

**BANK LOCKER SECURITY SYSTEM BASED ON RFID AND GSM  
TECHNOLOGY*****B.P. SANTOSH KUMAR<sup>1</sup>, S. SHAFIULLA BASHA<sup>2</sup>, C. HARI PRASAD<sup>3</sup>,******G. RUSHMITHA<sup>4</sup>, S. IBRAHIM<sup>5</sup>, S. RESHMA<sup>6</sup>, G. KIRITI<sup>7</sup>,******Associate Professor<sup>1,2</sup>, Academic consultant<sup>3</sup>, Batchelor of Technology Students<sup>4,5,6,7</sup>******Department of Electronics and Communication Engineering, Y.S.R Engineering College of Yogi  
Vemana University Proddatur-516360, Y.S.R (Dt) Andhra Pradesh***

**ABSTRACT:** The main aim of this paper is to design and implement a bank locker security system based on RFID and 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 RFID and GSM technology which include door locking system using RFID and 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 RFID and GSM is more secure than other systems. This system is made up of microcontroller, RFID reader, GSM modem, keyboard, and 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 micro-controller, which will verify the passwords entered by the key board 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 checkout of each user along with basic information of user.

**KEYWORDS:** RFID module, RFID cards, GSM, LCD, locker, keypad, ARDUINO

**I. Introduction**

In this present age, safety has becomes an essential 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 endanger the safety of money in the bank, house, and office. To

overcome the security threat, a most of people will install bunch of locks or alarm system. There are many types of alarm systems available in the market which utilizes different types of sensor. The sensor can detect different types of changes occur in the surrounding and the

changes will be processed to be given out a 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 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 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. There are many different types of RFID systems in the market. These are categorized on the basis of their frequency ranges. Some of the most commonly 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]. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. 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, and fax in a small form factor with low power consumption. [3].in this paper we have designed and implemented a bank locker security system based on RFID and GSM technology. In this system only authentic person can be recovered money from bank locker with two password protection method.

## II. Related Review

This section contains some of the related works with GSM monitoring and RFID usage. In paper [1], 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 paper [2] 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 paper [3] and [4], it projects Zigbee-GSM based Monitoring and Remote-Control System. In these 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 paper [5], 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. Design used in paper [6] has a Prepaid Water Meter System for prepaid billing of water consumption through remote monitoring without any human involvement. This system may be fast and accurate billing of water as well as preventing any mishandling of it. However, paper [7] developed a water meter reading using GSM system that suitable for remote places to monitor the water meter reading before any billing process. This could reduce the use of human resource for reading the meter and issuing a bill. There was also a work on monitoring of electrical meter reading using GSM network done in paper [8]. The system was able of monitoring the meter reading and sent an SMS to the official center for billing purpose. This could reduce the number of estimated reading when the empower person unable to reach the meter.

### III. Proposed Methodology

In this paper, first RFID Reader read the customer RFID tag number then OTP Password sends to registered mobile number using GSM Module and also PIN and OTP number is entered using the matrix keypad , everything is correct the door is opened , otherwise buzzer is enabled and message sends to customer. The Figure 2 of proposed system is achieved by designing an embedded system, which consists of embedded controller, Keypad, RFID module (Radio Frequency Identification) and GSM module. Embedded controller used here is ATMEGA 2560 micro controller. Keypad is used to enter password. GSM module provides communication between user mobile and bank. Here keypad is interfaced I/O lines of micro controller RFID module and GSM module are interfaced with serial port of micro controller. User who wants to do access the bank locker provided with Individual RFID tag. When user accesses the banking they show their RFID Tag. RFID reader reads the information from the tag.

