ATM THEFT DETECTION SYSTEM

Project Report submitted in partial fulfillment of the requirement for the degree of

Bachelor of Technology

in

Electronics and Communication Engineering

under the Supervision of

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By

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CERTIFICATE

This is to certify that project report entitled **ATM THEFT DETECTION SYSTEM** , submitted by **NEERAJ SAHU** and **SONIA JAIN** in partial fulfillment for the award of degree of Bachelor of Technology in Electronics and Communication Engineering to Jaypee University of Information Technology, Waknaghat, Solan has been carried out under my supervision.

This work has not been submitted partially or fully to any other University or Institute for the award of this or any other degree or diploma.

Date: 01.06.2012

NSharma

Ms. Neeru Sharma

(Sr. Lecturer)

ACKNOWLEDGEMENT

It has been wonderful and intellectually stimulating experience working on **ATM Theft Detection System** which is used for detecting the presence of thief inside ATM center using GSM technology.

We gratefully acknowledge the Management and Administration of Jaypee University of Information Technology for providing us the opportunity and hence the environment to initiate and complete our project.

For providing with finest details of the subject, we are greatly thankful to our project guide **Ms. Neeru Sharma**. She has provided us the way to get the job done, not providing the exact way to do it, but the concept behind the complexities so that we can make better use of the existing knowledge and build up higher skills to meet the industry needs. Her methodology of making the system strong from inside has taught us that output is not end of project.

Date: 01.06.2012

Neeraj Sahu

Sonia Jain

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ABBRIVIATIONS

ATM	Automated Teller Machine
GSM	Global System for Mobile Communications
RFID	Radio-frequency Identification
LCD	Liquid Crystal Display
SIM	Subscriber Identity Module
AT	Attention
PIN	Personal Identification Number
USB	Universal Serial Bus
LED	Light Emitting Diode
ROM	Read Only Memory
RAM	Random Access Memory
OTP ROM	One-Time Programmable
ADC	Analog-to-digital converter
I/O	Input/output
CPU	Central Processing Unit
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
TTL	Transistor-transistor Logic

ABSTRACT

Automated teller machines (ATM) service is considered as more profitable service of a bank. There are many pre caution have been determined to use an ATM but still some threats are face by customer to use an ATM, such as existence of stranger with a customer will be encountered as threat for ATM. The focus of this project is to design the architecture of an detection system which incorporates with ATM to detect the existence of unknown person with customer and takes some steps by the customer for his safety .The main objective of this project is to prevent forced ATM theft, using GSM technology.

In this every ATM user is provided with 2 passwords one is original and other one is dummy which is helpful in this situation as, when you are forcibly attempting to withdraw money, and you are entering a dummy password instead of your actual password. After that ATM shows that you have less than minimum balance in your account (even if you have plenty) and you are unable to withdraw simultaneously a message will be sent through GSM modem to nearby all police stations and concerned bank regarding thieves in ATM centre. And thief's tries to get out of the ATM, they will come to know that the ATM is surrounded by armed police and there is no way to escape.

CHAPTER 1

INTRODUCTION

An automated teller machine or automatic teller machine (ATM), also known as Cashpoint or cash machine or sometimes a hole in the wall in British English, is a computerized telecommunications device that provides the clients of afinancial institution with access to financial transactions in a public space without the need for a cashier, human clerk or bank teller. ATMs are known by various other names including ATMmachine, automated banking machine, and various regional variants derived from trademarks on ATM systems held by particular banks.

Using an ATM, customers can access their bank accounts in order to make cash withdrawals, credit card cash advances, and check their account balances as well as purchase prepaid cellphone credit. If the currency being withdrawn from the ATM is different from that which the bank account is denominated in (e.g.: Withdrawing Japanese Yen from a bank account containing US Dollars), the money will be converted at a wholesale exchange rate. Thus, ATMs often provide the best possible exchange rate for foreign travelers and are heavily used for this purpose as well.

An ATM is typically made up of the following devices:

- CPU (to control the user interface and transaction devices).
- Magnetic and/or Chip card reader (to identify the customer).
- PIN Pad (similar in layout to a Touch tone or Calculator keypad), often manufactured as part of a secure enclosure.
- Secure crypto processor, generally within a secure enclosure.
- Display (used by the customer for performing the transaction).
- Function key buttons (usually close to the display) or a Touchscreen (used to select the various aspects of the transaction).
- Record Printer (to provide the customer with a record of their transaction)
- Vault (to store the parts of the machinery requiring restricted access)

- Housing (for aesthetics and to attach signage to).

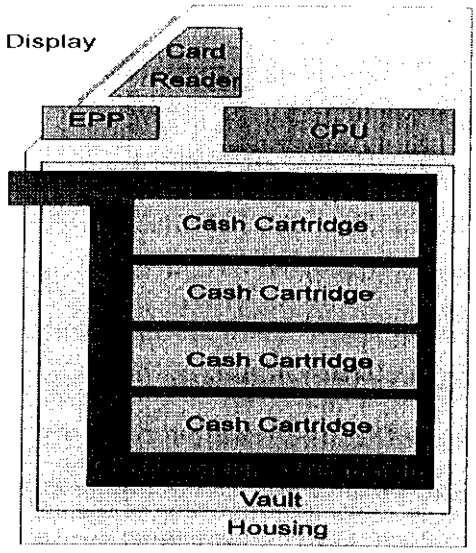

Fig1.1: Block Diagram of ATM

Recently, due to heavier computing demands and the falling price of computer-like architectures, ATMs have moved away from custom hardware architectures using microcontrollers and/or application-specific integrated circuits to adopting the hardware architecture of a personal computer, such as, USB connections for peripherals, Ethernet and IP communications, and use personal computer operating systems. Although it is undoubtedly cheaper to use commercial off-the-shelf hardware, it does make ATMs potentially vulnerable to the same sort of problems exhibited by conventional computers.

As with any device containing objects of value, ATMs and the systems they depend on to function are the targets of fraud. Fraud against ATMs and people's attempts to use them takes several forms.

1.1 Background of the Project

Automated teller machines (ATMs) are a part of most of our lives. The major appeal of these machines is convenience. ATMs allow customers access to get cash, pay bills, purchase or sellsecurities, or make deposits twenty-four hours a day.

Customers access their bank accounts through a plastic bankcard. This card has a magnetic strip on the back containing a passwordand relevant account information. ATM technology has virtually remained the same over the lastseveral decades, with a few minor changes like color touch-sensitive screens and voice-activatedcommands for the visually impaired. Citibank, which pioneered a full ATM network 23 years ago,now has a worldwide network covering offices in over 100 countries around the world. With somany machines available to account holders, it's no wonder that illegal users take advantage of this technology.

Automated teller machine theft is a major problem. Although banks do not publish their lossesdue to computer crime, A BAI Global study estimates one ATM crime is committed for every 2million transactions, or about 5,500 crimes a year. The American Bankers Association puts thenumber at an even lower one crime for every 3.5 million transactions, or about 3,000 a year.

With consumers becoming more dependent on ATMs and the proliferation of ATM debit cards, computer crime in this area is more likely to increase. Banks will have to find better methods toeliminate unauthorized use through hardware or software solutions, while keeping security costsdown. The purpose of this project is to explain how ATM fraud occurs, and possible solutionsbanks can implement to prevent such loss.

When any ATM user enter into an ATM to withdraw money for his need, and suddenly thief's enters into the ATM with a knife or a pistol, and force you to withdraw the entire amount in your account (considering the ATM has no security guard and is in a remote place). In these situations this project gives security as well as safety to user.

1.2 Project Description

In this project, we interfaced 8952 microcontroller with RFID Module and SIM300 GSM Module to receive the message and take required action. The protocol used for the communication between the microcontroller and the GSM Module is AT Commands.

Here in place of ATM Card, we are using RFID Tags so when they come in contact with RFID Reader, microcontroller receives the data from RFID and decodes it. After decoding, it will check the authenticity of the user and then it will proceed further. If the user is authorized, it will complete the transaction otherwise message will be sent to the registered mobile number.

