DESIGN OF A PC BASED WIRELESS DOOR SECURITY SYSTEM

Thesis submitted in partial fulfilment of the requirements for the degree

of

Master of Technology

in

VLSI Design and Embedded Systems

by

SUCHARITA JENA

Roll No: 210EC2317

Department of Electronics & Communication Engineering

National Institute of Technology

Rourkela

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Under the guidance of

Prof. S. K. Das

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CERTIFICATE

This is to certify that the thesis entitled, "**DESIGIN OF A PC BASED WIRELESS DOOR SECURITY SYSTEM**"submitted by SUCHARITA JENA in partial fulfilment of the requirements for the award of Master of Technology degree in **Electronics and Communication Engineering** with specialization in "**VLSI Design and Embedded Systems**" during session 2010-2012 at National Institute of Technology, Rourkela (Deemed University) and is an authentic work by her under my supervision and guidance.

To the best of my knowledge, the matter embodied in the thesis has not been submitted to any other university/institute for the award of any Degree or Diploma.

Date:

Prof. Santos Kumar Das

Dept. Of ECE

National Institute of Technology

Email: dassk@nitrkl.ac.in

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SUCHARITA JENA

Roll No: 210EC2317

Dept. of ECE

NIT, Rourkela

ABSTRACT

This project is developed by using Radio Frequency Identification (RFID) System, ATMEGA-32 Microcontroller and relay switching circuit to design a PC based Time attendance and Wireless door access system. The main objective of this project is to implement a time attendance system along with a door lock system for secure and reliable applications. The system gives all types of information regarding student registration, in-out track record, attendance details which can be used for future reference. In this project, both the hardware and software modules are integrated. The hardware module includes a Passive RFID reader, ATMEGA-32 microcontroller, Relay Switching circuit and LEDs. The advantage of using passive RFID is that it functions without a battery and passive tags are lighter and are less expensive than the active tags [4].The software module uses Microsoft visual studio 2008, which is designed in such a way that the hardware system is interfaced and controlled from the computer with a Graphical User Interface (GUI). The primary purpose of the project is to authenticate each user .The system enables user to check-in and check-out under fast, secure and convenient conditions. The system also includes door locking system which opens up when the user taps the tag on the RFID reader and the tag information is matched with the information already stored in database. The RFID reader along with ATMEGA-32 microcontroller controls the opening and closing of the door.

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ACRONYMS

RFID – Radio Frequency Identification

GUI – Graphical User Interface

ATmega32--microcontroller of Atmel's Mega AVR family

C# - C sharp

LED-Light Emitting Diode

ISO – International Organization for Standardization

USART – Universal Synchronous Asynchronous Receiver/Transmitter

Chapter 1

Introduction

1.1 Introduction

Wireless communication is the transfer of information over a distance without the use of wires. The distances involved may be short (a few meters as in television remote control) or long (thousands or millions of kilometers for radio communications). Door security system can be either wired or wireless. In case of wireless communication, the connectivity will be convenient and secured which also guarantees authentication process. The door security system basically requires few basic modules such as radio frequency identification (RFID), relay and microcontroller module. These modules can be interface with PC/Notebook through serial port (RS232) or universal serial bus (USB) port.

1.2 Literature Survey and Motivation

1.2.1 Literature Survey

The related works has been mentioned [1, 2, 3, 4]. The paper [1] introduces a system design for RFID reader. The architecture used in this paper implements various kinds of RFID standards by changing the soft of Nios-II core in FPGA. The paper [2] proposes an UFH RFID reader based on the ISO/IEC 18000-6B standard. It describes the hardware and software design of RFID reader. The paper [3] explains about microcontroller based RFID .It uses real time clock capability with which attendance can be taken more accurately since the time of attendance will be recorded. In Paper [4], it has implemented a digital security system which contains door lock system using passive RFID. A centralized system is being used for controlling and transactions. The door locking system works in real time that when the user taps the card in contact with the reader, the door opens and the information is stored in central server along with basic information of the user. RFID technology is utilized to provide solution for secure access of a space while keeping record of the user.

1.2.2 Motivation

Referring to the Literature survey in Paper [4], our work is extended to design PC and microcontroller based wireless door security system and Time attendance system using RFID technology. Wireless networks have been a subject of research for efficient and reliable data transmission. The major concerns were in the area of security. Wireless applications guarantees authentication, confidentiality and integrity of data.

1.3 Objective

The objective of the thesis is to design a Wireless door security system in which a Personal Computer can be interfaced with a RFID reader and Microcontroller. Here a Graphical user interface (GUI) is designed to communicate with the overall system.

1.3.1 Data transfer between RFID reader and Personal computer (PC) using visual studio

The data which is read by RFID reader when the card is tapped on the RFID reader is send to the PC through serial transmission. To access this data a database is designed on the PC using Microsoft Visual Studio 2008.

1.3.2 Data transfer from PC to ATMEGA32 microcontroller for Door Access

The RFID Card number which is tracked by the RFID reader is now compared with the data present in the database. If the Card number is present in the database then the PC will send a signal to the ATMEGA through the C# programming for Door Access.