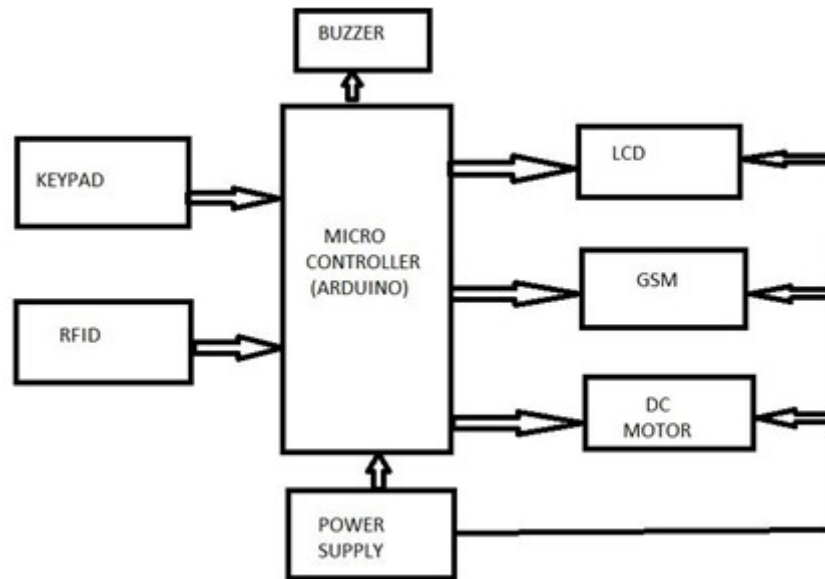


Figure 1: block diagram of proposed model

The micro controller is programmed to receive the RFID tag data from RFID reader and compares this data with already stored authorized data in micro controller. If it matches, it sends a password (OTP) to user's mobile phone. Then user enters the password through the keypad. Finally micro controller sends the details to user mobile through GSM module. If password

is incorrect buzzed is enabled and message send to customer.

### ARDUINO UNO

Arduino is an open source electronic platform based on easy-to-used hardware and software install. Arduino boards are able to read inputs .Over the years arduino has been the brain of thousands of projects, from everyday object to complex scientific instruments.

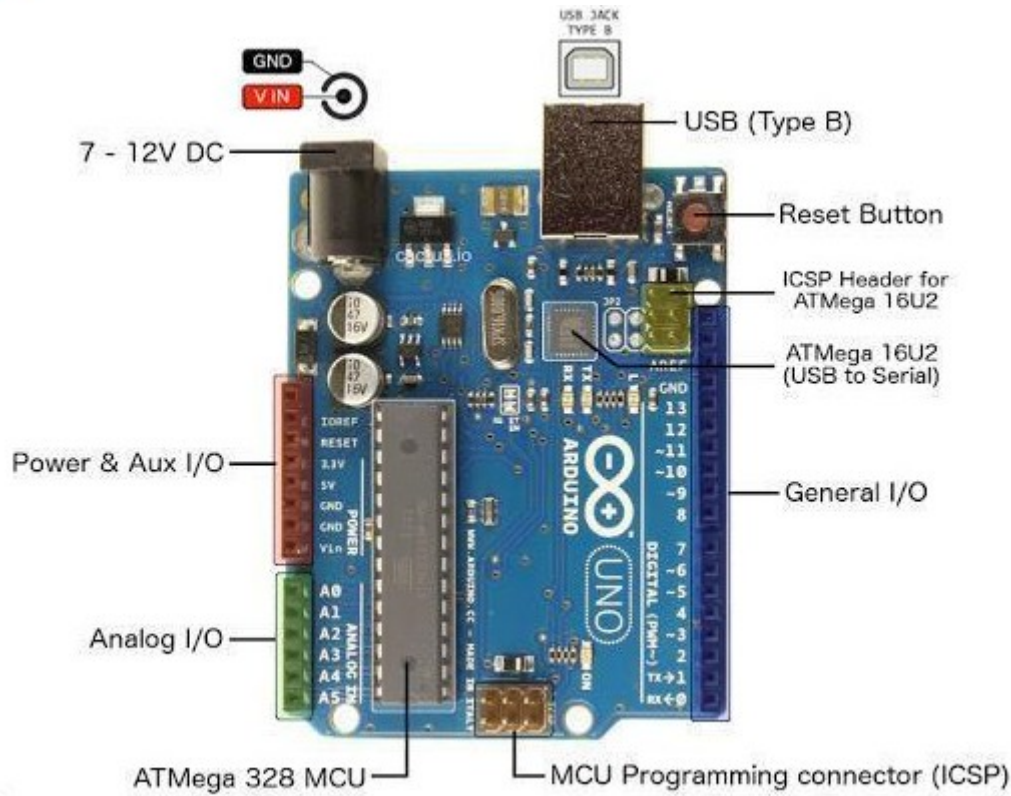


Figure 2: Schematic Diagram for Arduino UNO

A worldwide community of makers-students, artists, programmers and professionals has gathered around this open source platform, their contributions had added up to an incredible amount of accessible knowledge that can be of great help to novices. Arduino was born at the ivrea interaction design institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the arduino board started changing to adopted new needs and changes.