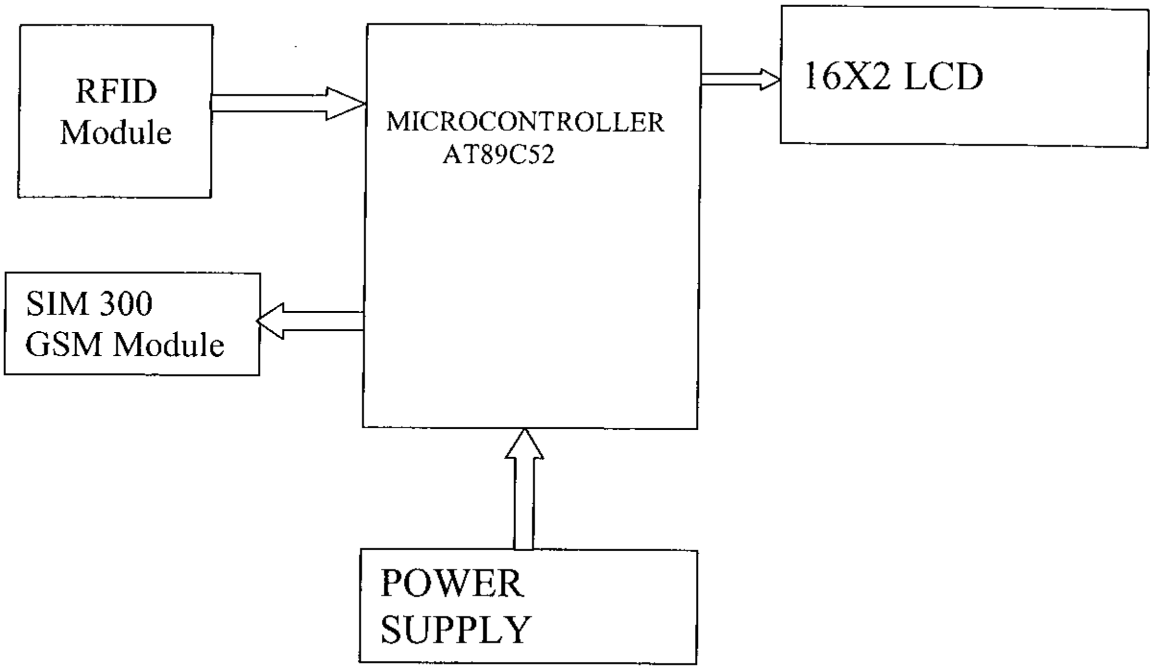

Fig 1.2 :Block Diagram

CHAPTER 2

CIRCUIT MODELLING

The circuit has a LCD Microcontroller interfacing, LED Microcontroller interfacing, RFID Module-Microcontroller interfacing and Microcontroller-GSM Module interfacing. The components of the circuit are as follows:

- Interfacing with RFID Module
- Interfacing with GSM Module
- Interfacing LCD for display

2.1 Interfacing with RFID Module

RFID reader module continuously produces radio frequency signals. These tags arepassive ones and it contains a embedded circuit and a coil. when the tag comeNearthe field produced by the reader it gets activated .the data present in the car dissued to the reader. The reader gives the details of thecard that is a 26 bit data as output in both Weigand format and RS 485 format. Interfacing of RFID reader with microcontroller is done with the help of an AND gate.We used WEIGAND output format. When data is available on the output pin of the reader, the microcontroller will get interrupted. The data pins areconnected to 0^{th}pin and 1^{st}pin of PORT1 fromthese pins microcontroller readsthe 26 bit data and process the same.

2.2 Interfacing with GSM Module

The Global System for Mobile (GSM) communication is the Second Generation of mobile technology. Although the world is moving towards Third and Fourth generation but GSM has been the most successful and widespread technology in the communication sector. GSM technology paved a new way for mobile communication.

This project explains the interfacing of a GSM Module with aAtmel microcontroller. It also covers a wayto dial a particular GSM mobile number as well as send a message to it using AT Commands with the help of AT89C52.

2.3 Interfacing LCD for display

It is very important to keep a track of the working of almost all the automated and semi-automated devices, be it a washing machine, an autonomous robot or anything else. This is achieved by displaying their status on a small display module. LCD (Liquid Crystal Display) screen is such a display module and a 16x2 LCD module is very commonly used. These modules are replacing seven segments and other multi segment LEDs for these purposes. The reasons being: LCDs are economical, easily programmable, have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. LCD can be easily interfaced with a microcontroller to display a message or status of a device.

CHAPTER 3

HARDWARE DESCRIPTION

Each component is explained with its basic theory which helps us get a basictheory which helps us get a basic detail inside of as to how that particular component is working and its use in this particular project.Hence a defined role of each and every component in this chapter. The basic components are as follows:

- MICROCONTROLLER
- LCD
- RFID Module
- GSM Module

3.1 Micro Controller:

3.1.1 Introduction

A microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications. in contrast to the microprocessors used in personal computers or other general purpose applications.

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems.

Some microcontrollers may use four-bit words and operate at clock rate frequencies as low as 4 kHz, for low power consumption. They will generally have the ability to retain functionality while waiting for an event such as a button press or other interrupt; power consumption while sleeping may be just Nanowatts, making many of them well suited for long lasting battery applications. Other microcontrollers may serve performance-critical roles, where they may need to act more like a digital signal processor (DSP), with higher clock speeds and power consumption.

Microcontrollers must provide real time (predictable, though not necessarily fast) response to events in the embedded system they are controlling. When certain events occur, an interrupt system can signal the processor to suspend processing the current instruction sequence and to begin an interrupt service routine. The ISR will perform any processing required based on the source of the interrupt before returning to the original instruction sequence.

Possible interrupt sources are device dependent, and often include events such as an internal timer overflow, completing an analog to digital conversion, a logic level change on an input such as from a button being pressed, and data received on a communication link. Where power consumption is important as in battery operated devices, interrupts may also wake a microcontroller from a low power sleep state where the processor is halted until required to do something by a peripheral event.

3.1.2 Microcontroller Programming

Microcontroller programs must fit in the available on-chip program memory, since it would be costly to provide a system with external, expandable, memory. Compilers and assemblers are used to convert high-level language and assembler language codes into a compact machine code for storage in the microcontroller's memory. Depending on the device, the program memory may be permanent, read-only memory that can only be programmed at the factory, or program memory may be field-alterable flash or erasable read-only memory.

3.1.3 Features

Microcontrollers usually contain from several to dozens of general purpose input/output pins (GPIO). GPIO pins are software configurable to either an input or an output state. When GPIO pins are configured to an input state, they are often used to read sensors or external signals. Configured to the output state, GPIO pins can drive external devices such as LEDs or motors.

Many embedded systems need to read sensors that produce analog signals. This is the purpose of the analog-to-digital converter (ADC). Since processors are built to interpret and process digital data, i.e. 1s and 0s, they are not able to do anything with the analog signals that may be sent to it by a device. So the analog to digital converter is used to convert the incoming data into a form that the processor can recognize. A less common feature on some microcontrollers is a digital-to-analog converter (DAC) that allows the processor to output analog signals or voltage levels. In addition to the converters, many embedded microprocessors include a variety of timers as well.

One of the most common types of timers is the Programmable Interval Timer(PIT). A PIT may either count down from some value to zero, or up to the capacity of the count register, overflowing to zero. Once it reaches zero, it sends an interrupt to the processor indicating that it has finished counting. This is useful for devices such as thermostats, which periodically test the temperature around them to see if they need to turn the air conditioner on, the heater on, etc.

3.1.4 Difference with Microprocessor

These microprocessors contain no RAM, no ROM, and no I/O ports on the chip itself. For this reason, they are commonly referred to as general-purpose microprocessors.

A system designer using a general-purpose microprocessor such as the Pentium or the 68040 must add RAM, ROM, I/O ports, and timers externally to make them functional. Although the addition of external RAM, ROM, and I/O ports makes these systems bulkier and much more expensive, they have the advantage of versatility such that the designer can decide on the amount of RAM, ROM and I/O ports needed to fit the task at hand. This is not the case with Microcontrollers.A Microcontroller has a CPU (a microprocessor) in addition to a fixed amount of RAM, ROM, I/O ports, and a timer all on a single chip. In other words, the processor, the RAM, ROM, I/O ports and the timer are all embedded together on one chip; therefore, the designer cannot add any external memory, I/O ports, or timer to it. The fixed amount of on-chip ROM, RAM, and number of I/O ports in Microcontrollers makes them ideal for many applications in which cost and space are critical.

In many applications, for example a TV remote control, there is no need for the computing power of a 486 or even an 8086 microprocessor. These applications most often require some I/O operations to read signals and turn on and off certain bits.

3.1.5 For Embedded Systems

A microcontroller can be considered a self-contained system with a processor, memory and peripherals and can be used as anembedded system.The majority of microcontrollers in use today are embedded in other machinery, such as automobiles, telephones, appliances, and peripherals for computer systems. While some embedded systems are very sophisticated, many have minimal requirements for memory and program length, with no operating system, and low software complexity. Typical input and output devices include switches, relays, solenoids, LEDs, small or custom LCD displays, radio frequency devices, and sensors for data such as temperature, humidity, light level etc. Embedded systems usually have no keyboard, screen, disks, printers, or other recognizable I/O devices of a personal computer, and may lack human interaction devices of any kind.

3.1.6 Types of Microcontroller

As of 2008 there are several dozen microcontroller architectures and vendors including:

- ARM core processors (many vendors)
- includes ARM9, ARM Cortex-A8, Sitara ARM Microprocessor
- Atmel AVR (8-bit), AVR32 (32-bit), and AT91SAM (32-bit)
- Cypress Semiconductor's M8C Core used in their PSoC (Programmable System-on-Chip)
- Freescale ColdFire (32-bit) and S08 (8-bit)
- Freescale 68HC11 (8-bit)
- Intel 8051
- Infineon: 8, 16, 32 Bit microcontrollers
- MIPS
- Microchip Technology PIC, (8-bit PIC16, PIC18, 16-bit dsPIC33 / PIC24), (32-bit PIC32)
- NXP Semiconductors LPC1000, LPC2000, LPC3000, LPC4000 (32-bit), LPC900, LPC700 (8-bit)
- Parallax Propeller
- PowerPC ISE
- Rabbit 2000 (8-bit)
- Renesas RX, V850, Hitachi H8, Hitachi SuperH (32-bit), M16C (16-bit), RL78, R8C, 78K0/78K0R (8-bit)
- Silicon Laboratories Pipelined 8-bit 8051 Microcontrollers and mixed-signal ARM-based 32-bit microcontrollers.
- STMicroelectronics STM8 (8-bit), ST10 (16-bit) and STM32 (32-bit)
- Texas Instruments TI MSP430 (16-bit)

- Toshiba TLCS-870 (8-bit/16-bit).

