FINGERPRINT BASED ATM SYSTEM

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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.

Keywords - fingerprint sensor (FIM3030), Microcontroller (LPC2148).

I. 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 and is the easiest to deploy and for a higher level of security at your fingertips. It is simple to install and also it takes little time and effort to acquire one’s fingerprint with a fingerprint identification device.

II. RESEARCH BACKGROUND

Crime at ATMs has become a countrywide issue that faces not only customers, but also bank hands and this financial crime case rise frequently in recent years. A lot of criminals tamper with the ATM terminal and steal customers’ card details by unlawful means. Once user’ bank card is lost and the password is pinched, the user’ account is exposed to attack. Traditional ATM systems validate generally b using a card (credit, debit, or smart) and a password or PIN which no doubt has some defects. The prevailing practices of user authentication, which involves the use of either passwords and user IDs (identifiers), or identification cards and PINs (personal identification numbers), suffer from several boundaries. Biometrics can be defined as measurable physiological and behavioral characteristic that can be captured and subsequently compared with another instance at the time of
verification. It is automated methods of recognizing a person based on a physiological or behavioral characteristic.

To implement the proposed security for ATM system with the use of fingerprint recognition, we use the different hardware and software platforms.

III. HARDWARE DESIGN

To implement the proposed security for ATM terminals with the use of fingerprint recognition, we use the different hardware and software platforms. Figure 1 shows the major system modules and their interconnections.

![Figure 1: Overview of the system.](image)

3.1 Microcontroller (LPC2148)

The system uses LPC2148 from ARM7 family. It is the core controller in the system. It has ARM7TDMI core which is a member of the Advanced RISC Machines (ARM) a family of general purpose 32-bit microprocessors. It offers high performance for very low power consumption and price. The ARM architecture is based on RISC (Reduced Instruction Set Computer) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective chip. All parts of the processing and memory systems can operate continuously since, pipelining is employed.

Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM memory interface has been designed to allow the performance potential to be realized without incurring high costs in the memory system. Speed-critical control signals are pipelined to allow system control functions to be implemented in standard low-power logic, and these control signals facilitate the exploitation of the fast local access modes offered by industry standard dynamic RAMs.
We have used LPC2148 from NXP semiconductors (founded by Philips). It shows features as follows:-

a. 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
b. 240 kB of on-chip static RAM and 512 kB of on-chip flash program memory.
c. In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software.
d. Two 10-bit A/D converters provide a total of 14 analog inputs, with conversion times as low as 2.44 μs per channel.
e. Single 10-bit D/A converter provide variable analog output.
f. Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus (400 kbit/s), SPI and SSP with buffering and variable data length capabilities.
g. Vectored interrupt controller with configurable priorities and vector addresses.
h. Up to 45 of 5 V tolerant fast general purpose I/O pins in a tiny LQFP64 package.

3.2 Fingerprint Module (FIM3030)
The important module of the system is fingerprint scanner. We used FIM3030 by NITGEN. It has ADSP-BF531 as central processing unit with 8 MB of SDRAM and 1 MB of MICRO CONTROLLER (LPC2148) LCD KEYBOARD POWER SUPPLY GSM MODEM FINGERPRINT MODULE (FIM3030) EEPROM MAX232 BUZZER International Journal of Applied Information Systems (IJAIS) – ISSN: 2249-0868 Foundation of Computer Science FCS, New York, USA 2nd National Conference on Innovative Paradigms in Engineering & Technology (NCIPET 2013).

It uses overall supply voltage of 3.3 V. The communication with the fingerprint module is made through RS-232 via UART0 of LPC2148. A fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern. The captured image is called a live scan. This live scan is digitally processed to create a biometric template (a collection of extracted features) which is stored and used for matching. FIM3030 is an evolutionary standalone fingerprint recognition module consisted of optic sensor OPP03 and processing board. As CPU and highly upgraded algorithm are embedded into a module, it provides high recognition ratio even to small size, wet, dry, calloused fingerprint. High speed 1: N identification and 1: N verification.

FIM3030 has functions of fingerprint enrollment, identification, partial and entire deletion and reset in a single board, thereby offering convenient development environment. Off-line functionality stores logs on the equipment memory (up to 100 fingerprints) and it’s identified using search engine from the internal algorithm. Evolutionary standalone fingerprint recognition module FIM3030 is ideal for on-line applications, because allows ASCII commands to manage the device from the host. On-line functionality, fingerprints to verify (1:1) or identify (1: N) can be stored on non volatile memory, or be sent by RS-232 port.
IV. SOFTWARE DESIGN

The embedded platform discussed above is programmed in C language with Keil µVision4 to follow the program logic shown in Figure 4 as follows.

![Figure 4: Realization of flow of tasks for the proposed system](image)

**Figure 3: Interfacing of 16 x 2 LCD with microcontroller LPC2148.**

**Figure 4: Realization of flow of tasks for the proposed system**
V. CONCLUSION

After testing the system developed, we came to know that ATM prototype can be efficiently used with fingerprint recognition. Since, password protection is not bypassed in our system, the fingerprint recognition done after it yielded fast response and is found to be of ease for use. Fingerprint images cannot be recreated from templates; hence no one can misuse the system. LPC2148 and FIM3030 provide low power consumption platform. Speed of execution can be enhanced with the use of more sophisticated microcontroller. The same hardware platform can be used with IRIS scanner to put forward another potential biometric security to the ATMs.

REFERENCES