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INTELLECTUAL LOCKER PROTECTION SYSTEM BASED ON OPENCV AND USER AUTHENTICATION USING ANDROID

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ABSTRACT

In our day to day life, Security and Authentication of individuals is necessary, especially in Bank lockers. But the security provided by bank systems has some backfalls. It has been enhanced by using techniques like pattern recognition comparing their existing traits and there is still a need for considerable computer vision. In this system a new approach is proposed for banking system. At first pattern flow are collected as data sets and maintained in bank agent server. The machine is attached with a camera to capture the pattern flow of user and sent for processing features of the user is recognized by comparison. Along with the authentication of user there is another system to identify the user before that RFID tag checking . Password entry through mobile phone is needed for next level of security. This can be done by using Bluetooth and also authentication is checked by verification through IMEI number. Finally when all levels of security is finished , the locker is opened for the user and the information is passed to the bank manager. Temperature and vibration sensors are used to find thief entry inside the bank. This project shows that all the bank accounts can be accessed using cards through this pattern recognition effectively and safely.

KEYWORDS: *Security,Authentication,OpenCV,WirelessCommunication,RFIDtags.*

INTRODUCTION

Banking is one of the sectors where technology and its advancements have not been utilized to the fullest be in any security or access systems or even in material handling in banks. For instance in the security systems even today very old practices are followed that can be made lot better using technologies like open CV which is easy to use and implement at a consumer level. In present, safety has become an essential issue for most of the people especially in all areas. Some people might try to cheat or steal the property which may endanger the safety of money in bank, house and work place.

To overcome this security threat, most of the people will install lots of locks or alarm system. There are many alarm systems available in the market that utilizes different types of sensors. The sensor could detect different types of changes occuring in the surrounding and the changes will be processed to give out a alert according to the pre-defined value. At the same time this system may not be the best for all purpose.

In this paper we have implemented safety of the money in the bank locker, house and work place (treasury) by using RFID and GSM technologies that would be more secure than other systems. Radio-frequency identification (RFID) based access-control system allows only authorized persons to open the bank locker using GSM technology. An RFID system contains an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with unique information. There are different types of RFID systems in the market. These are categorized based on their frequency ranges and some of the most commonly used RFID kits are low-frequency (30-500kHz), mid-frequency (900kHz-1500 MHz) and high-frequency (2.4-2.5GHz). The passive tags are light and less expensive than the active tags. 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 900MHz In this work, SIM300.

GSM module is used and it is a Tri-band 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. In this paper we have desi-gned and implemented a bank locker security system based on RFID and GSM technology that allow only authentic person to recover money from bank locker with two password protection method.

EXISTING SYSTEM

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

PROPOSED SYSTEM

Nowadays we are using locker key for banking

though they are secured there are some disadvan tages like it might allow wrong person access the account. Hence in our project we are implementting vibration sensor, temperature sensor on the door side for security purpose and on machine side three levels of authentication is needed.First RFID tag is provided for authentication of user id , next camera is installed to capture the pattern password of user and with the help of image processing using OPENCV. It recognizes the user pattern inorder to provide authentication for banking by password entry through mobile instead of normal keypad entry. For sending password from mobile to locker Bluetooth is used.Mean while validity of IMEI number of mobile is also checked. After completing all levels of authentication check the locker is opened for the user. Information about all these processes are sent to the bank manager through GSM. This system will be a best banking system as it is secured and of less cost. 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.

LITERATURE SURVEY

Ramesh et al., (2012) says that modern Industrialized world security systems can be enhanced by using biometrics together with digital (electronic) code locks which will open the door automatically whenever the series of authentication is verified and gives alert sounds when any mismatch occurs. In this system, microcontroller constantly monitors the sensors of the biometric system (Iris Scanner and Vein Detector), the keypad for the authenticated codes and the output of wireless motion detector which will be active during nights and gives alerts n terms of any changes.