Many others exist, some of which are used in very narrow range of applications or are more like applications processors than microcontrollers. The microcontroller market is extremely fragmented, with numerous vendors, technologies, and markets.

3.1.7 Microcontroller Embedded Memory Technology

Since the emergence of microcontrollers, many different memory technologies have been used. Almost all microcontrollers have at least two different kinds of memory, a non-volatile memory for storing firmware and a read-write memory for temporary data.

Data

From the earliest microcontrollers to today, six-transistor SRAM is almost always used as the read/write working memory, with a few more transistors per bit used in the register file. MRAM could potentially replace it as it is 4 to 10 times denser which would make it more cost effective.
In addition to the SRAM, some microcontrollers also have internal EEPROM for data storage; and even ones that do not have any (or not enough) are often connected to external serial EEPROM chip (such as the BASIC Stamp) or external serial flash memory chip.
A few recent microcontrollers beginning in 2003 have "self-programmable" flash memory.

Firmware

The earliest microcontrollers used mask ROM to store firmware. Later microcontrollers (such as the early versions of the Freescale 68HC11 and early PIC microcontrollers) had quartz windows that allowed ultraviolet light in to erase the EPROM.

The Microchip PIC16C84, introduced in 1993, was the first microcontroller to use EEPROM to store firmware. In the same year, Atmel introduced the first microcontroller using NOR Flash memory to store firmware.

Block Diagram

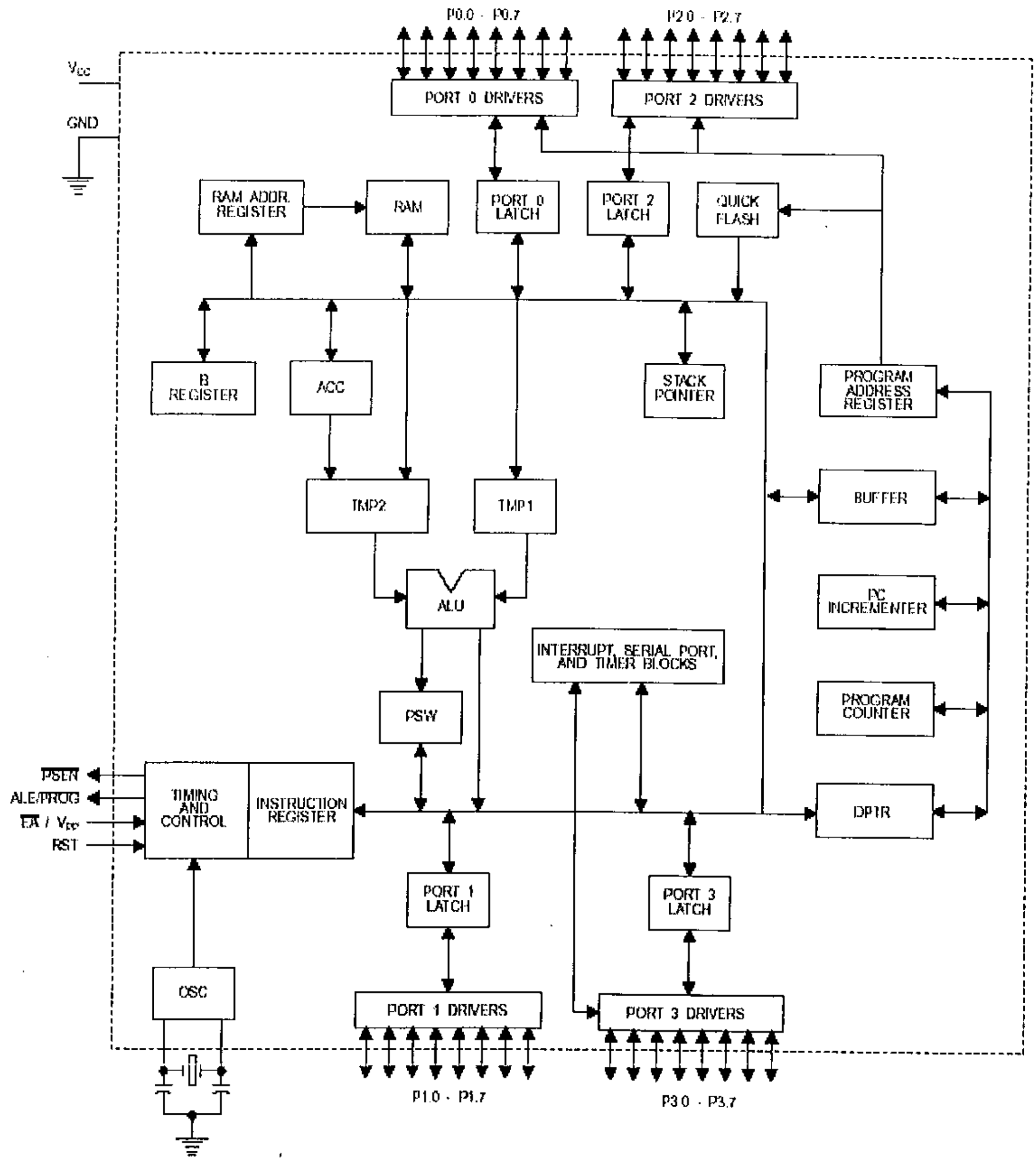

Fig 3.1: Block Diagram

3.1.8 AT89C52

Features

- Compatible with MCS-51™ Products
- 8K Bytes of In-System Reprogrammable Flash Memory
- Endurance: 1,000 Write/Erase Cycles
- Fully Static Operation: 0 Hz to 24 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Programmable Serial Channel
- Low-power Idle and Power-down Modes

Description:

The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pin out.

The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89C52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, three 16-bit timer/counters, a six-vector two-level interrupt architecture, full-duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89C52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next hardware reset.

PIN Description:

VCC: Supply voltage.

GND: Ground.

Port 0:

Port 0 is an 8-bit open drain bi-directional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as high impedance inputs.

Port 0 can also be configured to be the multiplexed low order address/data bus during accesses to external program and data memory. In this mode, P0 has internal pull-ups.

Port 0 also receives the code bytes during Flash programming and outputs the code bytes during program verification. External pull-ups are required during program verification.