1.4 Proposed Work

In our work, we use a commercially available RFID EM reader along with an ATMEGA-32 microcontroller board. ATmega32 microcontroller is a high-performance, low-power 8-bit AVR RISC-based microcontroller from Atmel Corp. including 32KB of programmable flash memory, 2KB SRAM, 1KB EEPROM, an 8-channel 10-bit A/D converter, which also have a JTAG interface for on-chip debugging. The device supports throughput of 16 MIPS at 16 MHz and operates between 4.5 to 5.5 volts. By executing instructions in a single clock cycle, the device

achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

1.5 Thesis overview

The overview of the thesis is as follows:

Chapter 2- Radio Frequency Identification: This describes about the brief introduction of RFID, its components and its interface with the system.

Chapter 3- ATMEGA32 microcontroller: It explains about architecture and its instruction set.

Chapter 4- System Design: This gives a detailed description of the steps including the hardware and software components

Chapter5- Results and discussion: Describes the results and output on the microcontroller board.

Chapter 6-Conclusions: It gives the conclusions drawn from the paper and Future development.

Chapter 2

Radio Frequency Identification (RFID) Reader

2.1 History of RFID

RFID i.e. **Radio-Frequency Identification** refers to small electronic devices that consist of an antenna and a small chip. The chip is capable of carrying 2,000 bytes of data or less. RFID is used to describe a system that transmits the identity of a person or object, wirelessly in the form of a unique serial number, using radio waves. RFID is an automatic identification technology. The RFID device must be scanned to retrieve the identifying information. Advantage of RFID devices is that it does not need to be positioned precisely relative to the scanner. RFID technology is used for efficient time management and it enhances data security [6].

2.2 Characteristics and Key attributes of RFID

RFID data Characteristics [7]

- Large volume
- Accurate analysis
- Temporal oriented
- Data safety
- System safety
- Repetitive use

Key attributes

- Provide real-time, wireless transmission of data without human intervention.
- Do not require line-of-site scanners for operation.
- Allow stored data to be altered during sorting
- Work effectively even in harsh environments.

2.3 RFID System Components

A basic RFID system mentioned in Fig. 2.1 consists of three components [5]:

- Tag
- Reader
- Host computer.

RFID tags: RFID tags contain tiny semiconductor chips and miniaturized antennas. They can be uniquely identified by the reader/host pair and, when applied or tied to an object or a person, that object or person can be tracked and identified wirelessly.

Following are the types of RFID tags:

i. **Active RFID tags** include on-board power source (miniature batteries) that are used to power the tag, and can transmit signals autonomously.

ii. **Passive RFID tags** don't include an on-board power source and have power given to them by the reader.

iii. **Battery Assisted Passive (BAP) or Semi-passive RFID tags** require an external source to wake up but have significant higher forward link capability providing greater range.

RFID Readers: RFID Readers are composed of an antenna and an electronic module. The antenna is used for communicating with RFID tags wirelessly. The electronic module is networked with the host computer through cables and relay message between the host computer and all the tags within the antenna's range. The electronic module also perform a number of security functions such as encryption/decryption and user authentication, and another critical function called anti-collision, which enables a reader to communicate with multiple tags simultaneously [13]. The reader can send information in two directions: it can read information from a tag and send it to the PC (read mode), or it can read information from the PC and to an RFID tag (write mode).

RFID Reader Specification and Features:

The following are the RFID Reader Specification:

- Reading range: Up to 10 centimeters
- Frequency : 125 KHz
- Interface : RS-232, Baud rate selectable (9600 bps)
- No parity, 8 Data bits, 1 Stop bit
- Dimension : W134.2 x H38.4 x D65.4 mm
- Operating Temperature: 0 to 55 Deg. C
- Storage Temperature: -25 to 65 Deg. C

- Humidity : 5 ~ 95% RH

The following are the RFID Reader features:

- Power supply 12VDC/AC.
- Read RFID transponder contactless.
- Verify the code number of RFID transponder.
- RS-232 Interface.

Host Computer: Host computer or PC provides an interface between the RFID hardware and application based system. They are used to network multiple RFID interrogators together and to centrally process information. The controller in any network is most often a PC or a workstation running database or application software. The following figure 2.1 shows the components of RFID system.

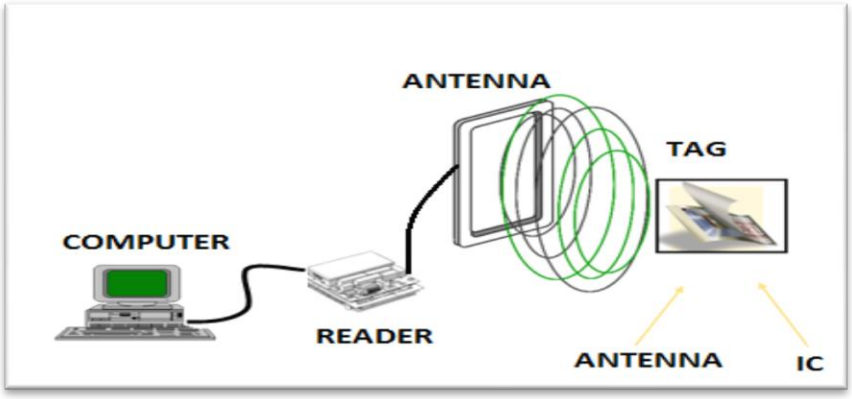

Figure 2.1 : Components of RFID System

2.4 Operation of RFID System

- The radio signals from antenna activate the tag in order to read and write data.
- Depending upon its power and the radio frequency used, the RFID reader emits radio waves from one inch to few 100 feet. When an RFID tag passes through this range, the RFID reader gets activated.

