FINGERPRINT BASED ATM SYSTEM

A Report for the Evaluation 3 of Project 2

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ABSTRACT

Identification and verification of a person today is a common thing; which may include door-lock system, safe box and vehicle control or even at accessing bank accounts via ATM, etc which is necessary for securing personal information. The conventional methods like ID card verification or signature does not provide perfection and reliability. The systems employed at these places must be fast enough and robust too. Use of the ATM (Automatic Teller Machine) which provides customers with the convenient banknote trading is facing a new challenge to carry on the valid identity to the customer. Since, in conventional identification methods with ATM, criminal cases are increasing making financial losses to customers. : The main purpose of our system to make online transaction more secure and user-friendly. Now days Biometric technology is increasing rapidly. Biometric is used for personal identification. Here we are using Fingerprint scanning biometric to provide access to ATM machine. Data of a fingerprint is stored in database using the enrollment process through the Bank.

Keywords- Fingerprint sensor (FIM3030), Microcontroller (LPC2148)

INTRODUCTION

Biometrics is a technology that helps to make your data extremely secure, unique all the users by way of their personal physical characteristics. Biometric information can be used to perfectly identify people by using their fingerprint, face, speech, iris, handwriting, or hand geometry and so on. Using biometric identifiers offers several advantages over traditional and current methods. Tokens such as magnetic stripe cards, smart cards and physical keys, can be stolen, lost, replicated, or left behind; passwords can be shared, forgotten, hacked or accidentally observed by a third party . There are two key functions offered by a biometric system. One technique is identification and the other is verification. In this paper, we are concentrating on identifying and verifying a user by fingerprint recognition.

A modern ATM is typically made up of the devices like CPU to control the user interface and devices related to transaction, Magnetic or Chip card reader to identify the customer, PIN Pad, Secure crypto-processor generally within a secure cover, Display to be used by the customer for performing the transaction, Function key buttons, Record Printer to provide the customer with a record of their transaction, to store the parts of the machinery requiring restricted access -Vault , Housing for aesthetics, Sensors and Indicators. Fingerprint technology is the most widely accepted and mature biometric method.

To implement this concept, we have studied different research works and found following information. For fingerprint recognition, a system needs to capture fingerprint and then follow certain algorithm for fingerprint matching. The research paper discusses a minutiae detection algorithm and showed key parameters of

fingerprint image for identification. For solving the bugs of traditional identification methods, the author of designs a new ATM terminal customer recognition system. The chip of S3C2440 is used for the core of microprocessor in ARM9 and an improved enhancement algorithm of fingerprint image. If images of fingerprint are poor-quality images, they result in missing features, leading to the degrading performance of the fingerprint system. Thus, it is very important for a fingerprint recognition system to estimate the quality and validity of the captured fingerprint images. Existing approaches for this estimation are either to use of local features of the image or to use of global features of the image . Traditional fingerprint recognition approaches have demerits of easy losing rich information and poor performances due to the complex type of inputs, such as image rotation, poor quality image enrollment, incomplete input image, and so on. Thus in order to overcome these shortcomings, in research paper , a new fingerprint recognition scheme based on a set of assembled invariant moment (geometric moment and Zernike moment) features to ensure the secure communications is proposed. In paper , fuzzy features match (FFM) based novel method on a local triangle feature is set to match the deformed fingerprints. Fingerprint here is represented by the fuzzy feature set: the local triangle feature set. Fingerprint scanning is one of the type of biometrics system .We are using finger for accessing the ATM machine for transaction. We are using this system because its easy to install. We don't have to remove the current ATM machine. The working process of ATM fingerprint deal with accessing the data from server.

Before accessing process we need to get authentication from bank. Bank employee scan fingerprint using biometric machine. Biometric machine extract the feature of fingerprint and store in to database this complete process is called enrolment process.