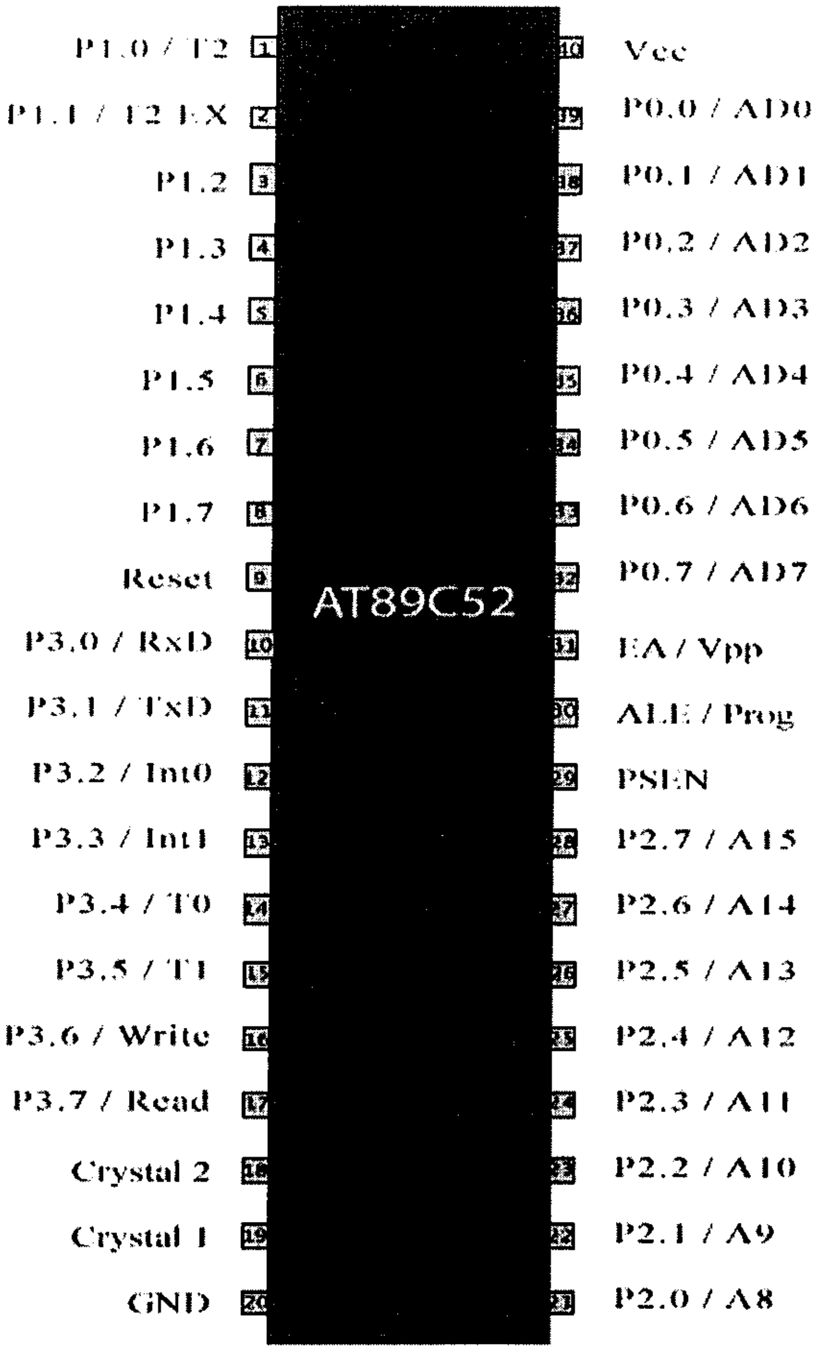

Fig 3.2: Pin Diagram

Port 1:

Port 1 is an 8-bit bi-directional I/O port with internal pull-ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups.

In addition, P1.0 and P1.1 can be configured to be the timer/counter 2 external count input (P1.0/T2) and the timer/counter 2 trigger input (P1.1/T2EX), respectively, as shown in the following table.

Port 1 also receives the low-order address bytes during Flash programming and verification.

Port Pin	Alternate Functions
P1.0	T2 (external count input to Timer/Counter 2), clock-out
P1.1	T2EX (Timer/Counter 2 capture/reload trigger and direction control)

Table 3.1: PORT 1 pins

Port 2:

Port 2 is an 8-bit bi-directional I/O port with internal 17ull-ups. The Port 2 output buffers can sink/source four TTL inputs. When 1s are written to Port 2 pins, they are pulled high by the internal 17ull-ups and can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current (IIL) because of the internal 17ull-ups.

Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external data memory that use 16-bit addresses (MOVX @ DPTR). In this application, Port 2 uses strong internal 17ull-ups when emitting 1s. During accesses to external data memory that use 8-bit addresses (MOVX @ RI), Port 2 emits the contents of the P2 Special Function Register.

Port 2 also receives the high-order address bits and some control signals during Flash programming and verification.

Port 3:

Port 3 is an 8-bit bi-directional I/O port with internal 18ull-ups. The Port 3 output buffers can sink/source four TTL inputs. When 1s are written to Port 3 pins, they are pulled high by the internal 18ull-ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current (IIL) because of the 18ull-ups.

Port 3 also serves the functions of various special features of the AT89C51, as shown in the following table.

Port 3 also receives some control signals for Flash programming and verification.

Port Pin	Alternate Functions
P3.0	RXD (serial input port)
P3.1	TXD (serial output port)
P3.2	$\overline{INT0}$ (external interrupt 0)
P3.3	$\overline{INT1}$ (external interrupt 1)
P3.4	T0 (timer 0 external input)
P3.5	T1 (timer 1 external input)
P3.6	$\overline{WR}$ (external data memory write strobe)
P3.7	$\overline{RD}$ (external data memory read strobe)

Table 3.2: PORT 3 pins

RST:

Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device.

ALE/PROG:

Address Latch Enable is an output pulse for latching the low byte of the address during accesses to external memory.

This pin is also the program pulse input (PROG) during Flash programming. In normal operation, ALE is emitted at a constant rate of 1/6 the oscillator frequency and may be used for external timing or clocking purposes. Note, however, that one ALE pulse is skipped during each access to external data memory.

If desired, ALE operation can be disabled by setting bit 0 of SFR location 8EH. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high. Setting the ALE-disable bit has no effect if the microcontroller is in external execution mode.

PSEN:

Program Store Enable is the read strobe to external program memory. When the AT89C52 is executing code from external program memory, PSEN is activated twice each machine cycle, except that two PSEN activations are skipped during each access to external datamemory.

EA/VPP:

External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH.

Note, however, that if lock bit 1 is programmed, EA will be internally latched on reset. EA should be strapped to VCC for internal program executions.

This pin also receives the 12-volt programming enable voltage (VPP) during Flash programming when 12-volt programming is selected.

XTAL1: Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2: Output from the inverting oscillator amplifier.

3.1.9 Special Function Registers

A map of the on-chip memory area called the Special Function Register (SFR) space is shown in Table 1. Note that not all of the addresses are occupied, and unoccupied addresses may not be implemented on the chip. Read accesses to these addresses will in general return random data, and write accesses will have an indeterminate effect.

User software should not write 1s to these unlisted locations, since they may be used in future products to invoke new features. In that case, the reset or inactive values of the new bits will always be 0.

Timer 2 Registers : Control and status bits are contained in registers T2CON (shown in Table 2) and T2MOD (shown in Table 4) for Timer 2. The register pair (RCAP2H, RCAP2L) are the Capture/Reload registers for Timer 2 in 16-bit capture mode or 16-bit auto-reload mode.

Interrupt Registers : The individual interrupt enable bits are in the IE register. Two priorities can be set for each of the six interrupt sources in the IP register.

3.2 LCD

3.2.1 LCD Display:

Certain organic large size molecule types of liquids possess properties, which cause them to interfere with light passage in them. One type, called the twisted nematic type, is becoming more useful in today's LCDs. In this, the liquid crystals have thread-like shapes: the units join head to tail for million molecules to form lengthy chains. Moreover each plane is twisted a few degrees from the next. Some of the recent chemicals of this variety are made of pyrimidines, phenyl cyclohexanes, bicyclohexane and 4-(4' methoxybenzylidine) -n-butylaniline. They exhibit a crystalline structure even in liquid form at ordinary temperatures.

The property of the liquid is anisotropic in the two perpendicular directions. The cell thickness is so designed that there is a 90^0 turn of the molecules between the top and the bottom faces. The twisted nematic has the property that twists light, which passes through it. Polaroid filters are fitted above and below the cell so that light is polarized as it enters, and is twisted through 90^0, exiting through a filter kept at 90^0 to the one at top. The light is then reflected via a mirror at the back and returns via the same pathway.

It has just a 12 um thin layer of liquid between two or more sheets of glass cum polarizer filters. One glass plate has the 7 segment electrodes etched on it and a conductive coating of tin oxide or Tin cum Indium oxide. The other plate has the common electrode. The conductive coat is treated further for good surface contact to liquid. The cell when assembled appears as clear glass: the segments are not visible.

When a voltage is applied between the plates, the molecules move with the dipoles aligned in the cell axis. Thus those regions under the segments, which have the electric field, have a contrasty appearance when viewed in light, while other unexcite segments are invisible.

The voltage needed is preferable 2-20 V A.C. The cathode (or front plane) voltage input to the LCD goes through an 'analog switch' that is on at any time so that a.c. voltage is applied to the appropriate segment. The anode (back plane) receives the a.c. supply. The display driving switches are from a set of MOSFET switches, which also form part of Integrated circuit. For eg. C 1200 clock LSI I.C. chip from Computer Syst. Inc, USA, is a digital clock chip with the LCD display driver. Turn on time for the LCD displays vary form 0.2-100 millisecs, depending on voltage applied. Turn of time is 30-100ms. So these displays are not suitable for very fast changing numbers. The power consumption is 1to 10 micro watt/cm^2. The voltage threshold for watch type LCD display is 1 to 2V. The operating a.c. frequency is 50-100 KHz.

In another method dc pulses of identical amplitude are used: One pulse to the back electrode and another to the display segment via and exclusive OR gate. In the OFF state, the pulses are in-phase; in the ON-state, they are out of phase. The frequency is 30-32 Hz. The power consumption for a LCD watch is roughly 45 □W, which is 1/1000th of that for LED displays.