Ramani, et al., (2012) proposed a bank locker security system based on RFID and GSM technology which can be organized in bank, secured offices and homes. In this system only authentic person can recover money from bank locker. The bank locker security system contains door locking system using RFID and GSM which can activate, authenticate and validate the user and unlock the door in real time for secure access. This system consists of microcontroller, RFID reader, GSM modem, keyboard and LCD, where the RFID reader reads the id number from passive 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 original password to open the bank locker, if the person send 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 also creates a log containing check-in and check-out of each user along with basic information of user.

Joshua et al., (2013) says that Bank security is important to provide secured banking for clients and protecting the bank from fraudulent behavior. Here efficient way of security for banks is provided by means of an advanced door lock system. It is used in the fields where security and secrecy is the primary constraint. The main objective is to design digital code that reduces manual interference to the maximum extent along with the ultrasonic motion sensor. The users are given with separate passwords by means of GSM, when they use their RFIDs. If any of the users want to open the door or locker then he needs to enter his password in the system correctly. After that the system sends a message to the user automatically. This message is sent through a GSM Modem.

Pavithra, et al., (2014) proposed the Finger print based bank locker system using microcontroller. Biometrics studies commonly include finger print, face, iris, voice, signature and hand geometry recognition and verification. Among other modalities, Finger Print proves to be one of the best traits providing good mismatch ratio and also reliablility. Hence to improved security to the bank lockers and make the work easier, this project is taking help of two different technologies viz. embedded systems and biometrics.

Chetna et al., (2014) proposes a method to integrate iris recognition with the RFID card to develop a high security access environment. Their system implements iris recognition in Bank Locker System a customer simply has to enter the account number through GUI and gets access to the locker room door when account number and iris image is matched with the record stored database. The mail is sent to the manager as well as to the customer ones get accessed and with the help of the RFID card the customer can access his locker.

Srinivasan et al., (2015) says a secured locker security system could be provided based on RFID, password, conveyer and GSM technology. The implemented locker security system based on RFID, password and GSM technology contains automatic movement of lockers system which can be easily activate, authenticate, and validate the

user in real time for secured locker access.

Shweta et al., (2015) proposes a technique to overcome security threats like thefts and robberies security threats by using Controller and GSM technology in security system. This system activates, authenticates and validates the user and then unlocks the door. It is standalone system controller is used to generate random password whereas GSM technology is used to send the password to the authorized person's mobile phone via SMS.

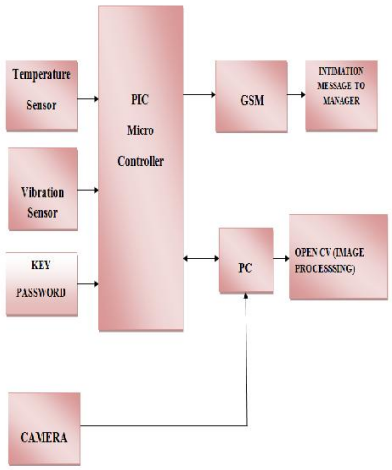
Parvathy et al., (2011) have reported the paper on RFID based exam hall maintenance system, a new method for examination hall management is proposed where a student can possibly identify the particular exam hall from any other hall by swiping the RFID card in a card reader located there. The card reader is placed at the entrance of the building, if the students enters wrong room, a buzzer alarm is set off, otherwise the room number is displayed on the LCD, connected to controller.

CONCLUSION OF LITERATURE SURVEY

A biometric system is essentially a pattern recognition system that identifies a person uniquely based on a feature vector derived from a specific physiological or behavioral characteristic of a person. The behavioral characteristics includes signature, gait, speech keystroke pattern, and gait. These characteristics changes with respect to age and environment. Physiological characteristic include fingerprint, face and iris etc.This character is remaining unchanged through life of person so biometric system operates as verification mode or identification mode depending upon on the requirement of application. In verification mode, the system validates a person's identity by comparing the captured biometric characteristic with the individual's biometric template that is already stored in the system data base. So the biometric is the essential tool for user identification in identify management system. Likewise Face recognition system is also based on the idea that each human being is different and unique in creation with facial structure which are unique to each person like finger print. Though all these biometric systems are useful to identify a user uniquely ,these methods are cost effective and tedious in the part of implementation.

