

Bank Locker Security System based On RFID and GSM Technology

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Abstract— The main aim of this paper is to design and implement a bank locker security system based on Radio Frequency Identification (RFID) and Global System for Mobile (GSM) technology which can be arranged in bank, secured offices and homes. In this system only genuine person can recover money from bank locker. We have arranged a bank locker security system based on Radio Frequency Identification (RFID) and Global System for Mobile (GSM) technology which include door locking system using on Radio Frequency Identification (RFID) and Global System for Mobile (GSM) which can activate, authenticate and validate the user and unlock the door in real time for bank locker secure access. The main merit of using passive on Radio Frequency Identification (RFID) and Global System for Mobile (GSM) is more secure than other systems. This system is made up of microcontroller, Radio Frequency Identification (RFID) reader, Global System for Mobile (GSM) modem, keyboard, and Liquid Crystal Diode (LCD). In this system the RFID reader reads the id number from submissive tag and send to the microcontroller, if the id number is valid then microcontroller send the SMS request to the authenticated person mobile number, for the master password to open the bank locker, if the person sends the password to the microcontroller, which will verify the passwords entered by the keyboard and received from authenticated mobile phone. 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 generates a log containing check-in and check-out of each user along with basic information of user.

Index Terms— Global System for Mobile (GSM), Radio Frequency Identification (RFID), locking system, Keyboard, Microcontroller

I. INTRODUCTION

In this present age, safety has become an key issue for most of the people especially in the rural and urban areas. Some people will try to cheat or steal the property which may risk the safety of money in the bank, house, and office. To overpower the security threat, a most of people will install cluster of locks or alarm system. There are many types of alarm systems available in the market which employ different types of sensor. The sensor can detect different types of transforms occur in the surrounding and the transforms will be processed to be given out an alert according to the pre-set value. By the same time this system may not be good for all the time. In this paper we have planned safety of the money in the bank locker, house, and office (treasury) by using RFID and GSM technology which will be more immune than other systems. Radio-frequency identification (RFID) based access-control system allows only genuine persons to open the bank locker with GSM technology. Basically, an RFID system made up of an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with special information. In the market there are many divergent types of RFID systems. These are classified on the basis of their frequency ranges. Some of the most frequently used RFID kits are low-frequency (30-500 kHz), mid-frequency (900 kHz-1500MHz) and high-frequency (2.4-2.5GHz)[1]. The passive tags are lighter and less expensive than the active tags [2]. Digital cellular communication globally accepts standard of Global system for mobile communication (GSM). GSM is a common European mobile telephone standard for a mobile cellular radio system operating at 900 MHz In the current work, SIM300 GSM module is used. The SIM300 module is a Triband GSM/GPRS solution in a compact plug in module featuring an industry-standard interface. It delivers voice, data and fax in a small form factor with low power consumption. [3]. In this paper we have designed and arranged a bank locker security system based on RFID and GSM technology. In this system only genuine person can recover money from bank locker with two password protection method.

Wherever Times is specified, Times Roman or Times New Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times. Avoid using bit-mapped fonts. True Type 1 or Open Type fonts are required. Please embed all fonts, in particular symbol fonts, as well, for math, etc.

II. RELATED WORKS

In this chapter some of related works connected to the monitoring system using GSM services are illustrated. In [4] has developed a Prepaid Water Meter System for prepaid billing of water utilization through remote monitoring without any human inclusion. This system may be fast and reliable billing of water as well as preventing any mishandling of it. However, [5] developed a water meter reading using GSM system that is worthy for remote places to monitor the water meter reading before any billing process. This could minimize the use of human resource for reading the meter and producing a bill. There was also a work on monitoring of electrical meter reading using GSM network done by [6]. The system was able to monitor the meter

reading and send an SMS to the official center for billing purpose. This could lessen the number of estimated reading when the authorize person is unable to reach the meter.

In [7], this system is used to control home appliance tenuously and offer security when the owner is away from the place. The similar work presented in [8] which designed and developed a smart home application system. The system allows the property owner to be able to monitor and control the residence appliances via a mobile phone set by sending commands in the form of SMS messages and receiving the home appliances status.

In [9], one more approach using GSM technology to communicate with the remote devices via SMS is remote metering system, in this paper illustrates a technique for remotely reading electricity meter readings using SMS. Both postpaid and prepaid are feasible to implement using this architecture as SMS based data gathering can be done very quickly and efficiently.

In [10] [11], this paper projected a Zigbee-GSM based Monitoring and Remote Control System. In this systems used both Zigbee and GSM for communicating between user and devices. This system allows user to monitor and control devices in the home through a number of controls, including a Zigbee based remote control. Users may remotely monitor and control their home devices using GSM.