3.2.2 PIN Description:

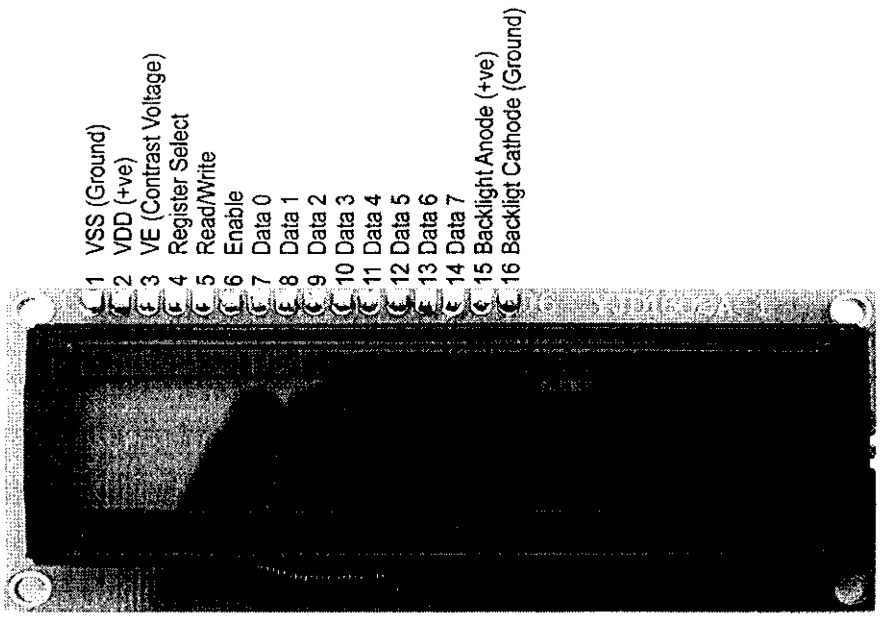

Fig 3.3 Pin Layout of LCD

Pin Number	Symbol	Function
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/W	H/L Read/Write Signal
6	E	H → L Enable Signal

7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (OV)

Table 3.3: Pin Description of LCD

3.3 RFID Module:

3.3.1 Introduction:

RFID (Radio Frequency Identification) allows an item, for example a library book, to be tracked and communicated with by radio waves. This technology is similar in concept to a cell phone. RFID is a broad term for technologies that use radio waves to automatically identify people or objects.

There are several methods of identification, but the most common is to store a serial number that identifies a person or object, and perhaps other information, on a microchip that is attached to an antenna (the chip and the antenna together are called an RFID transponder or an RFID tag). The antenna enables the chip to transmit the identification information to a reader. The reader converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can make use of it .

The heart of the system is the RFID tag, which can be fixed inside a book's back cover or directly onto CDs and videos. This tag is equipped with a programmable chip and an antenna. Each paper-thin tag contains an engraved antenna and a microchip with a capacity of at least 64 bits.

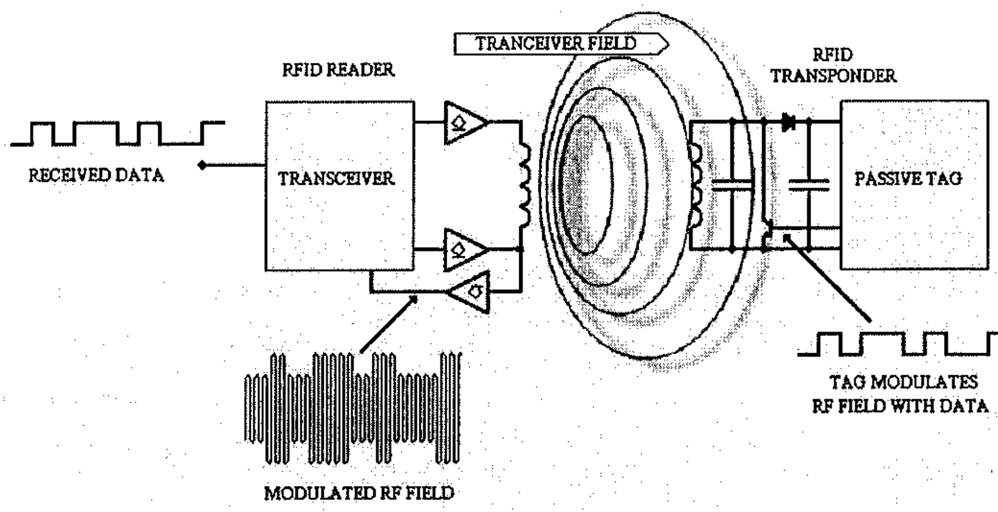

Fig 3.4: RFID System

3.3.2 Components of an RFID System:

A comprehensive RFID system has four components:

- RFID tags that are electronically programmed with unique information
- RFID Readers or sensors to query the tags
- Antenna

3.3.3 RFID Reader:

Description:

RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used & supported by our Reader is 125 KHz.

RFID readers or receivers are composed of a radio frequency module, a control unit and an antenna to interrogate electronic tags via radio frequency (RF) communication.

The reader powers an antenna to generate an RF field. When a tag passes through the field, the information stored on the chip in the tag is interpreted by the reader and sent

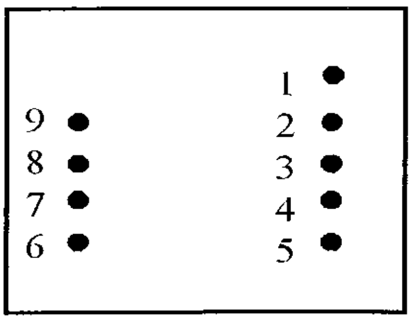

Fig 3.5: Pin Layout of RFID

PIN Details:

1. 5VDC
2. Gnd
3. Buzzer O/P
4. NC – Not Connected
5. NC – not Connected

6. Selection - High - TTL - Low -Weigend

7. TTL O/P - Tx

8. Weigend Data1

9. Weigend Data0

to the server, which, in turn, communicates with the integrated library system when the RFID system is interfaced with it.

RFID exit gate sensors (readers) at exits are basically two types. One type reads the information on the tag(s) going by and communicates that information to a server.

The server, after checking the circulation database, turns on an alarm if the material is not properly checked out. Another type relies on a "theft" byte in the tag that is turned on or off to show that the item has been charged or not, making it unnecessary to communicate with the circulation database.

An RFID reader typically contains a module (transmitter and receiver), a control unit and a coupling element (antenna). The reader has three main functions: energizing, demodulating and decoding. In addition, readers can be fitted with an additional interface that converts the radio waves returned from the RFID tag into a form that can then be passed on to another system, like a computer or any programmable logic controller. Anti-Collision algorithms permit the simultaneous reading of large numbers of tagged objects, while ensuring that each tag is read only once.

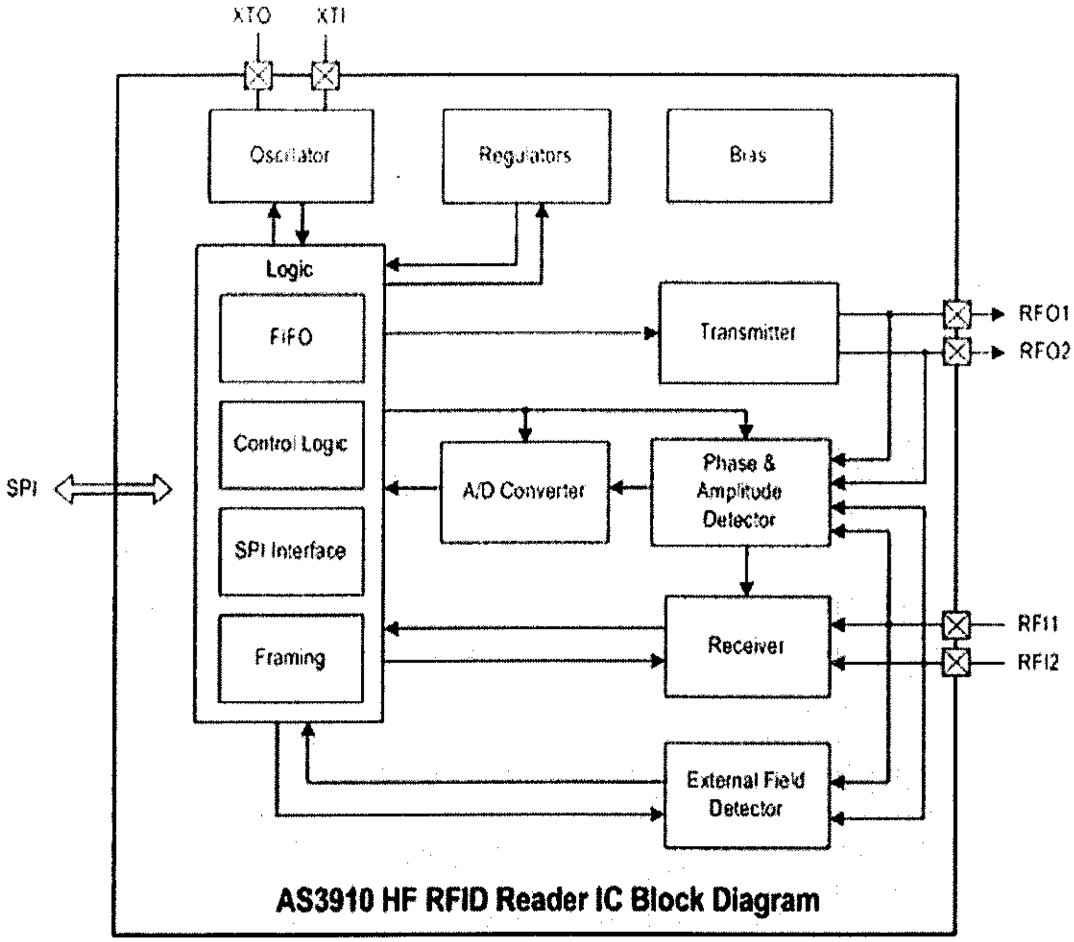

Fig 3.6: Block Diagram of RFID Reader

3.3.4 RFID Module Implementation:

The heart of the system is the RFID tag, which can be fixed inside a book's back cover or directly onto CDs and videos. This tag is equipped with a programmable chip and an antenna. Each paper-thin tag contains an engraved antenna and a microchip with a capacity of at least 64 bits, which contains the information about the book like name of the book etc. RFID is a combination of radio -frequency-based technology and microchip technology.