When customer want to use the ATM machine with Biometric Scanned first he have
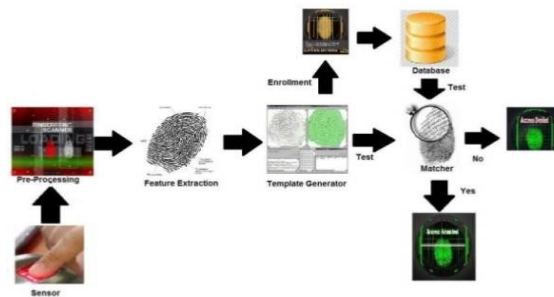

to place his finger at Biometric scanner will scan his feature and compare that extracted feature with stored Feature, if feature matches than the person is allowed for transaction otherwise it not process.

EXISTING SYSTEM

ATMs extend traditional banking hours by dispensing cash and making other transactions available 24 hours a day. At the beginning of 1974, there were only 1,656 operating ATMs. Today, online debit cardholders initiate approximately 12 billion ATM transactions per year at thousands of ATMs. In modern cash machines, the customer is identified by inserting a plastic ATM card with a magnetic stripe or a plastic smart card with a chip that contains a unique card number and some security information such as an expiration date. Authentication is provided by the customer entering a personal identification number (PIN) [8-wiki]. PIN is a four digit number which is generated by the respective financial institution. PIN is very easily remembered and is also changeable according to the user and PINs are 4-digit numbers in the range 0000-9999 resulting in 10,000 possible numbers, so that an attacker would need to guess an average of 5000 times to get the correct . The PIN supplied by the customer is always compared with the recorded reference PIN in the financial institutions. In the present system, the user has to insert the card and the PIN number. If PIN is correct, the system allows for transaction. Otherwise, the system asks for PIN again and it allows maximum of three times to enter it.

PROPOSED SYSTEM

The proposal is to use fingerprints in ATMs as passwords involved with the PIN number. Fingerprint recognition will make users relax by preventing unauthorized account access and assuring security. Here, a fingerprint module generates 4-digit code as a message to the customer's assigned mobile number by placing finger on it and on the basis of validation of this code, customers are allowed for further access.
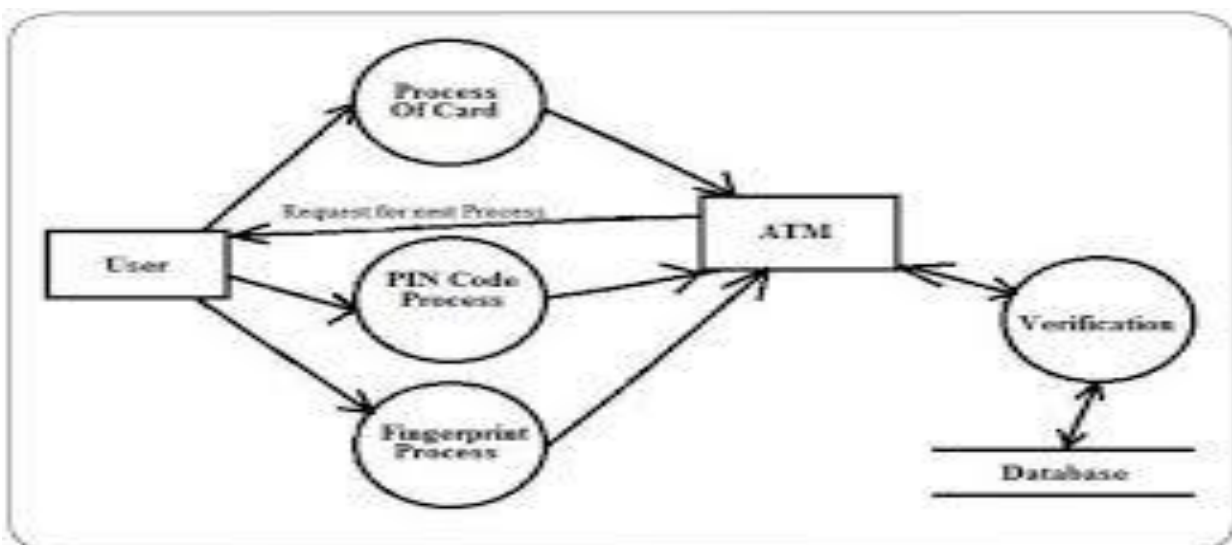
 A fingerprint in its narrow sense is an impression left by the friction ridges of a human finger. In a wider use of the term, fingerprints are the traces of an impression from the friction ridges of any part of a human hand. A friction ridge is a raised portion of the epidermis on the fingers and toes (digits), the palm of the hand, consisting of one or more connected ridge units of friction ridge skin. Fingerprint verification is to verify the authenticity of one person by his fingerprint and PIN code and Fingerprint identification is by matching the information of user such as pin code

and fingerprint matching.

