SECURED ACCESS TO ATM USING FINGERPRINT RECOGNITION

[1]SAHITYA TUMMURI

[1]Research Scholar, ECE Dept, St.Mary's Group of Institutions, Hyderabad, AP-India

Email: sahitya441@gmail.com

ABSTRACT: *The main objective of this system is to develop embedded system, which can be used for the ATM security applications. With this system Bankers will collect the customer fingerprints and mobile number while opening the accounts then customer only have access for the ATM machine. The working of these ATM machines is when customer places finger on the finger print module it automatically generates every time a different 4-digit code as a message to the mobile of the authorized customer through GSM modem connected to the micro controller. Then the code received by the customer is entered by pressing the keys on the touch screen. And after entering, it checks whether it is valid for one or more allows for customer access.*

Keywords: *ATM terminal, ARM9, finger print recognition, image enhancement, GSM MODEM.*

1. INTRODUCTION

NOW-A-DAYS, self-service banking system has got extensive popularization with the high-quality 24 hours service for customers. The ATM (Automatic Teller Machine) provides the customer with convenient banknote trading is very common. From which the financial crimes rises rapidly in recent years, lot of criminals steal user's credit card and password by illegal. Once user bank credit card is lost and the password is stolen, then the criminal will draw total cash in short time, which results in enormous financial losses to customer. How to identify the valid customer is the focus in current financial crises.

ATM machine authentication is generally by using the credit card and password, has some defects. Using credit cards and password cannot verify the client's ID exactly. In present years, the algorithms can be fingerprint recognition which is continuously updated and by sending the four digits code by the controller has offered new verifications. Then the original password method of authentication is combined with the biometric identification technology in verifying the clients' identity better and achieves the purpose that is use of ATM machines improves the safety effectively.

2. THE CHARACTERISTICS OF THE SYSTEM DESIGN

Embedded ATM client authentication system process is based on finger print recognition which is designed based on existing ATMs. The chip used for the core of this embedded system is associated with the technologies of finger print recognition and current high speed network communication. The primary functions are as following:

• **Finger print recognition:** The masters fingerprint information is used as the standards of identification. It must certify the features of human fingerprint before using ATM system.

• **Remote authentication:** System can compare current client's finger print information with remote fingerprint data server.

• **Message alarming:** Sending a different 4-digit code as a message to the mobile of the authorized customer without any disturbances, in order to access the terminals.

• **Two discriminates methods:** Besides the fingerprint recognition, the mode of password recognition can also be used for the system.

Objectives

There are two main objectives, as follows:

i. To integrate the fingerprint for access control of ATM system.

ii. To propose a framework for the ATM system using fingerprints verification.

Characteristics

The fingerprint is the easiest 'something you are' characteristic to capture and process. It is also very easy for a user to supply and the technology is neither invasive nor convenient. Among all the biometrics techniques, finger base identification is the oldest method which has been successfully used in many applications. Fingerprints are one of the most mature technologies and considered legitimate evidence in courts of law and all over the world. It is also used in forensic investigations. An increasing number of civilian and commercial applications are either using or actively considering finger based identification because of the better understanding of finger prints and furthermore, its matching performance is better than any other existing biometrics technologies. A fingerprint is believed to be unique to each person and also each finger. It is unique in terms of the arrangement of its minutiae. Even identical twins have different fingerprints and they do not change over time.

3. HARDWARE DESIGN AND SOFTWARE DESIGN

The design of entire system consists of two parts which are h/w and s/w. The hardware is designed by the user rules and there are three steps of software consisted parts.

A. HARDWARE DESIGN

The S3C2440 chip is used as the core of entire hardware. Furthermore, the modules of LCDs, alarms, and fingerprint recognitions are connected with the main chip. The RAM and FLASH are also embedded in the system. There some modules are consisted of the system as follows:

• ***LCD module****:* The OMAP5910 issued in this module as a LCD controller, it supports 1024*1024image of 15 gray-scale or 3375 colors.

• ***Keyboard module****:* It can be used for inputting passwords.

• ***SRAM and FLASH****:* The 16-bit 29LV160BB- 70RECof FLASH chip and the 32-bit HY57V561620CT 6 of SRAM chip are connected with the main chips. Their functions are storing the running codes, that information can be fingerprint and algorithm.

• ***Finger print recognition module****:* Atmel Company's AT77CI04B be used as fingerprint recognition. It has a 500 drier solution, anti-press, and anti-static, anticorrosion.

• ***Ethernets witch controller****:* RTL8308B can provide eight 10/100 Mbps RMII Ethernet ports, which can connect police network and remote fingerprint data server.