RF (radio frequency) portion of the electromagnetic spectrum is used to transmit signals. An RFID system consists of an antenna and a transceiver, which read the radio frequency and transfer the information to a processing device (reader) and a transponder, or RF tag, which contains the RF circuitry and information to be transmitted.

The antenna provides the means for the integrated circuit to transmit its information to the reader that converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can analyze the data.

Radio frequency identification (RFID) in a variety of ways including automatic identification and data capture (AIDC) solutions. We pride ourselves in providing customers with inexpensive RFID solutions that integrate well with other systems.

The reader has been designed as a Plug & Play Module and can be plugged on a Standard 300 MIL-28 Pin IC socket form factor.

Functions:

1. Supports reading of 64 Bit Manchester Encoded cards
2. Pins for External Antenna connection
3. Serial Interface (TTL)
4. Wiegand Interface also available
5. Customer application on request

3.3.5 Features:

- Voltage - 5V
- Current < 50Ma
- Operating Frequency – 125KHZ
- Read Distance – 10cm
- Output - TTL –Weigend Selectable - TTL - 9600 Baudrate
- Indication – Beep – Buzzer/ Led status
- Connectivity – Berg strip
- Enclosure - ABS
- Antenna – Built in

3.3.6 RFID Frequencies:

RFID tags and readers have to be tuned to the same frequency in order to communicate effectively. RFID systems typically use one of the following frequency ranges: low frequency (or LF, around 125 kHz), high frequency (or HF, around 13.56 MHz), ultra-high frequency (or UHF, around 868 and 928 MHz), or microwave (around 2.45 and 5.8 GHz).

3.3.7 Antenna:

The antenna produces radio signals to activate the tag and read and write data to it. Antennas are the channels between the tag and the reader, which controls the system's data acquisitions and communication. The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected continually. Antennas can be built into a doorframe to receive tag data from person's things passing through the door.

3.4 GSM Module

GSM or global system for mobile communication is a digital cellular system. It was originated in Finland Europe .however now it is throughout the world. GSM (Global System for Mobile Communication) accounts for 80% of total mobile phone technologies market. There are over more than 3 billion users of GSM (Global System for Mobile Communication) now. GSM technologygot its popularity, when people used it to talk to their friends and relatives. The use of GSM (Global System for Mobile Communication) is possible due to the SIM (subscribers identity module) GSM (Global System for Mobile Communication) is easy to use, affordable and helps you carry your cell phone everywhere. GSM (Global System for Mobile Communication) is a 2G technology. There are many frequency ranges for GSM (Global System for Mobile Communication) however 2G is the most used frequency. GSM (Global System for Mobile Communication) offers moderate security. It allows for encryption between the end user and the service base station. The use of various forms of cryptographic modules is part of GSM technology.

The origins of GSM can be traced back to 1982 when the Group Special Mobile (GSM) was created by the European Conference of Postal and Telecommunications Administrations (CEPT) for the purpose of designing a pan European mobile technology. It is approximated that 80 percent of the world uses GSM technology when placing wireless calls, according to the GSM Association (GSMA), which represents the interests of the worldwide mobile communications industry. This amounts to nearly 3 billion global people.

For practical and everyday purposes, GSM offers users wider international roaming capabilities than other U.S. network technologies and can enable a cell phone to be a "world phone". More advanced GSM incorporates the earlier TDMA standard. GSM carriers have roaming contracts with other GSM carriers and typically cover rural areas more completely than competing CDMA carriers (and often without roaming charges, too).

GSM also has the advantage of using SIM (*S*ubscriber *I*dentity *M*odule) cards in the U.S. The SIM card, which acts as your digital identity, is tied to your cell phone service carrier's network rather than to the handset itself. This allows for easy exchange from one phone to another without new cell phone service activation. GSM uses digital technology and is a second-generation (2G) cell phone system. GSM, which predates CDMA, is especially strong in Europe.

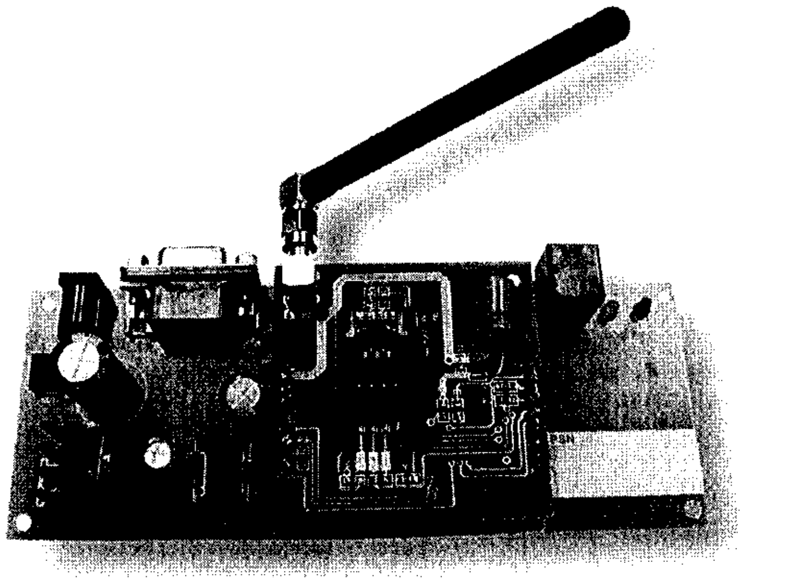

Fig 3.7: GSM Module

3.4.1 GSM Carrier frequencies:

GSM networks operate in a number of different carrier frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G), with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in Canada and the United States). In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first-generation systems.

Most 3G networks in Europe operate in the 2100 MHz frequency band.

Regardless of the frequency selected by an operator, it is divided into timeslots for individual phones to use. This allows eight full-rate or sixteen half-rate speech channels per radio frequency. These eight radio timeslots (or eight burst periods) are grouped into a TDMA frame. Half rate channels use alternate frames in the same timeslot. The channel data rate for all 8 channels is 270.833 kbit/s, and the frame duration is 4.615 ms.

The transmission power in the handset is limited to a maximum of 2 watts in GSM850/900 and 1 watt in GSM1800/1900.

3.4.2 Network structure:

The network is structured into a number of discrete sections:

- The Base Station Subsystem (the base stations and their controllers).
- The Network and Switching Subsystem (the part of the network most similar to a fixed network). This is sometimes also just called the core network.
- The GPRS Core Network (the optional part which allows packet based Internet connections).
- The Operations support system (OSS) for maintenance of the network.

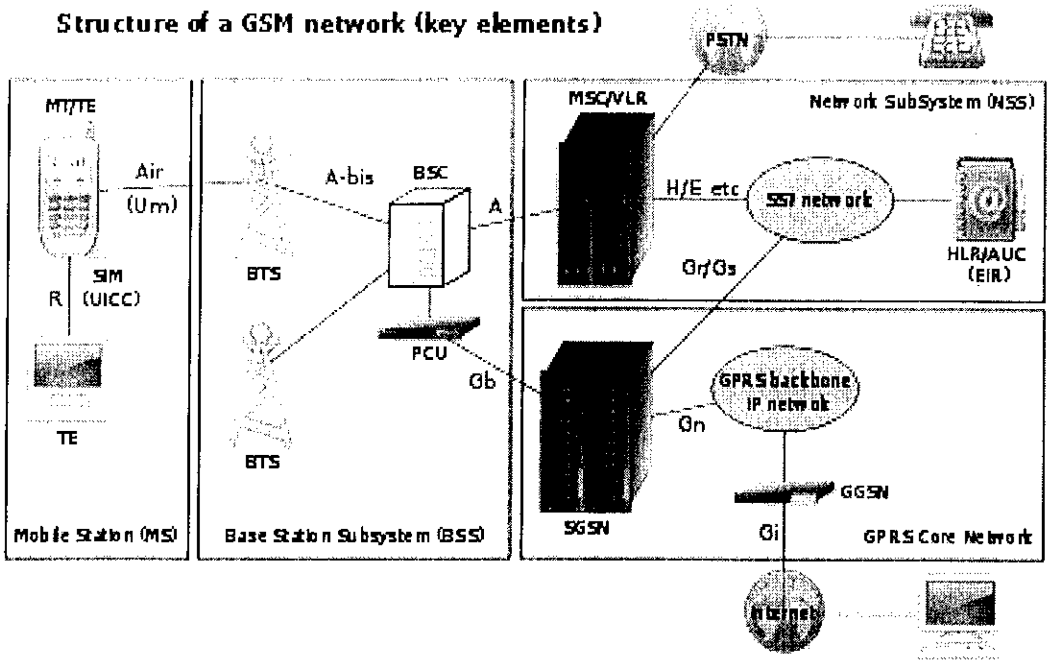

Fig 3.8: The Structure of GSM Network

3.4.3 Subscriber Identity Module (SIM):

One of the key features of GSM is the Subscriber Identity Module, commonly known as a SIM card. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets. Alternatively, the user can also change operators while retaining the handset simply by changing the SIM. Some operators will block this by allowing the phone to use only a single SIM, or only a SIM issued by them; this practice is known as SIM locking.