**GSM Technology**

The Global System for Mobile communication, usually called GSM, Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit switched network optimized for full duplex voice telephony.





Figure 3: GSM Mobile

This was expanded over time to include data communications, first by circuit switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS). Further improvements were made when the 3GPP developed third generation (3G) UMTS standards followed by fourth generation (4G) LTE Advanced standards. "GSM" is a trademark owned by the GSM Association.

A GSM network is composed of several functional entities, whose functions and interfaces are specified. Figure 1 shows the layout of a generic GSM network. The GSM network can be divided into three broad parts. The Mobile Station is carried by the subscriber. The Base Station Subsystem controls the radio link with the Mobile Station. The Network Subsystem, the main part of which is the Mobile services Switching Center (MSC), performs the switching of calls between the mobile users, and between mobile and fixed network users. The MSC also handles the mobility management operations. The Mobile Station and the Base Station Subsystem communicate across the Um interface, also known as the air interface or radio link. The Base Station Subsystem communicates with the Mobile services Switching Center across the A interface.

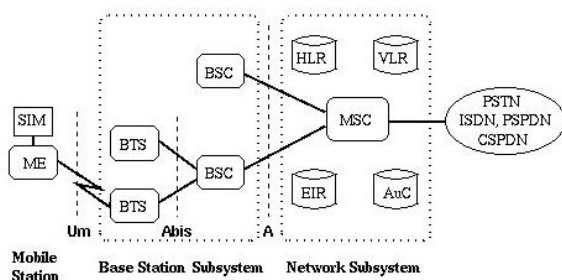


Figure 4: Architecture of GSM Network



Figure 5: RFID Module

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by and read at short ranges (a few meters) via magnetic fields (electromagnetic induction). Others use a local power source such as a battery, or else have no battery but collect energy from the interrogating EM field, and then act as a passive transponder to emit microwaves or UHF radio waves (i.e., electromagnetic radiation at high frequencies). Battery powered tags may operate at hundreds of meters. Unlike a bar code, the tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object.

Basic RFID consists of an antenna, transceiver and transponder. To understand the working of a typical RFID system, check the following animation. Antenna

emits the radio signals to activate tag and to read as well as write information to it. Reader emits the radio waves, ranging from one to 100 inches, on the basis of used radio frequency and power output. While passing through electronic magnetic zone, RFID tag detects activation signals of reader Powered by its internal battery or by the reader signals, the tag sends radio waves back to the reader. Reader receives these waves and identifies the frequency to generate a unique ID. Reader then decodes data encoded in integrated circuit of tags and transmits it to the computers for use.

#### **IV. Results And Analysis**

The output of both software simulation and hardware interface are found to be same. As expected, the RFID gives control to microcontroller by reading the cards and it is found efficient and fast when we use delay with the while loop. The motor driver converted the positive signs that is when both passwords matched to 12v as output to drive the motor.



Figure 6: Displaying the bank locker on the LCD

The use of 4\*3 keypad gives more combination of password instead of 3\*3 keypad. The GSM is found efficient as it sends and receives messages throughout the world and LCD as it is easy to interface. Analysing with the other models it is found more securable as it used two step authentication and GSM technology along with RFID technology.

#### V. Conclusion and Future Scope

We have implemented a Bank locker security system using passive RFID and GSM. It is a low cost, low in power conception, compact in size and standalone system. The microcontroller compares the passwords entered by keyboard and received through mobile phone. If these passwords are correct the microcontroller provides necessary control signal to open the bank locker. Alarm will be turn on

whenever door is forced to open. The microcontroller compares the passwords then the two passwords are matched the bank locker will be opened otherwise the locker will not opened. And also the buzzer will be ON and SMS alert will intimate the authorized Pearson registered mobile phone. Then that is two password verification system then it is the more secure than the other systems, and also more secure than the other systems.