Basically we can explain complete Fingerprint base ATM system in two phases:

1) Enrolment Phase

2) Authentication phase

1. Enrolment phase:

In the robust fingerprint application, 3-4 fingers should be enrolled. This enables the system to set high security threshold and still be able to cope with everyday real life issue like skewed finger placement dirty, wet dry, cut or worn fingers. Biometric reference data is collected enrolment and stored in database or in portable data carrier such

Fig: Enrolment Phase
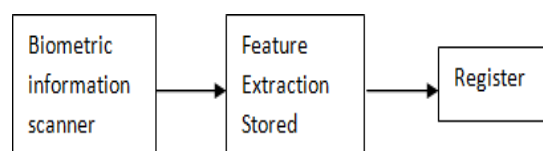
The Enrolment is crucial because the once recorded reference data will normally be used over the active lifetime of user or his/her biometric hardware device.

Multiple Finger enrolment: It is strongly recommended enrolling more than one finger. During daily life injuries can happen that turn a registered fingerprint currently unusable while minor cuts not affect a robust sized sensor system
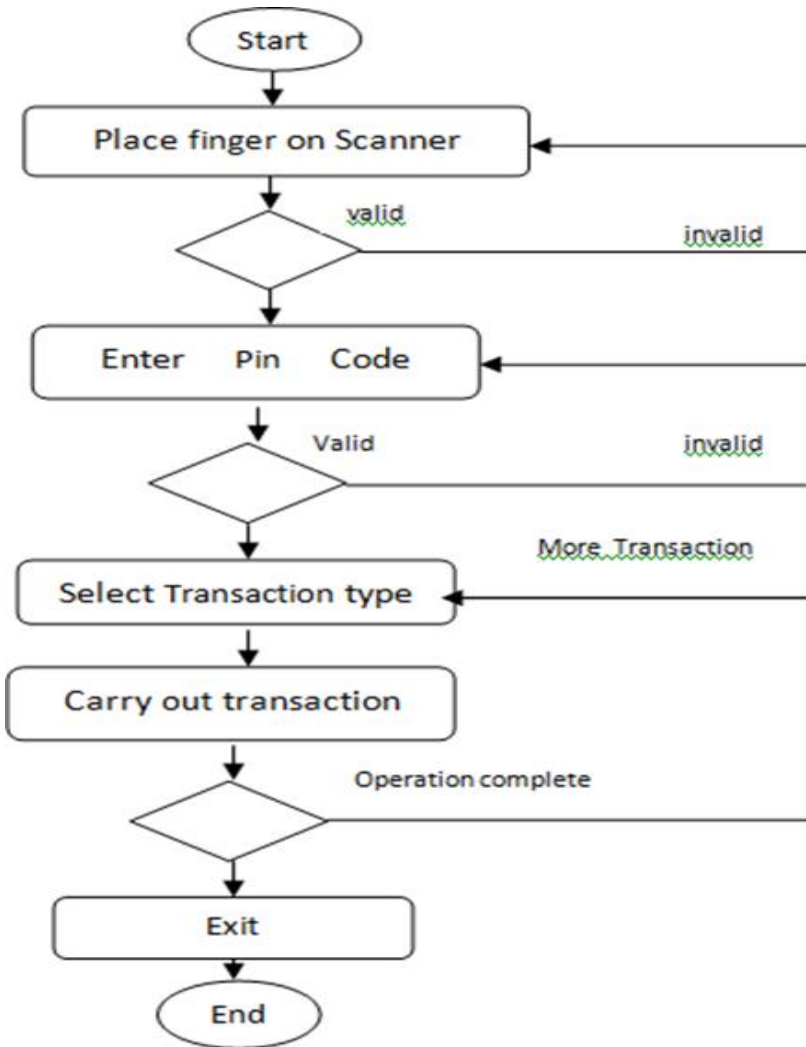
2.   Authentication Phase

In these phase user can make transaction by using their fingers. User can place finger on the Biometric scanner

and user's finger scan can be matched through database, where all authenticated user's fingerprints are stored .If User wants to do transaction they simply place their finger on biometric scanner and get their money in few seconds. If user's fingerprint cannot matched by database due to some accidental cuts on their fingers than they can used their other fingers and we will also provide a 4 pin code option ,user can also use this option with their convinces.