OPENCV

OpenCV supports a wide range of programming languages such as C++, python and such others. OpenCV python is a library of python bindings designed to solve computer vision Problems where Python is a general purpose programming language started by Guido van Rossum that became very popular as it is very quick and more specifically because of its simplicity and code readability. It enables the programmer to express ideas in fewer lines of code without reducing readability. Compared to languages like C/C++, Python is slower. That said, Python can be easily extended with C/C++, which permits us to write computationally intensive code in C/C++ and create python wrappers that can be used as python modules.



SOFTWARE PROGRAM TESTING

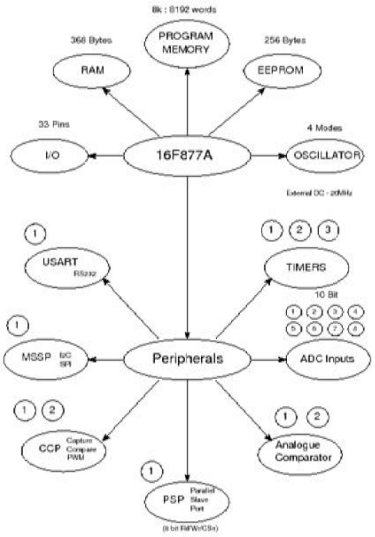
The software program is written in EMBEDDED 'C' language and compiled by HI-TECH C compiler using MPLAB IDE software. This compiler is used to convert middle level language into machine level language. After compiler operation the hex codes are generated and stored in the computer where the hex codes are codes that is understood by the micro controller. The hex code of the program is burnt into the ROM (Flash memory) of PIC16F877A by using PICKIT2 Programmer.

RFID

"RFID" stands for Radio Frequency Identification. The RFID tag's antenna picks up signals from an RFID reader or scanner and then returns the signal with some additional data like a unique serial number or other customized number information. RFID system consists of three components namely an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with some 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 which the tag responds by sending back its data.

PIC16F877A

PIC16F877A is High performance RISC CPU machine that has only have 35 simple word instructions. Some vital features of PIC16F877A are Operating speed: clock input (200MHz), instruction cycle (200nS), Up to 368×8bit of RAM (data memory), 256×8 of EEPROM (data memory), 8k×14 of flash memory. Wide operating voltage range (2.0 – 5.56) volts,28 bit timer and one 16 bit timer is available, 10bit multi-channel A/D converter, Synchronous Serial Port (SSP) with SPI (master code) and I2C (master/ slave). 100000 times erase/ write cycle enhanced memory.1000000 times erase/write cycle data EEPROM memory.



GSM

The GSM modem is a specialized modem that accepts a SIM card operating on a subscriber's mobile number over a network, just like a cellular phone. Modem sim900 is a tri- band GSM/GPRS engine that works on EGSM900MHz, DCS1800 MHz and PCS1900MHz frequencies. GSM Modem is RS232-logic level compatible. In the pin configuration the signal at pin 11 of the microcontroller is sent to the GSM modem through pin 11 of MAX 232.This signal is received at pin2 (RX) of the GSM modem. Then the GSM modem transmits the signal from pin3 (TX) to the microcontroller through MAX232, which is received at pin 10 of IC1.

BLUETOOTH DEVICE

Bluetooth is a frequency hopping wireless communication technology. As shown below in the scrolling spectrogram display, the Bluetooth device (the red/yellow energy squares) hops across the full 2.4 GHz Wi-Fi frequency band. This is easily seen in the scrolling spectrogram display, but more difficult to see in spectrum analyzer displays as its shows only frequency and amplitude information with limited time- domain information.