In [12], the most important objective of the paper is to design and develop a highly developed vehicle locking system in the real time situation. The design & development of a theft control system for an automobile, which is being used to prevent/control the theft of a vehicle. This system consists of an embedded system and Global System Mobile communication (GSM) technology. This system developed by Pravada P. Wan hade and Prof. S.O. Dahad, the developed system is installed in the vehicle. The mobile is connected to the microcontroller, which is in turn, connected to the engine. Once, the vehicle is being stolen, the information is being used by the vehicle owner for further processing. The information is passed onto the central processing insurance system which is in the form of the SMS, the microcontroller unit reads the SMS and sends it to the Global Positioning System (GPS) module and says to lock it or to stop the engine immediately. The main concept of this paper vehicle is controlled by GSM and GPS. The designed unit is reliable and efficient system for providing security to the vehicles through GSM, GPS and serial communication.

III. PROPOSED METHOD

In this project work, the RFID reader reads the data from tag and send to the microcontroller, if the card is authentic then microcontroller show the account holder name and number. Then the account holder needs to enter the password, if the password is authentic then microcontroller sends the SMS to account holder mobile number. Then account holder enters the password to the microcontroller through mobile phone using GSM. The microcontroller compares the passwords entered by keyboard and received SMS. If these passwords match, the microcontroller provides necessary control signal to open the bank locker. This method is simple and more reliable than other system.

III.1 RFID FUNDAMENTALS

Basically, an RFID system made up of an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with special information. In the market there are many divergent types of RFID systems. These are classified on the basis of their frequency ranges. Some of the most frequently used RFID kits are low-frequency (30-500 kHz), mid-frequency (900 kHz-1500MHz) and high- frequency (2.4-2.5GHz). Basically, an RFID system exists of three components: an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with special information. An RFID reader is a device that is used for examining an RFID tag. The reader has an antenna which emits radio waves; the tag responds by reverting back its data. An RFID tag is a microchip merged with an antenna in a compact package; the packaging is built to allow the RFID tag to be attached to an object to be traced. "RFID" represents Radio Frequency Identification. The tag's antenna collect signals from an RFID reader or scanner and then returns the signal, generally with some additional data (like a unique serial number or some other customized information). A submissive tag is an RFID tag that does not contain a battery; the power is imparted by the reader. When radio waves from the reader are experienced by a submissive RFID tag, the coiled antenna within the tag forms a magnetic field. The tag drives power from it, exciting the circuits in the tag. The tag then sends the information ciphered in the tag's memory. The RX and TX pins of RFID reader connected to Tx and Rx pins of AT89C51 Microcontroller subsequently. Then the reader senses the data from the Tag and sends the sensed data to microcontroller via serial port.



Figure1. RFID Reader

III.2 GSM modem SIM300 V7.03

The GSM modem is a special type of modem which accepts a SIM card works on a subscriber’s mobile number over a network, just like a mobile phone. Basically, it is a cell phone without display. Modem sim300 is a tri-band GSM/GPRS engine that works on EGSM900MHz, DCS1800MHz and PCS1900MHz frequencies. GSM Modem is RS232-logic level compatible, i.e., it takes -3v to -15v as logic high and +3v to +15 as logic low. MAX232 is used to convert TTL into RS232 logic level translator used between the microcontroller and the GSM board. The signal at pin 11 of the microcontroller is sent to the GSM modem through pin 11 of max232. This signal is received at pin2 (RX) of the GSM modem. The GSM modem sends the signal from pin3 (TX) to the microcontroller through MAX232, which is received at pin 10 of IC1.

Features of GSM

- Single supply voltage 3.2v-4.5v
- Usual power consumption in SLEEP Mode: 2.5Ma
- SIM300 tri-band
- MT,MO,CB, text and PDU mode, SMS storage: SIM card
- Supported SIM Card :1.8V,3V