CHAPTER 4

GSM Module

4.1 GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

A GSM modem can be an external device or a PC Card / PCMCIA Card. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. A GSM modem in the form of a PC Card / PCMCIA Card is designed for use with a laptop computer. It should be inserted into one of the PC Card / PCMCIA Card slots of a laptop computer.

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities. Both GSM modems and dial-up modems support a common set of standard AT commands. You can use a GSM modem just like a dial-up modem. A GSM modem exposes an interface that allows applications to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone.

4.2 SIM300 GSM Modem

This is the type of GSM Modem which we are going to use in our project.

Features	Implementation
Power Supply	Single supply voltage 3.4V – 4.5V
Power Saving	Typical power consumption in SLEEP mode to 2.5mA
Frequency bands	• SIM300 Tri-band: EGSM 900, DCS 1800, PCS 1900. The band can be set by AT COMMAND, and default band is EGSM 900 and DCS 1800. • Compliant to GSM Phase 2/2+
GSM Class	Small MS
Transmit Power	• Class 4 (2W) at EGSM900 • Class 1 (1W) at DCS1800 and PCS 1900
GPRS Connectivity	• GPRS multi-slot class 10 • GPRS mobile station class B
Temperature range	• Normal operation: -20°C to +55°C • Restricted operation: -25°C to -20°C and +55°C to +70°C • Storage temperature -40°C to +80°C
DATA GPRS	• GPRS data downlink transfer: max. 85.6 kbps • GPRS data uplink transfer: max. 42.8 kbps • Coding scheme: CS-1, CS-2, CS-3 and CS-4 • SIM300 supports the protocols PAP (Password Authentication Protocol) usually used for PPP connections. • The SIM300 integrates the TCP/IP protocol. • Support Packet Switched Broadcast Control Channel (PBCCH)

	• CSD transmission rates: 2.4, 4.8, 9.6, 14.4 kbps, non-transparent • Unstructured Supplementary Services Data (USSD) support
SMS	• MT, MO, CB, Text and PDU mode • SMS storage: SIM card • Support transmission of SMS alternatively over CSD or GPRS. User can choose preferred mode.
Fax	Group 3 Class 1
SIM interface	Supported SIM card: 1.8V ,3V
External antenna	Connected via 50 Ohm antenna connector or antenna pad
Audio Features	Speech codec modes: • Half Rate (ETS 06.20) • Full Rate (ETS 06.10) • Enhanced Full Rate (ETS 06.50 / 06.60 / 06.80) • Echo suppression
Two serial interfaces	• Serial Port 1 Seven lines on Serial Port Interface • Serial Port 1 can be used for CSD FAX, GPRS service and send • AT command of controlling module. • Serial Port 1 can use multiplexing function, but you can not use the Serial Port 2 at the same time; • Auto bauding supports baud rate from 1200 bps to 115200bps. • Serial port 2 Two lines on Serial Port Interface /TXD and /RXD • Serial Port 2 only used for transmitting AT command.

Table 4.1： SIM300 key features

PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
VBAT		Eight BAT pins of the board-to-board Connector are dedicated to connect the supplyvoltage. The power supply of SIM300 has tobe a single voltage source of VBAT= 3.4V...4.5V. It must be able to provide sufficient current in a transmit burst whichtypically rises to 2A.mostly, these 8 pins arevoltage input	Vmax= 4.5V Vmin=3.4V Vnorm=4.0V
VRTC	I/O	Current input for RTC when the battery is not supplied for the system. Current output for backup battery when the main battery is present and the backup battery in low voltage state.	V max=2.0V V min=1.2V V norm=1.8V I norm= 20uA
VDD_EXT	O	Supply 3.0V voltage for external circuit. By measure this pin, user can judge the system is on or off. When the voltage is low, the system is off. Otherwise, the system is on.	V max=3.15V V min=2.85V V norm=3.0V Imax=60mA
GND		Digital ground	

Table 4.2: Board-to-Board Connector pin description

4.3 Introduction to AT Commands

AT commands are instructions used to control a modem. AT is the abbreviation of ATtention. Every command line starts with "AT" or "at". That's why modem commands are called AT commands. Many of the commands that are used to control wired dial-up modems, such as ATD (Dial), ATA (Answer), ATH (Hook control) and ATO (Return to online data state), are also supported by GSM/GPRS modems and mobile phones. Besides this common AT command set, GSM/GPRS modems and mobile phones support an AT command set that is specific to the GSM technology, which includes SMS-related commands like AT+CMGS (Send SMS message), AT+CMSS (Send SMS message from storage), AT+CMGL (List SMS messages) and AT+CMGR (Read SMS messages).

Note that the starting "AT" is the prefix that informs the modem about the start of a command line. It is not part of the AT command name. For example, D is the actual AT command name in ATD and +CMGS is the actual AT command name in AT+CMGS. However, some books and web sites use them interchangeably as the name of an AT command.

Here are some of the tasks that can be done using AT commands with a GSM/GPRS modem or mobile phone:

- Get basic information about the mobile phone or GSM/GPRS modem. For example, name of manufacturer (AT+CGMI), model number (AT+CGMM), IMEI number (International Mobile Equipment Identity) (AT+CGSN) and software version (AT+CGMR).

- Get basic information about the subscriber. For example, MSISDN (AT+CNUM) and IMSI number (International Mobile Subscriber Identity) (AT+CIMI).

- Get the current status of the mobile phone or GSM/GPRS modem. For example, mobile phone activity status (AT+CPAS), mobile network registration status (AT+CREG), radio signal strength (AT+CSQ), battery charge level and battery charging status (AT+CBC).

- Establish a data connection or voice connection to a remote modem (ATD, ATA, etc).
- Send and receive fax (ATD, ATA, AT+F*).
- Send (AT+CMGS, AT+CMSS), read (AT+CMGR, AT+CMGL), write (AT+CMGW) or delete (AT+CMGD) SMS messages and obtain notifications of newly received SMS messages (AT+CNMI).
- Read (AT+CPBR), write (AT+CPBW) or search (AT+CPBF) phonebook entries.
- Perform security-related tasks, such as opening or closing facility locks (AT+CLCK), checking whether a facility is locked (AT+CLCK) and changing passwords (AT+CPWD).(Facility lock examples: SIM lock [a password must be given to the SIM card every time the mobile phone is switched on] and PH-SIM lock [a certain SIM card is associated with the mobile phone. To use other SIM cards with the mobile phone, a password must be entered.])
- Control the presentation of result codes / error messages of AT commands. For example, you can control whether to enable certain error messages (AT+CMEE) and whether error messages should be displayed in numeric format or verbose format (AT+CMEE=1 or AT+CMEE=2).
- Get or change the configurations of the mobile phone or GSM/GPRS modem. For example, change the GSM network (AT+COPS), bearer service type (AT+CBST), radio link protocol parameters (AT+CRLP), SMS center address (AT+CSCA) and storage of SMS messages (AT+CPMS).
- Save and restore configurations of the mobile phone or GSM/GPRS modem. For example, save (AT+CSAS) and restore (AT+CRES) settings related to SMS messaging such as the SMS center address.

4.3.1 Basic Commands and Extended Commands

There are two types of AT commands: basic commands and extended commands.

- Basic commands are AT commands that do not start with "+". For example, D (Dial), A (Answer), H (Hook control) and O (Return to online data state) are basic commands.

- Extended commands are AT commands that start with "+". All GSM AT commands are extended commands. For example, +CMGS (Send SMS message), +CMSS (Send SMS message from storage), +CMGL (List SMS messages) and +CMGR (Read SMS messages) are extended commands.

4.3.2 General Syntax of Extended AT Commands

The general syntax of extended AT commands is straightforward. The syntax rules are provided below. The syntax of basic AT commands is slightly different. We will not cover the syntax of basic AT commands in this SMS tutorial since all SMS messaging commands are extended AT commands.

Syntax rule 1: All command lines must start with "AT" and end with a carriage return character. (We will useto represent a carriage return character in this SMS tutorial.) In a terminal program like HyperTerminal of Microsoft Windows, you can press the Enter key on the keyboard to output a carriage return character. Example: To list all unread inbound SMS messages stored in the message storage area, type "AT", then the extended AT command "+CMGL", and finally a carriage

return character, like this
AT+CMGL

Syntax rule 2: A command line can contain more than one AT command. Only the first AT command should be prefixed with "AT". AT commands in the same command-line string should be separated with semicolons.

Example: To list all unread inbound SMS messages stored in the message storage area and obtain the manufacturer name of the mobile device, type "AT", then the extended AT command "+CMGL", followed by a semicolon and the next extended AT command "+CGMI":
AT+CMGL;+CGMI

An error will occur if both AT commands are prefixed with "AT", like this: AT+CMGL; AT+CGMI

Syntax rule 3: A string is enclosed between double quotes. Example: To read all SMS messages from message storage in SMS text mode (at this time you do not need to know what SMS text mode is. More information will be provided later in this SMS tutorial), you need to assign the string "ALL" to the extended AT command +CMGL, like this:
AT+CMGL="ALL"

Syntax rule 4: Information responses and result codes (including both final result codes and unsolicited result codes) always start and end with a carriage return character and a linefeed character.

