



SMART BANKING SECURITY SYSTEM

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Abstract - The main purpose of this paper is to design and implement high security system. In our daily lives security and authentication of individuals is necessary especially in bank lockers. We have implemented a locker security system based on face recognition, RFID and GSM technology. RFID reader is provided for authentication of user id. Face Recognition is one of the Biometric systems which are used to identify the individuals and verify their identity. GSM technology is mainly used for sending or receiving data such as message. It is used to intimate message to bank manager. We implemented vibration sensor and temperature sensor on the door side for the security purpose. Timer is on for accessing the bank locker it's locked automatically while user exceeds the time. Each and every user can access the locker through this face recognition efficiently and safely. In this system only authorized person are allowed to access the bank locker.

Keywords: Face Recognition module, RFID, GSM, Sensor, Microcontroller, PC Camera, PCA

1. INTRODUCTION

Banking is one of the sectors where technology and advancements in technologies have not been utilized to the fullest potential. In the security systems even today very old practices are followed like Locker key, passwords or PIN verification. By using technologies, this is easily usable and also easy to implement at a consumer level. In this present age, safety has become 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, most of people will install bunch of locks or alarm system. There are many types of alarm systems available in the market that utilizes different types of sensor. The sensor can detect different types of changes occur in the surrounding and the changes will be processed to give 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 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 card 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. Global system for mobile communication (GSM) is a Globally accepted standard. Several GSM is a common European mobile telephone standard for a mobile cellular radio system operating at 900MHz. In the current work, SIM900A GSM module is used. Christo Ananth et al. [2] discussed about an eye blinking sensor. Nowadays heart attack patients are increasing day by day. "Though it is tough to save the heart attack patients, we can increase the statistics of saving the life of patients & the life of others whom they are responsible for. The main design of this project is to track the heart attack of patients who are suffering from any attacks during driving and send them a medical need & thereby to stop the vehicle to ensure that the persons along them are safe from accident. Here, an eye blinking sensor is used to sense the blinking of the eye. spO2 sensor checks the pulse rate of the patient. Both are connected to micro controller. If eye blinking gets stopped then the signal is sent to the controller to make an alarm through the buffer. If spO2 sensor senses a variation in pulse or low oxygen content in blood, it may results in heart failure and therefore the controller stops the motor of the vehicle. Then Tarang F4 transmitter is used to send the vehicle number & the mobile number of the patient to a nearest medical station within 25 km for medical aid. The pulse rate monitored via LCD. The Tarang F4 receiver receives the signal and passes through controller and the number gets displayed in the LCD screen and an alarm is produced through a buzzer as soon the signal is received. In this system only authentic person can recover money from bank locker with two password protection method.

II. RELATED WORKS

While using bank we use our locker key for our banking. In the previous implementation, RFID Card technologies and password pin verification are used for authentication but these may give a chance for robbery. More level of authentication is needed. CCTV camera systems are used but this kind of system won't give instant alert to the particulars. Biometric accessing system is not involved in the current banking process.

III. PROPOSED SYSTEM

In the proposed system, we are implementing biometric face recognition system, RFID, GSM, vibration, temperature sensor for security purpose. RFID is provided for authentication of user id. If the RFID of the user is verified, further process can be processed. The camera is installed to capture the face of user and the image is sent for processing to recognize the user face with the help of Viola Jones algorithm. If the face of the user is verified, then only the locker system will be opened. Timer is on for accessing the Bank locker it's locked automatically while user exceeds the time and message notification also intimated to manager.

A. BLOCK DIAGRAM

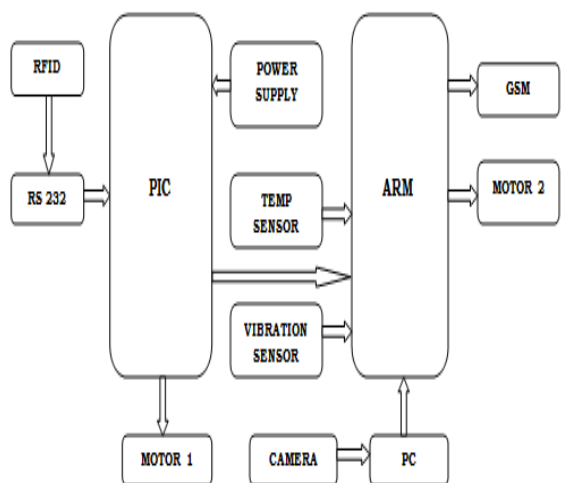


Figure 3.1 Block diagram of the system.

The design of our proposed system is shown above. In this system first the person insert the RFID tag in the RFID reader. This RFID reader is communicated with PIC microcontroller through serial communication. When PIC controller receives the signal from RFID reader it will

produce command to operate motor, which will help to open the door of bank locker room. So now only the person can enter into the room. The camera installed in front of the locker door capture the person's face. The image is analyzed in the image processing tool using the matlab in the PC. This PC will send the result to ARM processor through UART feature of ARM. ARM checks for authentication using viola Jones algorithm. If authentication is true then the processor send signal to motor for opening the door of locker. So he can withdraw his money. In addition to this thief prevention safety technique is provided with the help of vibration sensor and temperature sensor. If they sense any vibration and temperature above the threshold ARM activate the GSM modem to send message to the bank manager. So by implementing this proposed work, more security will be obtained.