Before using the ATM terminal, the client's fingerprint feature will be connected to the remote fingerprint data server to match fingerprint data with the master if the result is not correct the system sends alarm to the credit card owners. Then the block diagram of h/w design is shown in figure 1.

B. SOFTWARE DESIGN

The design consists of three parts included the design of main program flow chart- it can be initialized ones, and the algorithm of fingerprint recognition flowchart. This system of software is implemented by the steps as follows: the kernel and the File systems are loaded into the main chips.

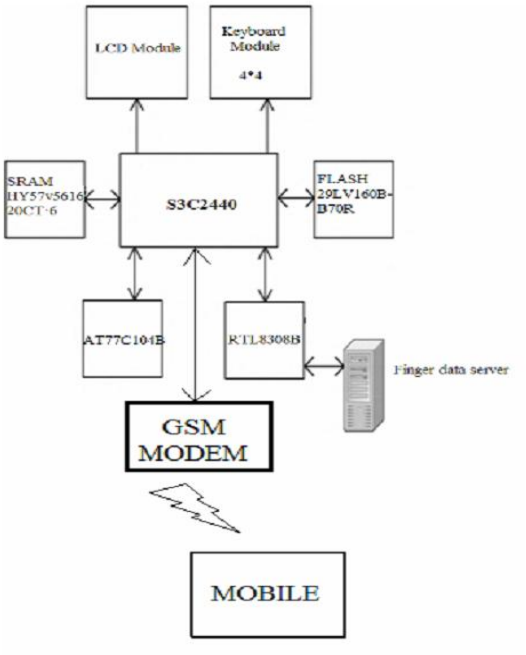

Fig 1. The block diagram of hardware

The next system can be initialized to implement specific tasks checking ATM systems, GSM communications and then each module reset for ready to run commands. Using ATM terminal of the mobile number and fingerprint of the customer is required.

First the system requires the owner fingerprint. If the recognition is right, then the system send a password to the accountholder and he will enter the same password in touch screen for accessing the ATM terminals. If the authentication fails it sends the alert message to account holders and banks. The overall flow of software is shown in figure 2.

The process of inputting fingerprint is a linear sensor that captures fingerprint images by swiping the finger over sensing areas; it is used for acquiring the images of fingerprints. This information will be temporarily stored in SRAM and upload to the remote finger data server to compare through bank networks which are controlled by main chip (S3C2440). The initializing process means setting hardware and software and then starts multiple modules. Each module will start according to the priorities of processes.

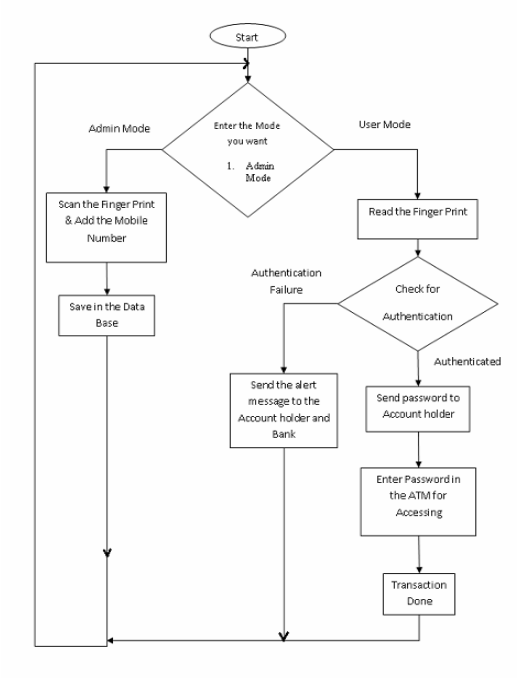

Fig 2. The overall flow chart of software

Initialize the system clock; it can execute the codes to open interrupt and the open interrupted tasks. Then, the system would be judged and enter the process of modules. Finally, this system starts to attempt the multiple tasks. It is shown in figure 3.

4. FINGERPRINT RECOGNITION ALGORITHM

The design of algorithm based on fingerprint recognition is so vital for the whole system. We approach the two steps to process image fingerprints.

1) The design of fingerprint image enhances fingerprint recognition module is an extremely important part of the systems, with high quality images are the major factors influencing the performance in the system. The fingerprint recognition algorithm is based on Gabor and direction filter.

