

# ATM Access & Security using Finger Print Module & GSM Technology

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**Abstract**— The aim of this project is to develop an embedded system, that can be used for ATM security applications. In this system, Bankers will collect the finger prints of the customers and their mobile number while creating the accounts then customer only can access ATM machine. The working of this ATM machine is when the customer places his finger on the finger print module when access it automatically generates different 4-digit code as a message every time to the mobile of the authorized customer through GSM modem which is connected to the microcontroller. The code that received by the customer should be entered by pressing the keys on the keypad provided. After entering it checks whether it is a valid one or not and allows the customer further access.

**Key words:** ATM Access & Security, Finger Print Module, GSM Technology

## I. INTRODUCTION

Now-a-days, in the self-service banking system has got extensive popularization with the characteristic offering high-quality 24 hours service for customer. ATM (Automatic Teller Machine) which provide the customers with the easily accessible bank note trading is quite common. However, the financial crime cases are rising repeatedly in recent years, many criminals tamper with the ATM terminal and rob the user's credit card and password illegally. Once user's bank ATM card is lost and the password is stolen, the criminal will withdraw all the cash with in the shortest time, which will lead to enormous financial losses to customer. How to carry on the valid identity of the customer becomes the main focus in present financial circle. Traditional ATM systems authenticate basically by using the credit card and the password, this method has some defects. Using the credit card and password cannot verify the user's identity exactly. In recent years, the algorithm that the fingerprint recognition consistently updated and sending the four digit code through the controller which has offered new verification method for us, the original password authentication method joined with the biometric identification method verify the clients' identity much better and achieve the purpose that using of the ATM machines improves the safety effectively. Laptop with speeds up to 12Mb/s. In this the on board peripherals include SD/MMC card interface, USB2.0 interface, wi-fi wireless module interface, L293D DC motor controller, 16X2 character LCD and many more.

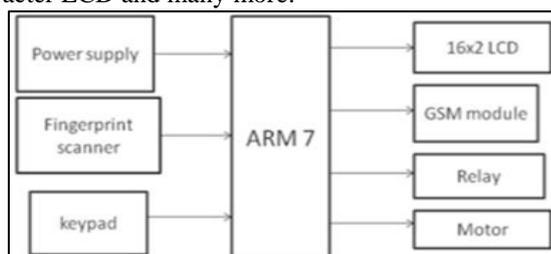


Fig. 1: Block Diagram of the System

## II. LPC2148 MICROCONTROLLER

The NXP microcontroller invented by philips company lpc2148 is an arm7 tdmis based high performance 32-bit RISC microcontroller it contains thumb instructions with the memory of 512kb, it contains on-chip flash ROM memory with the facility of in-system programming (ISP) and in application programming (IAP) specification, it contains 32kb ram and vectored interrupt controller, it has two 10bit ADCS with 14 channels available in it, USB 2.0 full speed device controller is available in it, two UARTS are present in it, one with full modem interface and two i2c serial interfaces, two SPI serial interfaces two 32-bit timers, it contains watchdog timer, PWM unit, real time clock with optional battery backup, even it has brown out detect circuit general purpose i/o pins. In this CPU clock up to 60 MHZ, on-chip crystal oscillator and on-chip PLL is also available.

ARM is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by ARM Company belongs to british. A RISC-based computer means ARM processors require particularly few number of transistors than some typical processors in average type computers. This reduces costs, heat and power usage. These are desirable qualities for light, portable, battery-powered devices which contains smartphones, laptops, tablet and other embedded systems. A simpler design of ARM facilitate more efficient multicore cpus and higher core with low cost provides higher processing power and energy efficiency of the computers are improved.

LPC2148 microcontroller has a Development Board, it is a powerful development platform based on LPC2148 ARM7TDMI microcontroller with the memory 512K on-chip memory. This board is featured by USB port and it does not need any external power supply. It is good for developing embedded applications. It involving high speed wireless communication technology such as Zigbee, Bluetooth, wifi, USB based data logging, it contain real time data monitoring and control, interactive control panels etc. In this the on-chip USB controller provides direct high speed interface to a PC or laptop with speeds up to 12Mb/s. In this the on board peripherals include SD/MMC card interface, USB2.0 interface, 4Kbit I2C EEPROM, Xbee, Bluetooth, wifi wireless module interface, ULN2003 500ma current sinking driver, L293D DC motor controller, 16X2 character LCD and many more.

P1.0	1	40	VCC
P1.1	2	39	P0.0 (AD0)
P1.2	3	38	P0.1 (AD1)
P1.3	4	37	P0.2 (AD2)
P1.4	5	36	P0.3 (AD3)
P1.5	6	35	P0.4 (AD4)
P1.6	7	34	P0.5 (AD5)
P1.7	8	33	P0.6 (AD6)
RST	9	32	P0.7 (AD7)
(RXD) P3.0	10	31	EA/VPP
(TXD) P3.1	11	30	ALE/PROG
(INT0) P3.2	12	29	PSEN
(INT1) P3.3	13	28	P2.7 (A15)
(T0) P3.4	14	27	P2.6 (A14)
(T1) P3.5	15	26	P2.5 (A13)
(WR) P3.6	16	25	P2.4 (A12)
(RD) P3.7	17	24	P2.3 (A11)
XTAL2	18	23	P2.2 (A10)
XTAL1	19	22	P2.1 (A9)
GND	20	21	P2.0 (A8)

Fig. 2: Pin Config. of 89C51

### III. FINGERPRINT MODULE

Fingerprint identification is one of the most well-known and publicized biometrics. Because of their uniqueness and consistency over time, fingerprints have been used for identification for over a century, more recently becoming automated (i.e. a biometric) due to advancements in computing capabilities.