PIC

It is High performance RISC CPU machine. Only have 35 simple word instructions. Operating speed: clock input (200MHz), instruction cycle (200nS). It has 368x8bit of RAM (data memory), 256x8 of EEPROM (data memory) and 8kx14 of flash memory. Wide operating voltage range (2.0 – 5.56) volts. It has two 8 bit timer and one 16 bit timer, 10bit multi-channel ADC.100000 times erase/write cycle enhanced memory.1000000 times erase/write cycle data EEPROM memory.

ARM

The LPC2148 micro-controllers are based on a 32/16 bit ARM7TDMI-S CPU core. They have real-time emulation and embedded trace support that combines the micro-controller with embedded high speed flash memory of 512kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. It has serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI and SSP to I2Cs. It has on-chip SRAM of 8kB up to 40kB.

RFID

RFID" stands for Radio Frequency Identification. The tag's antenna picks up signals from an RFID reader or scanner and then returns the signal, usually with some additional data (like a unique serial number or other customized information). RFID system consists of three components: an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with unique information. An RFID reader is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves. The tag responds by sending back its data.

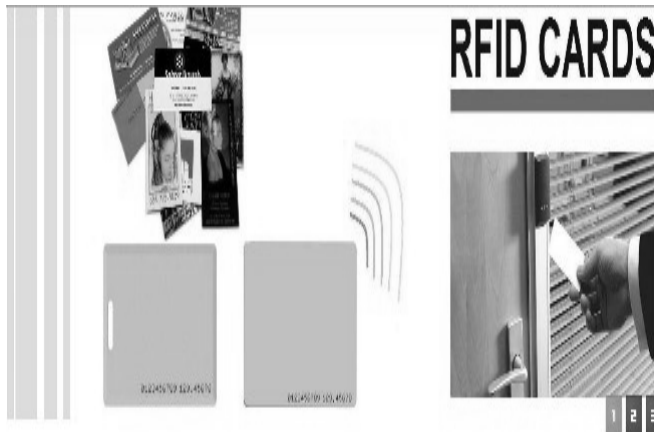


Figure 3.2 RFID

GSM

Global system for mobile communication (GSM) is a globally accepted standard. Several GSM is a common European mobile telephone standard for a mobile cellular radio system operating at 900MHz. A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. In the current work, SIM900A GSM module is used. The SIM900A Module is used which is an ultra compact and reliable wireless module. It works frequencies at 900/1800MHZ. It has applications such as remote control, SMS alerts, sensor monitoring, etc. It delivers voice, data and fax in a small form factor with low power consumption. It is used to intimate message to bank manager when something is detected and recognized.

B. SOFTWARE PROGRAM TESTING

The software program is written in EMBEDDED „C“ language and compiled by HI-TECH C compiler using MPLAB IDE software. The compiler is used to convert middle level language into machine level language. After compiler operation the hex code is generated and stored in the computer. The hex is nothing but machine level language understands by the micro controller. The hex code of the program is burnt into the ROM (Flash memory) of PIC16F877A by using PICKIT2 Programmer.

C. FACE RECOGNITION SYSTEM

Face recognition is the process of identifying one or more people in images or videos by analyzing and comparing patterns. Face recognition is an important part of many biometric, security and surveillance systems, as well as image and video indexing systems. It consists of Image acquisition, Pre-processing, Feature extraction, face detection and Recognition.

Image acquisition: An automated mechanism that scans and captures an image of living personal characteristics.

Pre-processing: Once the input is captured, the original input image or voice signal is processed to remove the noise and blurring effect. The image is localized to extract the region of interest. The voice signal is framed to extract the desired signal. Then this processed input is given to feature extraction module.

Feature extraction: Personal Component Analysis (PCA) technique is used for feature extraction. PCA is an effective feature extraction method based on face as a global feature. It reduces the dimension of images effectively and holds the primary information at the same time. The feature extraction algorithms are applied to get feature vector of the biometric image.

Face detection: Viola Jones Face detection Algorithm is used. Viola Jones algorithm was based on object detection by extracting some specific features from the image.

Database: Another entity which handles compression, processing and storage of the captured data with stored data.

Classifier: Euclidean distance, which is used to classify the feature of images present in the database and test image.