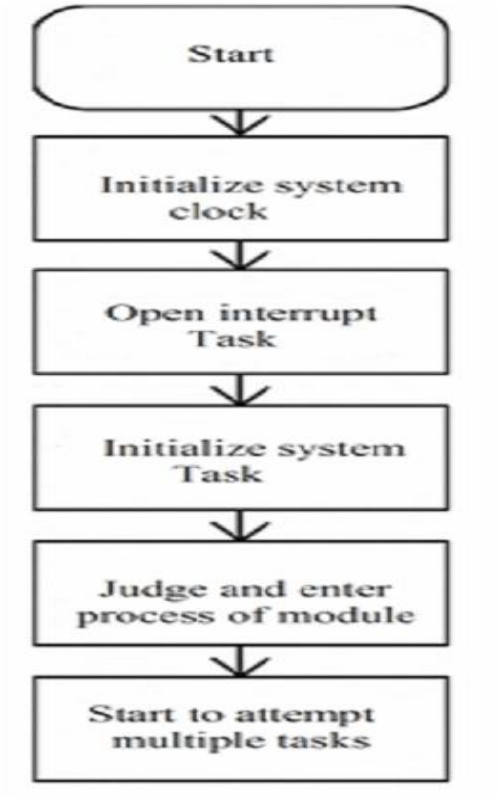

Fig 3. The flow chart of fingerprint recognition

The fingerprints enhancement algorithms based on Gabor filter could be better and remove strength then the definition between the ridge, it significantly improve the image enhancing process capacity is slow with the high capacity requirements.

2) The detail of fingerprint recognition process. The first step is acquisition of fingerprint image by above device mentioned in the algorithm, the results were sent to the following process. Preprocessing images can be acquired. Generally it is filtering, the histograms computing, enhancement and image finalization. the characteristic value will be extracted, and the results would be compared with the information of owner's fingerprint in the database so as to verify whether the character is match, the system returned by the results matched or not.

Patterns

The three fingerprint ridges as follows

Arch: The ridges enter from one side of the finger, rise in the center forming arc, and then exit from other side.

Loop: The ridges enter from the one side of the finger, form a curve, and then exit on that same side.

Whorl: The Ridges form their circularly around a central point on the finger or field that is defined as the tangential vector of the fingerprint ridge curves is disclosed.

Three primary functions are as follows

Enrollment: Acquires a fingerprint image from the sensor and save it in SRAM. Then the image is processed, and compressed by the creation of a fingerprint template. Various filters clean up the images and converted to a mathematical representation, these making is impossible to a template and directly recreate a fingerprint image.

Search: Compares a raw candidate image to a list of previously enrolled templates. Through the series of screening process, then the algorithm narrows the list of templates to a manageable size. These templates survive as screening and are compared to the candidate and verification scores are provided if score exceeding the present threshold indicates a positive identification.

Verification validates a user's identity by comparing a raw candidate image to a previously enrolled template via real time and closed loop matching algorithms. A score is returned by indicating the similarities of the candidate and template to generate a yes/no match decision.

GSM

Global System for Mobile Communications (GSM: originally from Group Special Mobile) is the most popular standard for mobile phones in the world. Its promoter and association can estimate 82% of the global market uses the standard GSM is used by over 2 billion people across more than 212 countries and territories. Then the GSM differs from its predecessors, both signaling and speech channels are digital quality is considered by a second generation (2G) mobile phone system. This is also meant by data communication was built in to the system using the 3rdGeneration Partnership Project (3GPP). GSM digitizers and compresses data sends down a channel with two other streams of User data, each in its own timeslot. It operates at either the 900 MHz frequency band. The GSM is the defect wireless telephone standard in Europe. The GSM has over one billion users from worldwide and is available in190 countries. GSM also pioneered a low-cost alternative to voice calls, the short message service. The GSM users can be a variation of "Time Division Multiple" Access (TDMA) and GSM is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA).

Technical Details

GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. The GSM networks operator is a four different frequency ranges. Most of the GSM networks can operate in the 900 MHz or 1800MHzbands. Some countries in the Americans (including Canada and the United States) use the 850MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. These rarer 400 and 450 MHz frequencies are assigned in some countries, where frequencies should were previously used for first-generation systems.

The Future of GSM

GSM together with the other technologies is a part of an evolution of wireless mobile telecommunication that includes High-Speed Circuit-Switched Data (DSCSD), General Packet Radio System (GPRS), Enhanced Data rate for GSM Evolution (EDGE), and Universal Mobile Telecommunications Service (UMTS).

5. ATM TERMINAL

An ATM or automatic teller machine is an electronic terminal that allows one to conduct many bank transactions without the assistance of a human. Typical transactions include deposits, cash withdraws, but some machines allow

additional functions. Security is a goal of such machines. Using a combination of the debit card issued by the bank and a password to access your account.ATM machines are found in many locations in stores and malls. These machines can allow convenient access to funds in an account. Some machines and banks charge ATM fees for use of certain machines. The fees can make use of ATM machine, especially for small transactions. Every ATM dispenses cash in the same way they all provide the same services.