Figure2. GSM modem

IV. BLOCK DIAGRAM

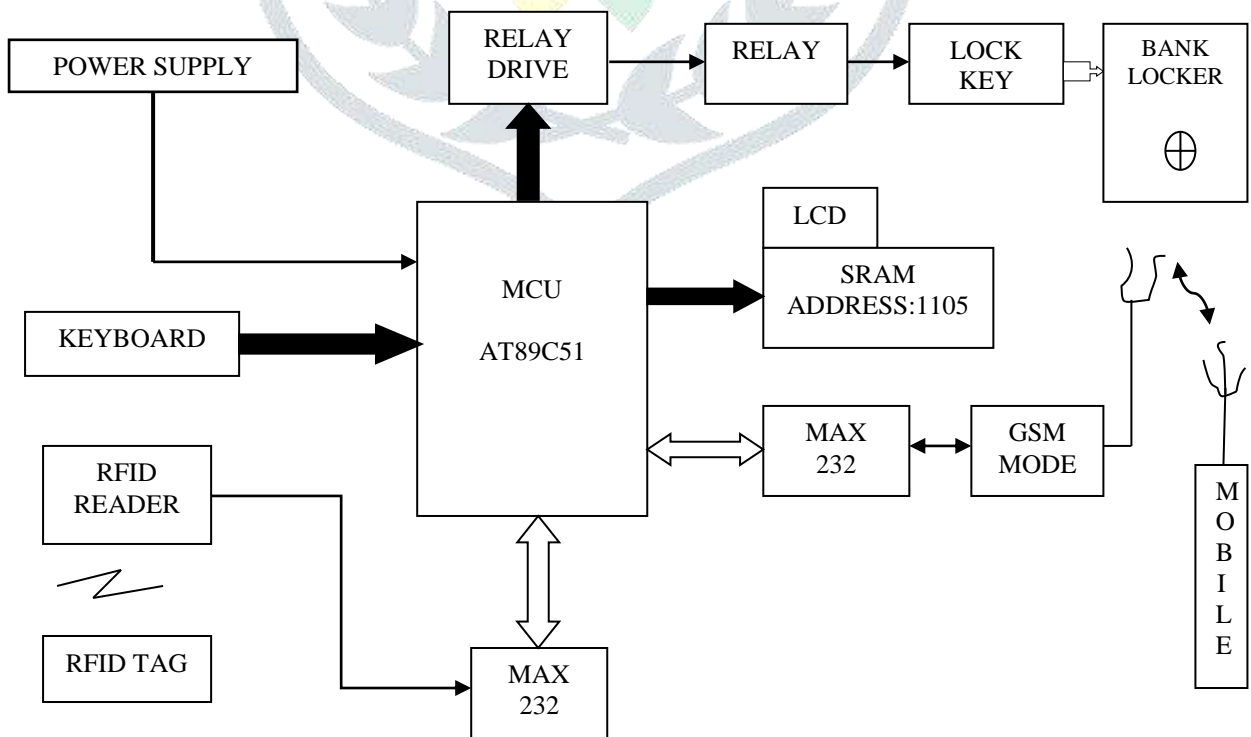


Figure3. Block diagram of Bank locker system based on RFID and GSM technology

The block diagram of Bank locker system is based on RFID and GSM technology as shown in the figure3. It consists of the power supply section, relay driver, , RFID Reader, AT89C51 microcontroller, MAX232driver, keyboard and GSM modem, LCD. The GSM board has a authentic SIM card with adequate recharge amount to make outgoing calls. The circuit is powered by regulated +5v dc.

V. CIRCUIT DESCRIPTION

V.I. Power Supply

The power supply section is essential for any electronics circuits. To drive the power supply, the 230V, 50Hz AC mains is stepped down by transformer X1 to distribute a secondary output of 12V, 500 mA. The transformer output is rectified by a full-wave rectifier having diodes D1 to D4, filtered by capacitor C1 and regulated by ICs 7812 (IC2) and 7805 (IC3). Capacitor C2 neglects the ripples present in the regulated supply. LED1 acts as the power indicator and R1 limits the current through LED1. The power supply part is shown in the figure4.