The main goal of this project is to design and implement a bank locker security system based on Finger print and OTP technology. This project is to overcome the above project drawbacks to implement the new proposal and implement. In this system first person enrol user name and password and mobile number. If user name and password matches then Finger of



person will detect and store with ID. If the ID gets matches then four digit code will be sent on authorized person mobile to unlock. So biometric and Bluetooth security is more advantages than other system. The proposed system consists of an LDR (Light Dependent Resistor) based sensor which acts as an electronic eye for detecting the theft or attempt, and a signalling procedure is monitored in smart phone via wireless Bluetooth device. Fingerprint module is used for authorized person to unlock the bank locker. Once a Finger print is scanned it sends an OTP to the registered mobile number. If it matches the locker may unlock. In case of any unauthorized person try to unlock than alert message is send to mobile via Bluetooth to monitor the bank locker security details.

## VI. References

- [1] Malik Sikandar Hayat Khiyal, Aihab Khan, and ErumShehzadi. "SMS Based Wireless Home Appliance Control System (HACS) for Automating Appliances and Security", Issues in Informing Science and Information Technology. Vol. 9. pp. 887 – 894. 2009.
- [2] Al-Ali, A.R. Rousan, M.A. Mohandes, M. "GSM-Based Wireless Home Appliances Monitoring & Control System", Proceedings of International Conference on Information and Communication Technologies: From Theory to Applications, pp 237-238, 2004.
- [3] Carelin Felix and I. Jacob Raglend, "Home Automation Using GSM", Proceedings of 2011 International Conference on Signal Processing, Communication, Computing and Networking Technologies, pp. 15-19, 2011.
- [4]Ahmad A.W., Jan N., Iqbal S. and Lee C., "Implementation of ZigBee-GSM based home security monitoring and remote-control system", IEEE 54th International Midwest Symposium on Circuits and Systems (MWSCAS), 2011, pp. 1-4.
- [5] Md. Wasi-ur-Rahman, Mohammad Tanvir Rahman, Tareq Hasan Khan and S.M. Lutful Kabir, "Design of an Intelligent SMS based Remote Metering System", Proceedings of the IEEE International [3] Conference on Information and Automation, 2009, pp. 1040- 1043
- [6] Islam, N.S. Wasi-ur-Rahman, M. "An intelligent SMSbased remote Water Metering System". 12thInternational Conference on Computers and Information Technology, 2009, 21-23 Dec. 2009, Dhaka, Bangladesh.

- [7] Mohd Helmy Abd Wahab, Siti Zarina Mohd Muji, FazlizaMd. Nazir. "Integrated Billing System through GSM Network". In proceeding of 3rd International Conference on Robotics, Vision, Information and Signal Processing 2007 (ROVISP2007), Penang, 28 – 30 November 2007
- [8] Mohd Helmy Abd Wahab, Azhar Ismail, Ayob Johari and Herdawatie Abdul Kadir. "SMS-Based Electrical Meter Reading". In Proceeding of International Conference on Rural Information and Communication Technology 2009 (r-ICT), 17 – 18 June 2009, Bandung, and Indonesia.
- [9] Parvathy A, Venkata Rohit Raj, Venumadhav, Manikanta, "RFID Based Exam Hall Maintenance System", IJCA Special Issue on "Artificial Intelligence Techniques - Novel Approaches & Practical Applications" AIT, 2011.
- [10] Gyanendra K Verma, Pawan Tripathi, "A Digital Security System with Door Lock System Using RFID Technology", International Journal of Computer Applications (IJCA) (0975 – 8887), Volume 5– No.11, August 2010
- [11] Kumar Chaturvedula .U.P, "RFID Based Embedded System for Vehicle Tracking and Prevention of Road Accidents", International Journal of Engineering Research & Technology (IJERT), Vol. 1 Issue 6, and August – 2012, ISSN: 2278-0181