TEMPERATURE SENSOR

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 is rated to operate over a −55˚ to +150˚C temperature range. With this feature of LM35 ,we can create a digital thermometer easily by using LM35 temperature sensor and interfacing it with any microcontrollers.

VIBRATION SENSOR

A capacitive vibration sensor or an accelerometer is formed from a capacitor one plate of which is a proof mass, with the other plate fixed to a substrate. Vibration sensors are utilized in a various applications to measure acceleration and/ or vibration activity. Vibration sensors are useful for monitoring the condition of rotating machinery where overheating or excessive vibration could indicate excessive loading, inadequate lubrication, or bearing wear.

RESULTS

The following figures indicates results of proposed system

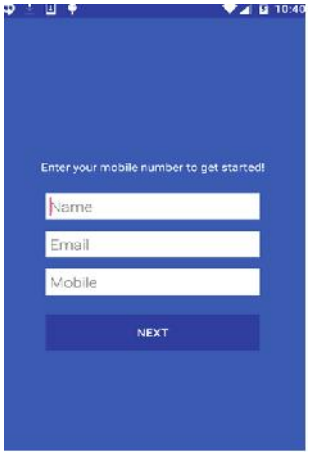


Figure 1: User installing Bank Application

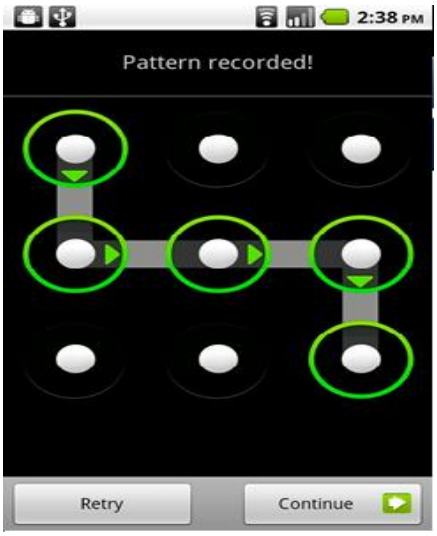


Figure 2: Initial entry of User locker pattern in Bank Application

Figure 3: RFID card for next level locker access

Figure 4: OTP Generation

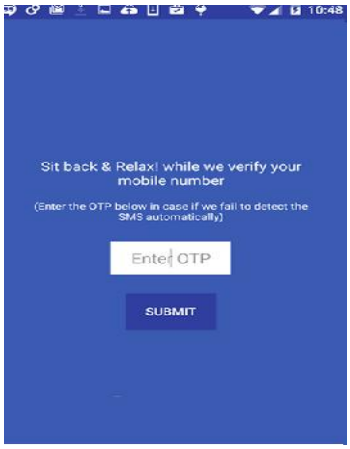


Figure 5: Entry of OTP in Bank Application

Table 1: RFID Benefits

Properties	Passive chip	Active chip
Characteristics	No battery	Battery integrated into the chip with an active transmitter and receiver. Generally equipped with sensors
Cost	Minimum 5/10 Euro cents	A few Euros
Stakes and crucial factors	• Reduced size of chips • Very low cost • Low reading distance • Frequency • High reading rate* • Non-hostile environment (metallic /non liquid)	• Limited energy consumption to increase chip lifespan • Medium to long reading distance • High security • Effective interface with captors

CONCLUSION

In this paper, we have reviewed the recently proposed where we are using locker key for banking. Though they are Secure there are some pitfalls in them. 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 and on machine side three level of authentication is needed .First one is RFID tags for authentication of user id, next is camera which is installed to capture the pattern password of user. With the help of image processing using OPEN CV we can recognize the user pattern and authenticate them through keypad password sent to their mobiles that is parallelly verified with the registered IMEI numbers of account users. This is another level authentic-

cation.for users access to bank lockers, Incase of theft or stealing or the user exceeds the time a message notification is intimated to the manager and the locker door gets locked automatically. This security system is secure and less cost as simple hard wares are used to provide rich security for accessing the bank locker.

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