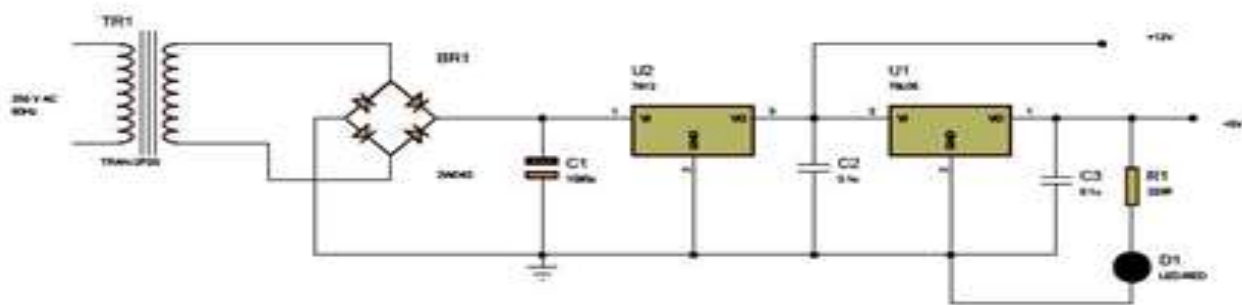


Figure4. Power supply

V.II. Circuit Diagram

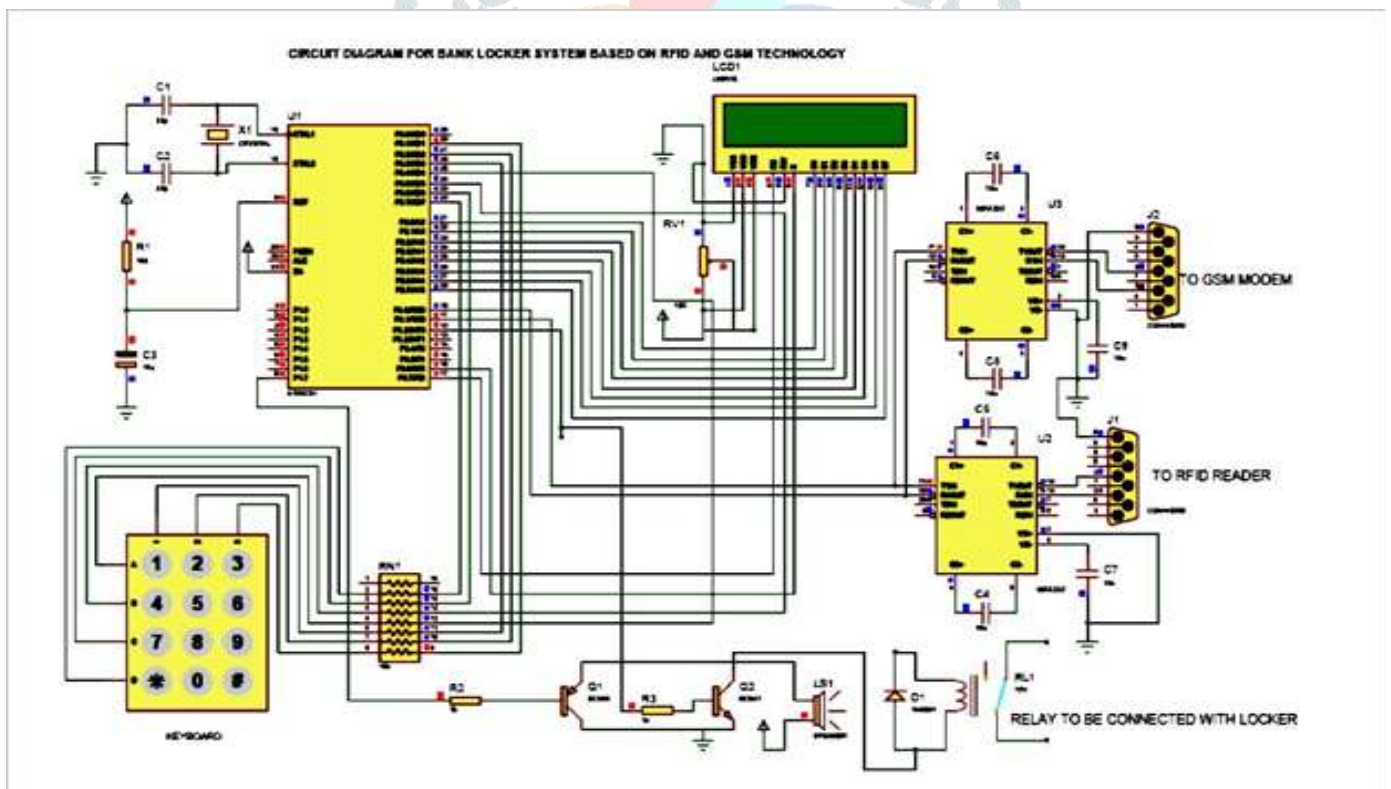


Figure5. Circuit diagram of Bank locker system based on RFID and GSM technology

VI. SOFTWARE PROGRAM TESTING

The software program has been written in c or assembly language and compiled using keil software. After compiler action the hex code is generated and stored in the computer. The hex code of the program is stored into the AT89C51 by using Top win Universal programmer.

VI.1 Hardware Assembling and Testing

First step, we require to make single side PCB layout of the Bank locker system based on RFID and GSM technology for testing the circuit, start as follow

1. After collecting all the components on the PCB, connect TX and RX pins of the GSM modem to pins 13 and 14 of MAX 232 and RFID Reader, respectively and insert a genuine SIM in the card holder of the GSM modem.
2. Connect ground pins of the GSM modem and RFID to the ground rail of the circuit.
3. This project is applied and tested successfully by us.
4. This system is very handy for bank locker, office, homes for keeping money safe.

VI.2 Comparative study of existing and proposed locker system

S.No	Existing system	Proposed system
1	RFID Technologies used	RFID and GSM Technologies used
2	One password is referred	Two password are referred
3	May be in Secured due to robbery of RFID and password	More secured due to double password

VII. CONCLUSIONS

We have executed a Bank locker security system using submissive RFID and GSM. It is a low cost, low in power conception, small in size and standalone system. The microcontroller compares the passwords entered by keyboard and received via mobile phone. If these passwords match the microcontroller provides required control signal to access the bank locker. Alarm will be turn on whenever door is forced to open.

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