-out of each user along with basic information of user.

I. INTRODUCTION

In this paper we have implemented safety of the money in the bank locker, house, and office (treasury) by using RFID and GSM technology which will be more secure than other systems. Radio frequency identification (RFID) based access control system allows only authorized persons to open the bank locker along with GSM technology. Basically, an RFID system consists of an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with unique information. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication.

RFID is a means of identifying a person or object using a radio frequency transmission. In other words RFID is an electronic method of exchanging data over radio frequency waves. We can identify, track, sort or detect a wide variety of objects using this system. The purpose of this project is to increase the security for every customer to use their locker in a secure environment with maximum stages of security present to avoid any theft or hacking within the system. We have provided a DC motor and Relay to show the demo of valid security access. And a buzzer is provided which is turned on when an invalid RFID card is shown to the reader. GSM modem is one of the main components of this project. SMS is sent for valid and invalid access to the system.

II. LITERATURE REVIEW

The idea came to us while searching for good project topics. We always wanted to put theoretical ideas into practice. An embodiment of the present invention provides a compact electronic security locker system that includes an array of lockers, each of which is electronic locked and electronically accessed.

One aspect of an embodiment of the present invention allows authorized personnel access to the identification of the person storing an article in a particular locker. In another aspect of an embodiment of the present invention, the storage lockers are arranged in a matrix of rows and columns and are constructed to have a size to accommodate items having a size of common cell phones. Nowadays, banks are continuously improving their locker security systems by integrating increasing amount of electronic components. Therefore we are making a system for the protection of bank locker using RFID and GSM technology.

EXISTING SCENARIOS:

- **Manual:** In most banks, the lockers have manual locks. Whenever the user wishes to open the locker, he is to be assisted by the bank manager. The major drawback of manual system is lack of security and misplacement of key to the locker.
- **Using RFID technology:** In 2014, RFID system was used as a breakthrough in the field of security for bank lockers. RFID is similar to barcode technology but uses radio waves to capture the data from the tags instead of optical scanning. The RFID system interfaced with the microcontroller requires the controller to continuously scan the input from the RFID reader. RFID reader module is also called as an interrogator. They convert the radio waves returned from the RFID tag into a form that can be passed on to the controller.
- **Using GSM technology:** From this project proposed in 2015 which uses GSM based secure access which can provide a sophisticated theft alert system for bank locker system. This system uses a keypad, microcontroller, GSM module and LCD display. By using keypad we need to enter the password that is provided. If the password entered is wrong then the GSM network converts the digital information in airborne signals and SMS is transferred to registered mobile number.

DRAWBACKS OF EXCISTING SYSTEMS:

- The major drawback of manual system is lack of security and misplacement of key to the locker.
- Only one level of password security. The tag/s can be misplaced. This system is somewhat secure.
- The transit time of message between the user and the microcontroller is somewhat unpredictable.

PROPOSED SYSTEM:

In this paper, we have implemented safety of money in bank locker, houses, business firms etc. by using RFID and GSM technology which will be more secure than other systems. In this system, RFID reader reads the id number from the passive tag and sends it to the microcontroller. T then sends SMS request to the authenticated person's phone, the authenticated person enters both the password given during the time of account registration and the one received from the microcontroller. The microcontroller will then verify the password. If they are matched, the locker will be opened. It is more secure than other system as it uses RFID identification and two password security.

III. BLOCK DIAGRAM

We have implemented a bank locker security system based on RFID and GSM technology containing door locking mechanism which can activate, authenticate, and validate the user and unlock the door in real time for bank locker secure access. The main advantage of using RFID and GSM is more secure than other systems.

This system consists of microcontroller, RFID reader, GSM modem, keyboard, and LCD. In this system the RFID reader reads the id number from passive tag and sends it to the microcontroller. It then sends SMS request to the authenticated person mobile number, the authenticated person enters both the password through the keyboard which was already given to the user during the time of registration and the one received from the microcontroller i.e. one time password(OTP). The microcontroller will verify the passwords.

If these two passwords are matched the locker will be opened otherwise it will be remain in locked position. This system is more secure than other systems because two passwords required for verification. This system also creates a log containing check-in and check-out of each user along with basic information of user.