Fig. 3: Fingerprint Sensor Module R305

Fingerprint identification is popular because of the inherent ease in acquisition, the numerous sources (ten fingers) available for collection, and their established use and collections by law enforcement and immigration. [2]. A fingerprint generally looks like a series of dark lines that indicates the high, peaking portion of the friction ridge skin, the lines between these ridges looks like white space and as the low, depth portion of the long narrow skin. Fingerprint recognition is based mainly on the minutiae, or on the location and direction of the long narrow endings and splits along the long narrow path. The images that shown below are the examples of fingerprint features: two types of minutiae and (b) examples of another detailed characteristics that are used during the automatic classification and minutiae extraction processes. [3].

### IV. GSM

Mobile Station (MS) or Mobile Equipment (ME) are used for mobile terminals which are Supporting GSM services. A call came from the GSM mobile station to the PSTN is called “mobile originated call” (MOC) or “Outgoing call” and a call

originated from a fixed network to a GSM mobile station is called “mobile Terminated call” (MTC) or “incoming call”.

The Global System for Mobile communications is a digital cellular technology that is used for transmitting the mobile voice and also the data services. GSM supports voice calling and data transfer speeds that range up to 9.6 kbit/s, also with the transmission.



Fig 4: GSM Modem using SIM900 Module

Of SMS. GSM operates at 900MHz and 1.8GHz bands in Europe region and the 1.9GHz and 850MHz bands in the US location. The GSM and 3G in Australia uses 850MHz, and also Canada and many South American countries. Having the harmonized spectrum across most the globe, GSM’s international roaming capability allows customers to access the same services while travelling abroad or as at home. This provides consumers seamless and same number connectivity in almost more than 218 countries. More than 80% of the world’s population is covered by the Terrestrial GSM networks. GSM satellite roaming has given the extended service access to areas in which terrestrial coverage is not available.

The architecture of GSM is basically a network of computers. The system does not contain partition and no available frequency and assigns only certain part of the frequency spectrum to any base transceiver station and it should also reuse the scarce frequency regularly. GSM was first made for the 900 Mhz range but later the 1800 Mhz range was also used in cellular technology. The 1800 MHz and 900 Mhz GSM technology has the same architecture and specifications.

### V. LCD



Fig. 5:

To display messages in our project we are using LCD Module. LCD display contains of 2 lines they are each 16 characters in a line that is interfaced to the controllers. In LCD module D0 to D7 bit are the Data lines, RS, RW and EN pins are the control pins and remaining pins are +5V, -5V and GND to provide supply. Where RS is the Register Select, RW is the Read Write and EN is the Enable pin.

## VI. PROBLEM FORMULATION

During the course of the project, we came across several problems that were a hindrance to the appropriate functioning of the system. There were hardware as well as software issues. Out of many problems encountered, some of them are listed below.

### A. Complication with the GSM Modem

A 12V/1A adaptor is needed to power up a GSM modem. After inserting a valid SIM card in the SIM card slot, the GSM catches network LED on GSM modem. It is connected to a tested microcontroller via a serial communication port. However, in spite of having network the GSM modem was unable to send an SMS to the authorized person.

## VII. SYSTEM WORKING

Fingerprint processing involves two steps finger enrolment and finger matching. Initially, to enroll the fingerprint, user must give his fingerprint twice to the module. Module checks these two images and generates a template image and stores it. In second step of finger matching, for 1: N matching input is matched with the images in the library. It gives the matched image; a page id of the matched image is generated. If the fingerprint is matched then buzzer will go on and signal goes to user and message on LCD will be "unauthorized person" and signal goes to the user. All these activities are informed to user with the help of message through GSM technology. GSM is second generation digital cellular mobile system used to send messages. GSM is also integrated to microcontroller to send message of activities.

## VIII. RESULTS & ANALYSIS

The Fingerprint Based Security System using GSM Module was successfully implemented.

Message on 16x2 LCD	Interpretation
Display System ready	Fingerprints canner ready to scan finger
Access Granted	Fingerprint scanned is Verified and the motor Rotates in clockwise direction
Access Denied	Fingerprint scanned did not match as on records and a message is sent to the registered mobile number and the system gets locked until restarted
Button	Function
ADD	Resister the finger prints of a new user
EMPTY	Initiate the scanner
SEARCH	Delete all registered users
RESET	Restart the entire system

Table 1:

## IX. CONCLUSION

The project "ATM Security Using GSM and Fingerprint with Authorized Permission for Transaction" has been successfully designed and tested. The total features of all the hardware components that are used have developed it. Presence of each module has been reasoned out and placed properly and contributing to the best working of the unit.

Using highly advanced IC's with the help of improving technology, the project has been implemented successfully.

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