Feature extraction:

Feature extraction from a fingerprint image is generally categorized into three levels. Feature can used to categorize into major pattern type such as loop or whorl. The main objective of this system is to develop a system that will increase the ATM security. However, despite the numerous advantages of ATM system, ATM fraud has recently become more widespread. In recent years, biometric authentication has grown in popularity as a means of personal identification in ATM authentication systems.

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         ▼
    ┌──────────────────────────────────┐◄──────────────┐
    │    Place finger on Scanner        │               │
    └─────────────────┬────────────────┘               │
                      ▼        valid                    │
                    ◇─────────────────── invalid ───────┘
                      │
                      ▼
    ┌──────────────────────────────────┐◄──────────────┐
    │    Enter   Pin   Code             │               │
    └─────────────────┬────────────────┘               │
                      ▼        Valid                    │
                    ◇─────────────────── invalid ───────┘

                                    More Transaction
    ┌──────────────────────────────────┐◄──────────────┐
    │    Select Transaction type        │               │
    └─────────────────┬────────────────┘               │
                      ▼                                 │
    ┌──────────────────────────────────┐               │
    │    Carry out transaction          │               │
    └─────────────────┬────────────────┘               │
                      ▼     Operation complete          │
                    ◇───────────────────────────────────┘
                      │
                      ▼
    ┌──────────────────────────────────┐
    │    Exit                           │
    └─────────────────┬────────────────┘
                      ▼
                    ┌─────────┐
                    │   End   │
                    └─────────┘
```

AUTHENTICATION PHASE

IMPLEMENTATION

This software is implemented by the steps as follows: first of all. The system is initialized to implement specific task, such as checking ATM system, GSM communication and so on, and then each module reset for ready to run commands. Before using ATM terminal, the mobile number and fingerprint of the customer is
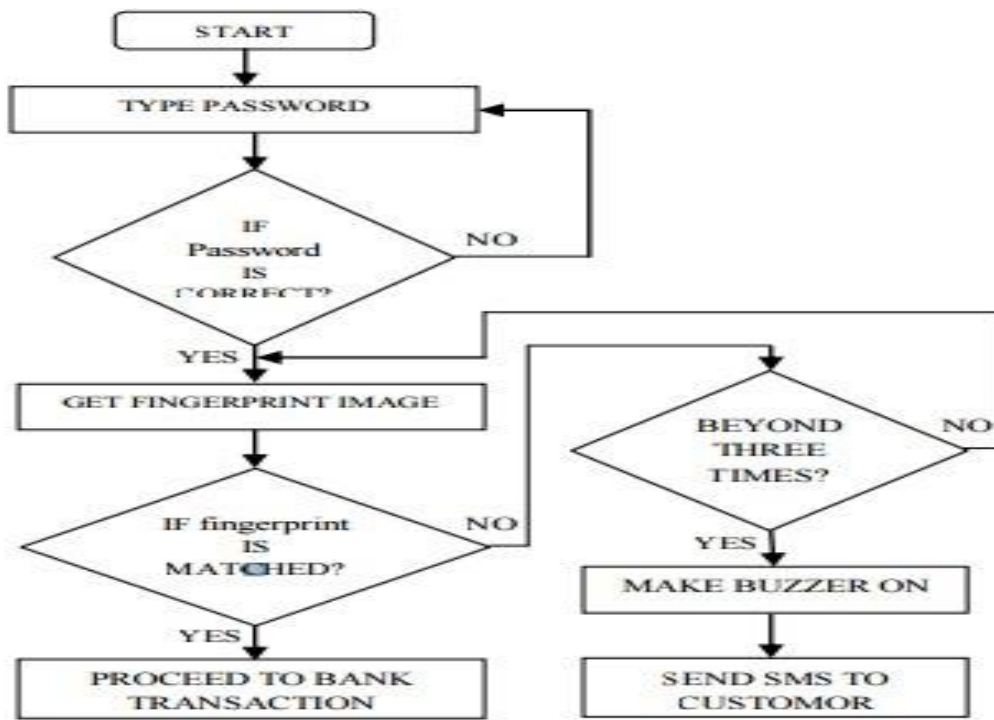

Fig 4: Realization of flow of tasks for the proposed system.

Required. ATM machine increase the reliability of the bank organization by providing the easy access to the cash transaction. We can withdraw the cash anywhere and anytime without waiting in queue. Hence, ATM card is used wildly but we have to face the fraud related to the ATM transaction . To make ATM transaction more secure we are using biometric scanning machine to identify the account holder. Finger is unique identity of each person so the use of Biometric Fingerprint scanner we can avoid ATM related fraud. The Security feature enhanced stability and reliability of owner recognition .The whole system designed by using technology of embedded system which makes the system more secure, reliable and easy to use.

HARDWARE DESIGN

To implement the proposed security for ATM terminals with the use of fingerprint recognition, we use the different hardware and software platforms. Fig shows the major system modules and their interconnections
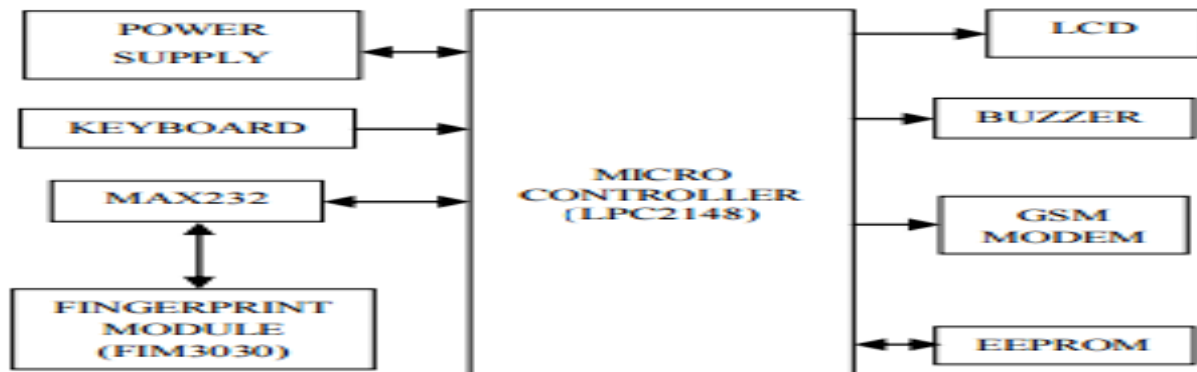