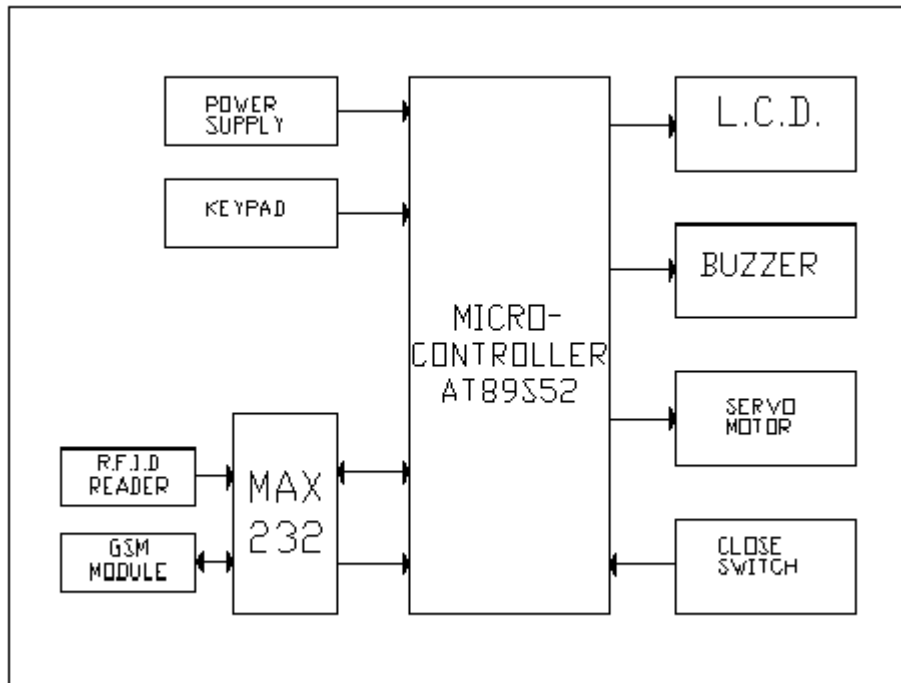


Fig. 1 Block Diagram

IV. HARDWARE IMPLEMENTATION

The compact circuitry is built around Atmel AT89S52 microcontroller. The AT89S52 is a low-power; high performance CMOS 8-bit microcomputer with 8 kilo Bytes of Flash programmable and erasable read only memory (PEROM). It has 256 bytes of RAM, 32 input/output (I/O) lines, three 16-bit timers/ counters, a six-vector two-level interrupt architecture, a full-duplex serial port, an on-chip oscillator and clock circuitry.

The system clock also plays a significant role in operation of the microcontroller. An 11.0592MHz quartz crystal connected to pins 18 and 19 provides basic clock to the microcontroller. Power-on reset is provided by the combination of electrolytic capacitor C3 and resistor R1. Port pins P2.0 through P2.7 of the microcontroller are connected to data port pins D0 through D7 of the LCD, respectively. Port pins P3.7 and P3.6 of the microcontroller are connected to register-select (RS) and enable (E) pins of the LCD, respectively. Read/write R/W pin of the LCD is grounded to enable for write operation.

All the data is sent to the LCD in ASCII format for display. Only the commands are sent in hex form. Register-select (RS) signal is used to distinguish between data (RS=1) and command (RS=0). Preset RV1 is used to control the contrast of the LCD. Resistor 10k limits the current through the backlight of the LCD. Port pins P3.0 (RXD) and P3.1 (TXD) of the microcontroller are used to interface with the RFID reader through Max232 and GSM Modem are used to interface through Max232.

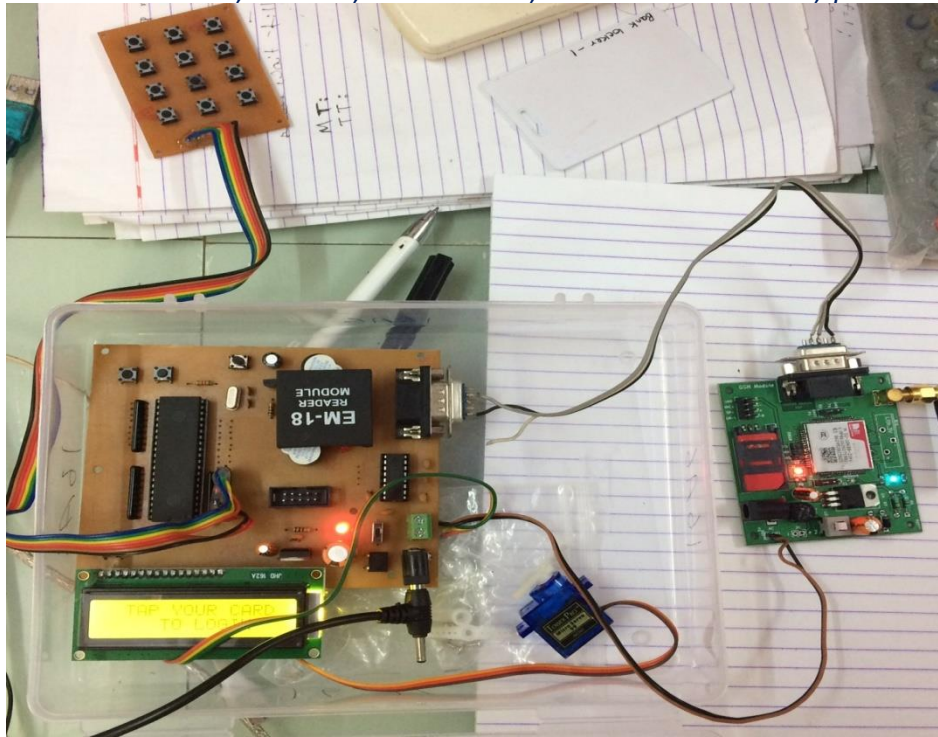


Fig. 2 Hardware Implementation

V. SOFTWARE PROGRAM TESTING

The software program is written in c or assembly language and compiled using keil software. After compiler operation the hex code is generated and stored in the computer. The hex code of the program is burnt into the AT89S52 by using Top win Universal programmer.

