



ARM BASED MODERN SYSTEM IMPLEMENTED FOR TRANSACTIONS ON ATM DESIGNED TERMINAL

G.UDAYA SREE¹,M.VINUSHA²,R.V.KRISHNAIAH³

¹Assistant Professor ECE, JNTU Hyderabad, DRKIST Hyderabad, Andhra Pradesh, India
Udaya2222@gmail.com

²Associate Professor ECE, JNTU Hyderabad, DRKIST Hyderabad, Andhra Pradesh, India
Vinu.mandava@gmail.com

³ Professor CSE, JNTU Hyderabad, NIT Warangal, Andhra Pradesh, India
r.v.krishnaiah@gmail.com

Abstract- The purpose of this project is to increase the security that customer who uses ATM machine. Once user's bank card is lost and the password is stolen, the criminal will draw all cash in the shortest time, which will bring enormous financial losses to customer, so in order to rectify this problem we are implementing this project. Now a days using the ATM (Automatic Teller Machine) which provide customers with the convenient bank transactions. However, the financial crime case rises repeatedly in recent years; a lot of criminals tamper with the ATM[5] terminal and steal user's credit card and password by illegal means. Once user's bank card is lost and the password is stolen, the criminal will draw all cash in the shortest time, which will bring

enormous financial losses to customer. Due to all this reasons we have proposed this project which can save customers money from criminals. Traditional ATM systems authenticate generally by using the credit card and the password, the method has some defects. Using credit card and password cannot verify the client's identity exactly. In recent years, the algorithm that the fingerprint recognition continuously updated, which has offered new verification means for us, the original password authentication method combined with the biometric finger module which we can protect our money from illegal activities.

Keywords-ATM terminal; ARM9; fingerprint recognition; image enhancement; Gabor filtering

1.INTRODUCTION

With the development of computer network technology and e-commerce, the self-service banking system has got extensive popularization with the characteristic offering high-quality 24 hours service for customer. Nowadays, using the ATM (Automatic Teller Machine) which provides customers with the convenient banknote trading is very common. However, the financial crime case rises repeatedly in recent years, a lot of criminals Tamper with the ATM terminal and steal user's credit card and password by illegal means. Once user's bank card is lost and the password is stolen, the criminal will draw all cash in the shortest time, which will bring enormous financial losses to customer. How to carry on the valid identity to the customer becomes the focus in current financial

circle.

Traditional ATM systems authenticate generally by using the credit card and the password, the method has some defects. Using credit card and password cannot verify the client's identity exactly. In recent years, the algorithm that the fingerprint recognition continuously updated, which has offered new verification means for us, the original password authentication method combined with the biometric identification technology verify the clients' identity better and achieve the purpose that use of ATM machines improve the safety effectively.

2. THE CHARACTERISTICS OF THE SYSTEM DESIGN

The embedded ATM client authentication system is based on fingerprint recognition which is designed after analyzed existed ATM system.

Fingerprint recognition: The masters' fingerprint information[2,3] was used as the standards of identification. It must certify the feature of the human fingerprint before using ATM system.

Remote authentication: System can compare current Client's fingerprint information with remote Fingerprint data server.

Telephone alarming: Once an exception happens, such as log in as the fake identity, the system will start the phone alarm to inform client and bank staff as soon as possible.

Message alarming: the message can be send to the relevant staffs mobile phone without any noise, in order to carry on emergency processing.

Police network connection: The system can call the police via the police network.

Two discriminant analysis methods: Besides the fingerprint recognition, the mode of password recognition can be also used for the system.

3.HARDWARE DESIGN AND SOFTWARE DESIGN

The design of entire system consisted of two part which are hardware and software.

The S3C2440 chip is used as the core of entire hardware. Furthermore, the modules of LCD, keyboard, alarm, fingerprint recognition are connected with the main chip (S3C2440)[10,11,12].The SRAM and FLASH are also embodied in the system. There are some modules consisted of the system as follows:

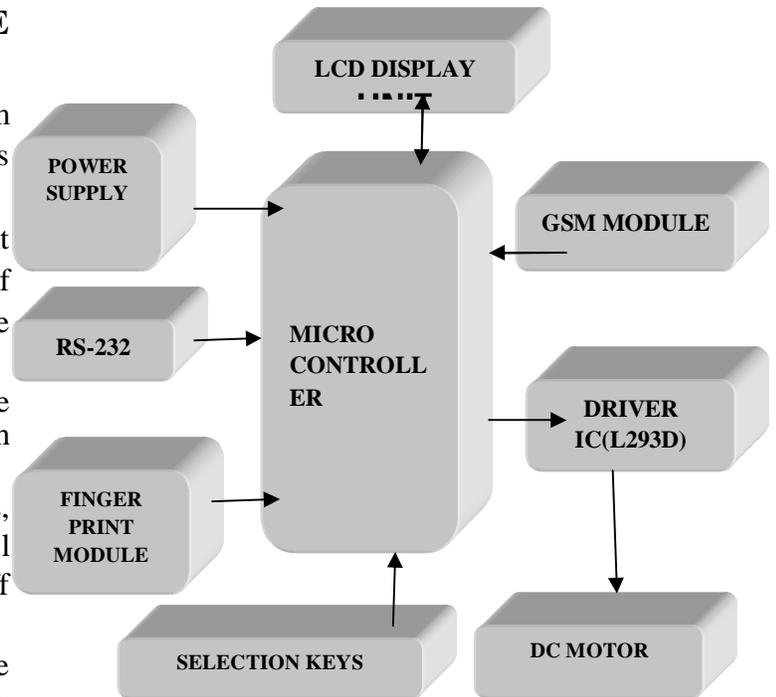


Figure 1: Block diagram

3.1. Software design

The design of software is very important for this embedded system[9]. The design was component of three parts included the design of main program flow chart, the initializing ones, and the algorithm of fingerprint recognition flow chart. This system of software is implemented by the steps as follows: first of all, the Linux kernel and the File system are loaded into the main chip.

The next, the system is initialized to implement specific task, such as checking A TM system, GSM communication and so on, and then each module reset for ready to run commands. Before using A TM terminal, the password and fingerprint is required. First need to enter owner's password, if password is successful then the system is required the owner's fingerprint. If all the recognition is right, the system would enter into the waiting status.

The following flowchart explains the main aim of project:

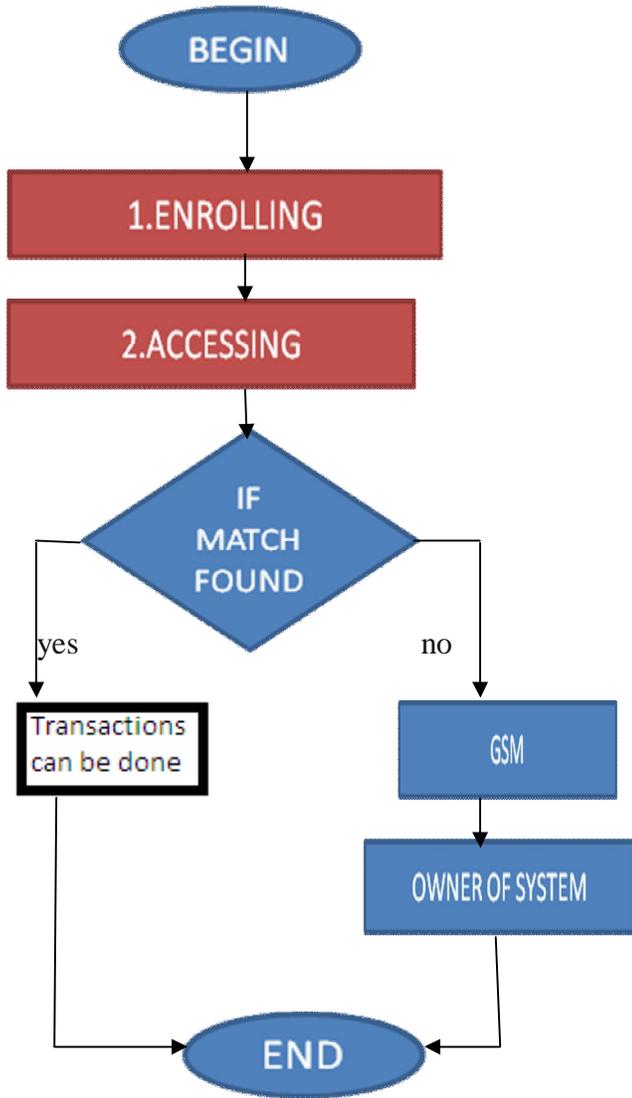


Figure 2 : flow chart of project

3.2The design of fingerprint recognition algorithm

The design of algorithm based on fingerprint recognition is so vital for the whole system. We would approach two steps to process the images of fingerprint[13,14].