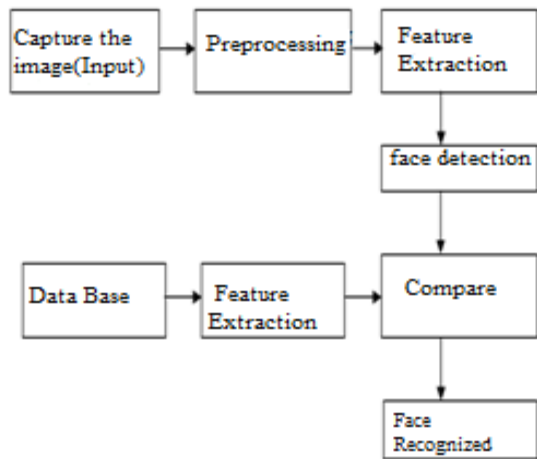


Figure 3.3 Outline of Face recognition



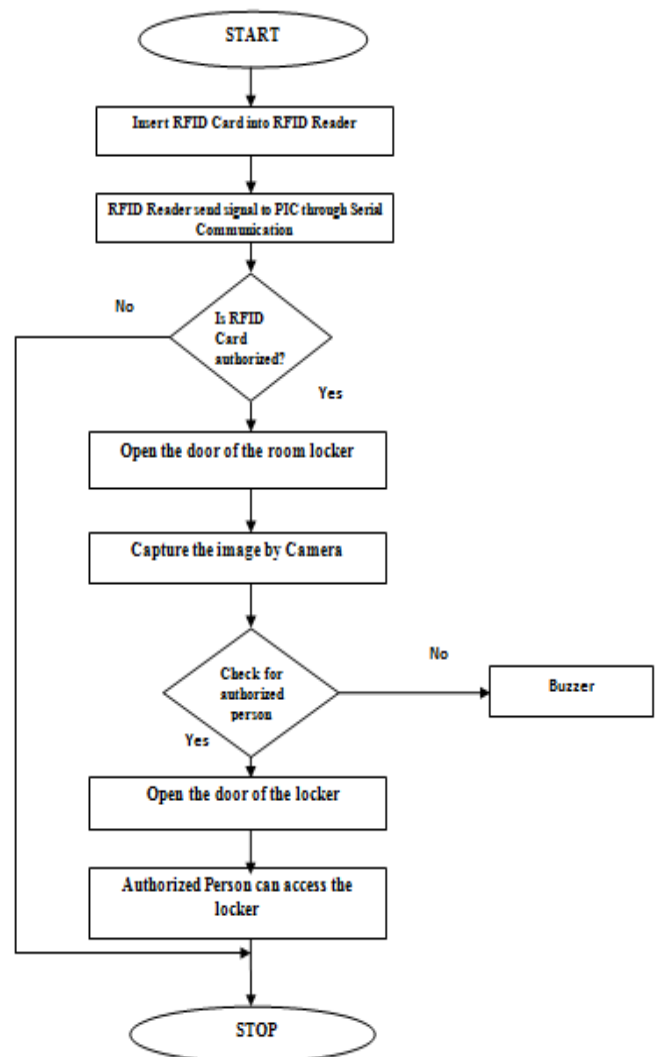
Figure 3.4 Output of Face detection

IV. WORKING PRINCIPLE

The design of our proposed system is explained with the below flowchart. In this system first the person inserts the RFID tag in the RFID reader. This RFID reader is communicated with PIC microcontroller through serial communication. When PIC controller receives the signal from RFID reader it will produce command to operate motor, which will help to open the door of bank locker

room. So now only the person can enter into the room. The camera installed in front of the locker door capture the person's face. The image is analyzed in the image processing tool such that using the mat lab in the PC. This PC will send the result to ARM processor through UART feature of ARM. ARM checks for authentication using viola Jones algorithm. If authentication is true then the processor send signal to motor for opening the door of locker. So he can withdraw his money. In addition to this thief prevention safety technique is provided with the help of vibration sensor and temperature sensor. If they sense any vibration and temperature above the threshold ARM

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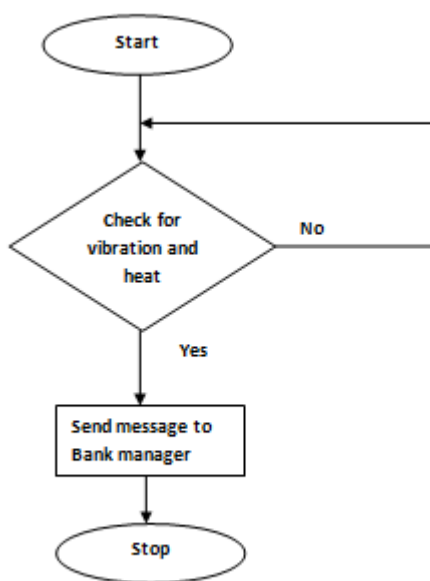


Figure 4.1 Operation Flowchart of the system

V. CONCLUSION

In this paper, we have first reviewed the recently proposed locker key for banking though they are secured there are some disadvantages .It may provide wrong person access the account. So in our project we are implementing sensors vibration, temperature sensor on the door side for security purpose. Two level of authentication password is needed to provide high security. RFID tag is provided for authentication of user id. The camera is installed to capture the face of user and the face recognition is done to recognize the user face. If the thief accesses the bank locker an immediate door lock is applied and message is intimated to bank manager. This system is secure and less cost it will be a best banking system. Timer is on for accessing the bank locker it's locked automatically while

the user exceeds the time as well as message notification also intimated to the manager.

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