The design of fingerprint recognition algorithm recognition is so vital for the whole system. We would approach two steps to process the images of fingerprint.

1) The detail of fingerprint recognition process.

The first step was the acquisition of fingerprint image by above device mentioned in the algorithm, and the results could be sent to the following process. secondly, pre-processing the images acquired. After obtain the fingerprint image, it must be pre-processing. Generally, pre-processing of one's is filtering, histogram computing, image enhancement and image binarization. Lastly, the characteristic value was extracted, and the results of the above measures would be compared with the information of owner's fingerprint in the database so as to verify whether the character is matched, and then the system returned the results matched or not.

2) The design of fingerprint image enhancement

Fingerprint recognition module is an extremely important part of the system, the high-quality images was the major factors of influencing the performance in the system. The algorithm of fingerprint recognition

based on the algorithm of Gabor and direction filter was used.
fingerprint enhancement algorithm based on Gabor filter could be better
to remove noise, strengthen the definition between the ridge and valley,
it could significantly improve the image enhancement processing
capacity, but this algorithm was slow in dealing with the high capacity
require

RESULT

Fingerprint is dependable biometric trait as it is an idiosyncratic and dedicated. It is a technology that is increasingly used in various fields like forensics and security purpose. The vital objective of our system is to make ATM transaction more secure and user friendly. This system replaces traditional ATM cards with fingerprint. Therefore, there is no need to carry ATM cards to perform transactions.

The money transaction can be made more secure without worrying about the card to be lost. In our system we are using embedded system with biometrics i.e r305 sensor and UART microcontroller. The Fingerprint and the user_id of all users are stored in the database. Fingerprints are used to identify whether the Person is genuine. A Fingerprint scanner is used to acquire the fingerprint of the individual, after which the system requests for the PIN (Personal Identification Number). The user gets three chances to get him authenticated. If the fingerprints do not match further authentication will be needed. After the verification with the data stored in the system database, the user is allowed to make transactions.

1) The existing ATM machine uses PIN-Card as a security which is very weak and easy to contravene. This paper tries to find a solution to the above problems by introducing fingerprint authentication into the existing ATM machine. A program prototype was designed to imitate a typical ATM system that uses fingerprint identification to enhance the security of the ATMs. The proposed system demonstrated a three-tier architectural structure. The verification system which centered on the enrolment, enhancement, feature extraction and matching of fingerprints. The backend database system that serves as warehouse of the templates of all ATM account holders' pre-registered fingerprints. The system's platform creates related transactions such as withdrawals, bill payment, buying of credit cards and balance enquiries etc. The results obtained confirm that the current approach could significantly reduce ATM fraud if not totally eradicate. The main objective of this system is to develop an system, which is used for ATM security