3.3 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 ones 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.

3.4 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. There is a lot of noise in fingerprint image, the image enhancement[7] was the precondition for recognition of fingerprint characteristics. The algorithm of fingerprint recognition based on the algorithm of Gabor[2,3] and direction filter was used. Finger print enhancement algorithm[1] 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 requirements. Fingerprint enhancement algorithm based on direction filter has faster processing capabilities, but it was not good to handing the large noise areas. so combination of these two algorithms could obtain better effects.

The algorithm based on direction filter was used in the clear area, and based on Gabor filter was used in the recoverable region

$$h(x, y, \theta, f) = \exp \left[-\frac{1}{2} \left(\frac{x'^2}{\delta_x^2} + \frac{y'^2}{\delta_y^2} \right) \right] \cos(2\pi f x') \quad (1)$$

Besides,

$$x' = x \sin \theta + y \cos \theta$$

$$y' = x \cos \theta - y \sin \theta$$

b) The direction filter algorithms

For each point, according to its frequency, direction, using formula (4) on the clear fingerprint image area.

$$h(x, y) = \sum_{u=-3}^3 \sum_{v=-3}^3 G(x+u, y+v) g(u, v) \quad (4)$$

$G(u, v)$ is normalized after the fingerprint image[6], $g(u, v)$ as a template filter coefficient.

Proposed image block average M , the calculation using image block average gray level range, if the mean was small, the variance was small, that is not to restore area; if the mean moderate, have a great variance, the smaller the

4. CONCLUSIONS

The design of ATM tenninal system based on fingerprint recognition took advantages of the stability and reliability of fingerprint characteristics, a new technology which was designed for the sake of human beings when their ATM card is stolen, based on the image enhancement algorithm of Gabor and direction filter. The security features were enhanced largely for the stability and reliability of owner recognition. The whole system was built on the technology of embedded system which makes the system more safe, reliable and easy to use.

ratio of mean and variance, it could be regard as the clear area; if the mean moderate, variance and they were smaller than the ratio of non-recovery area, it could be regard as confusion region.

Image block average calculated as follows:

The fingerprint image[4] was divided into $w \times w$ area, using equation (5), (6) in each of a gray-scale mean and variance, And the statistics is greater than the number of M , marked as m and

$$(3) \quad \text{if } |m - n| > w^2, \bar{M} = \begin{cases} \bar{M} - \theta & m < n \\ \bar{M} + \theta & m \geq n \end{cases} \quad (5)$$

θ is very small,

$$M(n, m) = \frac{1}{w^2} \sum_{u=1}^w \sum_{v=1}^w h[w(n-m)+u, w(m-m)+v] \quad (6)$$

less than the number of M , marked

as

$$N(n, m) = \frac{1}{w^2} \sum_{u=1}^w \sum_{v=1}^w \{h[w(n-m)+u, w(m-m)+v] - M(n, m)\}^2 \quad (7)$$

5. RESULTS

Over view of project kit



6. FUTURE SCOPE

The main module in this project is fingerprint module, it has some advantages and disadvantages .sometimes it won't accept its input and again we need to register so it is better if this module has high capabilities and can be very useful for this century if it has been implemented. so ,I here by conclude that for transactions on ATM this method is very useful and a secured way of transactions for customers used ATM cards..

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AUTHORS



G.UDAYA SREE

G.Udaya sree is student of DRK Institute of Science and Technology, hyderabad, ap, india. She has received B.Tech Degree Electronics communications and Engineering, M.Tech Degree in Electronics communications and Engineering. Her main research interest includes Embedded systems.



M.VINUSHA

M.Vinusha is working as an Associate Professor in DRK Institute of Science and Technology, JNTUH, Hyderabad, Andhra Pradesh, India. She has completed M.Tech (Comm & signal processing) from V R Siddartha, Vijayawada. She started her Research work in TIFAC .



Dr.R.V.KRISHNAIAH

Dr.R.V.Krishnaiah (Ph.D) is working as Principal at DRK INSTITUTE OF SCINCE & TECHNOLOGY, Hyderabad, AP, INDIA. He has received M.Tech Degree EIE and CSE. His main research interest includes Data Mining, Software Engineering