The flow of the circuit begins from initiating all the interfaces, serial communication ports and I/O ports of the microcontroller. The LCD displays a startup message indicating the system has been initialized. The RFID reader will read the tag when it is brought to its vicinity of about 10 cm or less. If the tag is of an authenticated user, the LCD will display it so, else it will give an error message.

The next step includes of entering the password through an externally interfaced (4x3) keypad. When the password matches with the one programmed into the system, it asks for the OTP password to be entered. In this system, we have devised the use of clock to synchronize when initially the system boots. The clock starts its count till the time the system requests an OTP. The system then uses the clock bits as an OTP and transmits it to the microcontroller for verification of the password. If both the passwords match accurately, the system opens the locker door through a servo motor mechanism.

VI. RESULT

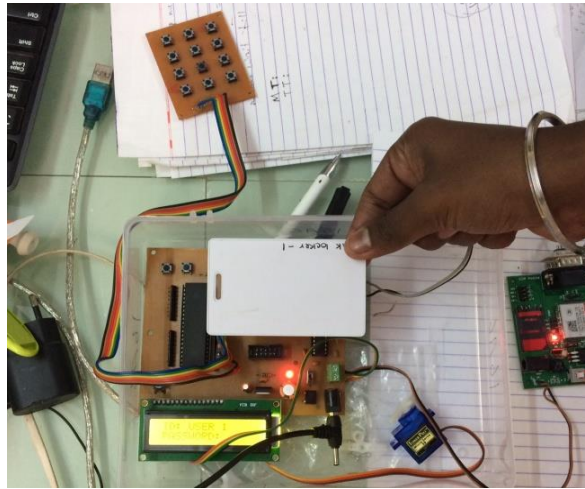


Fig. 3 RFID tag is brought in clear vicinity to the reader

- When an allowed person having the tag enters the RF field generated by the RFID reader, RF signal is generated by the RFID reader to transmit energy to the tag and retrieve data from the tag. Then the RFID reader communicates through RXD and TXD pins of the microcontroller for further processing.

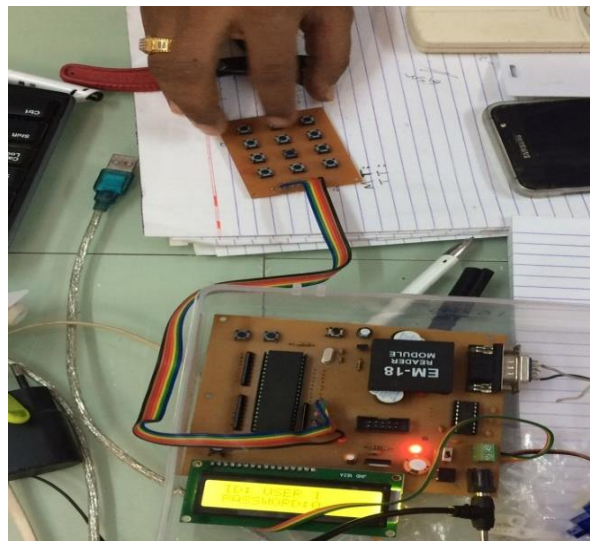


Fig. 4 Password is entered through the matrix keypad

- Thus on identifying the authorized person, the authorized person enters the password through keyboard and send to the microcontroller.

- The assigned password is entered through a 4x3 matrix. The LCD displays the password on the screen.



Fig. 5 Displayed password

- After the password is authorized, the request for OTP is done with the microcontroller. The OTP is self-assigned to the system through the bits of clock that is initiated when the system starts up.



Fig. 6(a) The request for OTP



Fig. 6(b) The OTP password is displayed on the screen

- If the password is correct then the microcontroller sends the SMS to the account holder person, account holder again send the password through SMS to the microcontroller.
- The microcontroller verifies the password and received password through GSM mobile. If this password is correct, the microcontroller provides high signal to open the bank locker. Simultaneously, the LCD shows "Access granted" message for aural indication. If the password is not valid, the LCD shows "Access denied" and the bank locker doesn't open.

VII. CONCLUSION

We have implemented a multilevel security system for bank locker system using RFID and GSM technology. ATME89s52 is the heart of proposed system. It is a low cost, low in power consumption, compact in size and standalone system. Proposed system is more secure and less time consuming. If the authorized person wants to access the locker, the RFID reader reads the id number from passive tag and sends it to the microcontroller.

It then sends SMS request to the authenticated person mobile number, the authenticated person enters both the password through the keyboard which was already given to the user during the time of registration and the one received from the microcontroller i.e. one time password(OTP). The microcontroller will verify the passwords. If these two passwords are matched the locker will be opened otherwise it will be remain in locked position. This system is more secure than other systems because two passwords required for verification.

VIII. REFERENCES

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