applications. In these systems, Bankers will collect the customer finger prints and mobile number while opening the accounts then customer only access ATM machine. The working of these ATM machine is when customer place finger on the finger print module when it access automatically generates every time different 4-digit code as a message to the mobile of the authorized customer through GSM modem connected to the microcontroller. The code received by the customer should be entered by pressing the keys on the screen. After entering it checks whether it is a valid one or not and allows the customer further access.

CONCLUSION

ATM machine increase the reliability of the bank organization by providing the easy access to the cash transaction. We can withdraw the cash anywhere and anytime without waiting in queue. Hence, ATM card is used wildly but we have to face the fraud related to the ATM transaction . To make ATM transaction more secure we are using biometric scanning machine to identify the account holder. Finger is unique identity of each person so the use of Biometric Fingerprint scanner we can avoid ATM related fraud. The Security feature enhanced stability and reliability of owner recognition .The whole system designed by using technology of embedded system which makes the system more secure, reliable and easy to use.

The Implementation of ATM security by using fingerprint recognition and GSM MODEM took advantages of the stability and reliability of fingerprint characteristics. Additional, the system also contains the original verifying methods which was inputting owner's password which is send by the controller. The security features were enhanced largely for the stability and reliability of owner recognition. The whole system was build on technology. In the present days it is being used for computer network access and entry devices for building door locks. Fingerprint readers are being used by banks for ATM authorization and are becoming more common at grocery stores where they are utilized to automatically recognize a registered customer and bill their credit card or debit account. Finger-scanning technology is being used in a novel way at some places where cafeteria purchases are supported by a federal subsidized meal program. The system can be extended using a GSM module. The GSM module sends alert messages to the respective authorities when unauthorized person"s finger print is detected.

REFERENCES

[1] The Biometric Consortium, "Introduction to Biometrics", (http://www.biometrics.org), 2006.

[2] D. Maltoni, D. Maio, A.K. Jain, and S. Prabhakar, "Handbook of Fingerprint Recognition", Springer, London, 2009.

[3] Samir Nanavati, Michael Thieme, and Raj Nanavati, "Biometrics: Identity Verification in a Networked World", John Wiley & Sons, 2002.

[4] Julian Ashbourn, "Biometrics: Advanced Identity Verification", Springer-Verlag, London, 2002.

[5] Edmund Spinella, "Biometric Scanning Technologies: Finger, Facial and Retinal Scanning", SANS Institute, San Francisco, CA, 2003.

[6] Peatman, John B., "Design with PIC Microcontrollers", Pearson Education, India, 1998.

[7] Microchip Technology Inc., "PIC16F87XA data sheet, DS39582S

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BONAFIDE CERTIFICATE

Certified that this project. "FINGER PRINT BASED ATM SYSTEM". Is the bonafide work of. "ANKIT SINGH(1613101144)" who carried out the project work under my supervision .

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