ATM CARD

An ATM card is a plastic card embossed with a name and account number, with some magnetic stripe on back. It is issued by the bank union and used with a PIN (personal identification number) to access an automatic teller machine, verify identification to purchase goods.

6. ARM9

ARM9 architecture is a 32-bit RISC CPU family. With this ARM moved from a non Neumann architecture (Princeton architecture) that a Harvard architecture with in separate instruction of data buses. Significantly increasing its potential speed. Most of the silicon chips integrating these cores and modified Harvard architecture chips, by combining the two address buses on the another side of separated for CPU caches and tightly it coupled memories.

There are two types of subfamilies, implementing for different ARM architecture versions.

Differences from ARM7 cores

Key improvements over that ARM7 cores, enabled by spending a more transistors they are,

- Cycle count improvements are many unmodified binaries were measured as taking about that 30% fewer cycles to execute on ARM9 cores. Key improvements can be include faster loads and stores, many of instructions cost just one cycle. This is helped by both modified architecture (reducing bus and cache contention) and new pipeline stages.

- Exposing of pipeline inter locks can enabling compiler of some optimizations to reduce blockage between stages.
- Clock frequency of improvement Shifting from a three stages of pipeline to a five stage one lets the clock speed can be approximately double on the same silicon fabrication of process.
- Decreased heat production by the lower overheating risk.

Switching to a Harvard architecture establish a non unified cache, but that instructions can fetches do not evict data. ARM9 cores have separated that data and address bus signal, which chip will designer in various ways. In most of cases they connect at part of the address space in von Neumann style, used these both instructions and data, usually to can AHB interconnect to a DRAM interface and an External Bus Interface use with flash memory. Such hybrids are longer pure Harvard architecture processors.

Additionally, it has some ARM9 cores incorporate "Enhanced DSP" instructions is there, which as a multiply accumulate, to support more efficient and implementations of digital signal process algorithms.

A. ARM9TDMI

ARM9 TDMI is a successor for popular ARM7 TDMI core, and it is also based on ARMv4T architecture. Cores based on it support 32-bit ARM and 16-bit Thumb instructions sets and it includes:

- ARM920T with 16 KB and it each of I/D cache an MMU
- ARM922T with 8 KB and it each of I/D cache an MMU
- ARM940T with cache "Memory Protection Unit" (MPU)

B. ARM9E

ARM9E, its ARM9EJ sibling, implements the basic ARM9 TDMI pipeline, but it adds some support for the ARM architecture, which includes the some DSP instructions, set extensions. In an addition for that multiplier unit which has been double, then the time required for that most multiplications. They support for 32-bit, 16-bit, and sometimes 8-bit instruction sets also.

- ARM926EJ-S with the ARM Jazelle technology, which can enable to the direct execution of 8-bit Java bytes code in the hardware an MMU
- ARM946
- ARM966
- ARM968

COMPARISON WITH OTHER ATM MACHINES

Typically a user inserts into the ATM a special plastic card that is encoded with information on a magnetic strip. The PIN number is also entered by the user by keypad. Then computer permits the ATM to complete the transition. Integrated ATM system with the biometric authentication techniques is a solution to avoid the fraud. Biometric authentication ensures that a person is actually present rather than their cards and passwords. Banks can implement different authentication schemes for their customers at their ATMs.

7. CONCLUSIONS

The Implementation of ATM security by using fingerprint recognition and GSM MODEM took advantages of the stability and reliability of fingerprint characteristics. Then the Additional system is also contains the original verifying methods which was inputting owner's password which is send by the controller. Then the security features were enhanced some largely for the stability and reliability of owner of recognition. Then the whole system was build for the technology of embedded system which makes the system more for safe and it is reliable and easy to use.

8. REFERENCES

[1] Lin Hong, Wan Yifei, Anil Jain. Finger print image enhancement: algorithm and performance evaluation.

[2] Enhancement using CNN Gabor Cpefilter Proceedings of the International Work shop on Cellular Neural Networks.

[3] Gu J, ZhouJ, Zhang D.A combination model for orientation field of fingerprints.

[4] Cheng J.Tian J. Fingerprint enhancement with dyadic scale-space, Patterns of Recognition Letters.

[5]. "About Script ATMs: How do cash less ATM work? Atmscrip.com.

[6]."Automatic Teller Machine". The history of computing project. Thocp.net. 17 April 2006

[7].Wan, W.W.N.; Luk, C.L.; and Chow, C.W.C. (2005), Customers Adoption of Banking Channels in Hong K34rong, International Journal of Bank Marketing.