Example: After sending the command line "AT+CGMI" to the mobile device, the mobile device should return a response similar to this:

Nokia
OK

The first line is the information response of the AT command +CGMI and the second line is the final result code. and represent a carriage return character and a linefeed character respectively. The final result code "OK" marks the end of the response. It indicates no more data will be sent from the mobile device to the computer / PC.

When a terminal program such as HyperTerminal of Microsoft Windows sees a carriage return character, it moves the cursor to the beginning of the current line. When it sees a linefeed character, it moves the cursor to the same position on the next line. Hence, the command line "AT+CGMI" that you entered and the corresponding response will be displayed like this in a terminal program such as HyperTerminal of Microsoft Windows.

AT+CGMI

Nokia

OK

CHAPTER 5

CONCLUSION

Our project is finally implemented on the PCB board with the help of our project guide and is in working condition.

It can be used in following fields:-

- **Used in ATM booths for theft detection.**

  This project is very useful for controlling the ATM's in remote locations. It can control 2-3 near by ATM's in a same time.

- **Can be used in Home Securities.**

  At home it can control the security system of home, shop etc.

FUTURE SCOPE

- More than one ATM's could be connected.
- We can implement GPS module in it and can connect to internet.
- We can also add a protection feature in which we can use "Stepper Motor" to shut off the door permanently until someone comes

Everyday technological advancements are being made in this field and this technology promises to be a part of various research projects in the future. Technology never stops developing and there is always a scope for Future expansion.

REFERENCES

BOOKS:

- The 8051 Microcontroller And Embedded Systems Using Assembly And C by Mazidi
- Electronics Circuits and Devices by J.B. Gupta
- Mobile Communication By Jochen Schiller

RESEARCH PAPERS:

- *Muhammad Javed, Bashir Ahmad, Muhammad Ali Abid, Imran Ali Khan* **"Intelligent Agent for detection of ATM Theft"** ISSN 2222-1719 (Paper) IISTE, Vol 2, No.4, 2011

WEBSITES:

- www.answer.com
- www.atmel.com
- www.alldatasheet.com
- www.electronics4u.com
- www.datsheetarchieve.com
- www.wikipedia.com

APPENDIX-A

SOURCE CODE OF MICROCONTROLLER

```
#include <REGX51.H>

#define LCD P0

sbit RS   = P0^0;

sbit EN   = P0^1;

sbit LED1 = P2^0; // Green

sbit LED2 = P2^1; // Red

void init_LCD(void);

void delay_lcd(unsigned int);

void lcd_data(unsigned char);

void lcd_cmd(char);

void dis_cmd(unsigned char);

void dis_data(unsigned char);

void init_UART();

unsigned char cmd_value1;

unsigned char data_value1;

void tx_UART(char v)

{

  TI=0;
```

```
SBUF = v;
while(TI!=1);
TI=0;
}
void msg_send()
{
int a;
char code arr3[]="at+cmgs=";
char code arr4[]="9816741212";
char code arr5[]="UNAUTHORIZED ACCESS";
for(a=0;a<=7;a++)
{
tx_UART(arr3[a]);
}
tx_UART("");
for(a=0;a<=9;a++)
{
tx_UART(arr4[a]);
}
tx_UART("");
tx_UART(0x0D);
for(a=0;a<=18;a++)
{
```

```
tx_UART(arr5[a]);
   }
 }
void init_gsm()
{
int a;
   char code arr1[]="at";
   char code arr2[]="at+cmgf=1";
   char code arr3[]="at+cmgs=";
   char code arr4[]="9816741212";
   char code arr5[]="ALERT : System Activated";
   char code arr6[]="at+cmgd=1";

   for(a=0;a<=1;a++)
   {
tx_UART(arr1[a]);
   }
tx_UART(0x0D);
   for(a=0;a<=8;a++)
   {
tx_UART(arr2[a]);
   }
tx_UART(0x0D);
```

```
for(a=0;a<=8;a++)
{
tx_UART(arr6[a]);
}
for(a=0;a<=7;a++)
{
tx_UART(arr3[a]);
}
tx_UART("");
for(a=0;a<=9;a++)
{
tx_UART(arr4[a]);
}
tx_UART(0x0D);
for(a=0;a<=23;a++)
{
]    tx_UART(arr5[a]);
}

void lcd_init()
{
dis_cmd(0x28);
dis_cmd(0x01);
```

```
dis_cmd(0x0C);

dis_cmd(0x06);

dis_cmd(0x80);

}


void dis_cmd(unsigned char cmd_value)

{

        RS=0;

        ret_data = (LCD&0x0F);

        cmd_value1 = (cmd_value | ret_data);

        ret_data = (LCD&0x0F);

        cmd_value1 = ((cmd_value<<4) | ret_data);

        lcd_cmd(cmd_value1);

}



void dis_data(char data_value)

{

        RS=1;

        ret_data = (LCD&0x0F);

        data_value1=(data_value | ret_data);

        ret_data = (LCD&0x0F);

        data_value1=((data_value<<4) | ret_data);
```

```
lcd_data(data_value1);

}

void lcd_data(unsigned char dta)
{
LCD = dta;
EN=1;
delay_lcd(20);
EN=0;
}

void lcd_cmd(unsigned char cmmd)
{
LCD = cmmd;
EN=1;
delay_lcd(20);
EN=0;
}

void delay_lcd(unsigned int DD)
{unsigned inti,j;
for(i=1;i<=DD;i++)
{
```

```
for(j=1;j<=50;j++);
}
}

void lcd_string(unsigned char *dat)
        {
        while(*dat)
        dis_data(*dat++);
        }

void main_lcd(void)
{
        lcd_init();
        lcd_string("OK            ");
}

void init_UART()
{
        TMOD = 0x22;
    SCON = 0x50;
    TH1  = 0xFD;
    TL1  = 0xFD;
```

```
}
intread_card()
{
        int lv,flg1,lv2;
        unsigned char arrt[15];
        unsigned char code darr[3][10]       =        {{'6','2','E','3','8','0','E','B','0','8'},
                                                       {'6','2','E','3','8','0','E','A','6','D'},
                                                       {'6','2','E','3','8','0','E','B','6','4'}
};
        dis_cmd(0x01);
        lcd_string("   PLACE CARD   ");
        RI=0;
        for(lv=0;lv<12;lv++)
        {
                while(!RI);
                arrt[lv] = SBUF;
                RI = 0;
        }
        dis_cmd(192);
        dis_data(' ');dis_data(' ');dis_data(' ');
        for(lv=0;lv<10;lv++)
        {
                dis_data(arrt[lv]);
```

```
}

delay_lcd(2000);


for(lv2=0;lv2<3;lv2++)

{

        flg1=0;

        for(lv=0;lv<10;lv++)

        {

                if(arrt[lv]==darr[lv2][lv])

                {

                        flg1++;

                }

        }


        if(flg1==10)

        {

                return lv2+1;

        }

}

        dis_cmd(0x80);

        lcd_string("                ");

        dis_cmd(0xC0);

        lcd_string("                ");
```

```
                dis_cmd(0x80);
                dis_cmd(0x80);
                lcd_string(" INVALID CARD ! ");
                msg_send();
                LED2 = 0;
                delay_lcd(2000);
                LED2 = 1;
                return 0;
}

int main()
{
        int ret;
        main_lcd();
        init_UART();
        init_gsm();
        lcd_string("                ");
        dis_cmd(0xC0);
        lcd_string("                ");
        while(1){
                        ret = read_card();
                        if(ret<=0 || ret>3)
                        {
```

```
}
else
{
dis_cmd(0x80);
lcd_string("                ");
dis_cmd(0xC0);
lcd_string("                ");
        if(ret==1)
        {
                dis_cmd(0x80);
                lcd_string("                ");
                dis_cmd(0xC0);
                lcd_string("                ");
                dis_cmd(0x80);
                lcd_string(" WELCOME  USER1 ");
                LED1 = 0;
                delay_lcd(5000);
                delay_lcd(5000);
                LED1 = 1;

        }
        if(ret==2)
```

```
{
        dis_cmd(0x80);
        lcd_string("              ");
        dis_cmd(0xC0);
        lcd_string("              ");
        dis_cmd(0x80);
        lcd_string(" WELCOME  USER2 ");
        LED1 = 0;
        delay_lcd(5000);
        delay_lcd(5000);
        LED1 = 1;
}
if(ret==3)
{
        dis_cmd(0x80);
        lcd_string("              ");
        dis_cmd(0xC0);
        lcd_string("              ");
        dis_cmd(0x80);
        lcd_string(" WELCOME  USER3 ");
        LED1 = 0;
        delay_lcd(5000);
        delay_lcd(5000);
```

```
                    LED1 = 1;
                }
            }
        }
        return 0;
}
```