- The reader reads the data encoded in the RFID tag and the data is send to the host computer for further processing.
- The data present in the tag gives the identification or information, about the product or user.
- Generally RFID tag consists of a spiral antenna connected to a microchip which can store 2 Kbytes of user data.
- RFID reader has a trans-receiver to activate and retrieve the stored data from RFID tag. The reader then passes the information to the host computer system [1].

2.5 RFID System Model:

The following figure 2.2 explains about the RFID System Model

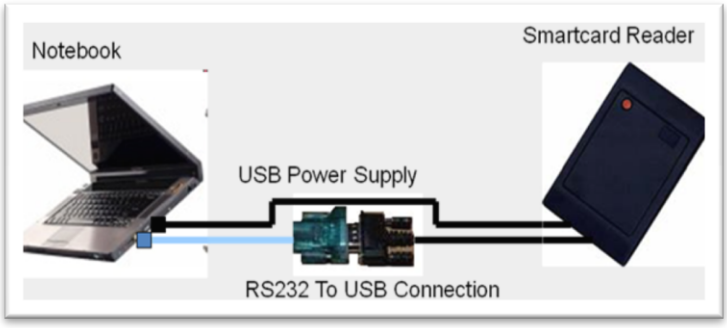

Figure 2.2: Interface of RFID Reader with Personal Computer

The system model shows the RFID interface with Personal Computer .RFID reader includes a contactless RFID tag. The reader can be connected to a PC through RS232 to USB converter. We propose the connection techniques and its implementation. The connection technique is very simple, where a reader will be connected to PC via RS232 cable. In our implementation, we considered the communication protocol between the reader and PC. We provided a front-end GUI using C# language with the supporting of MS Access database as the back-end.

2.6 Applications of RFID

- Asset Tracking
- People Tracking
- Document tracking
- Government Library
- Healthcare

Chapter 3

ATMEGA-32 Microcontroller

3.1 Introduction

The Atmel AVR ATmega32 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. ATMEGA 32 Development Board is made from double sided PTH PCB board to provide extra strength to the connector joints for increased reliability. Power supply for the board can be from 7 to 15V DC supply. It has built-in reverse polarity protection. It has 7805voltage regulator has heat sink for heat dissipation so that it can supply 1Amp current continuously without getting over heated. It has switches for boot loading, reset and power. It also has RS232 interface with DB9 female connector based on MAX232.All the ports are connected to standard 10 pin FRC connectors. Open pads for connecting microcontroller's pins to external devices are also provided [11].

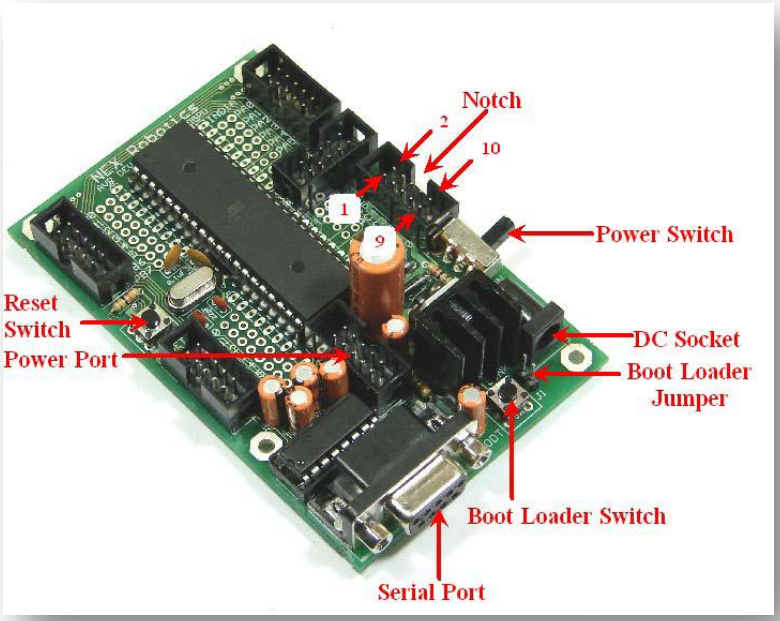

Figure 3.1: AVR DEVELOPMENT BOARD

3.2 Features of AVR Microcontrollers (ATMEGA-32)

- 32K bytes of ISP Flash Program memory with Read-While-Write capabilities.
- 1Kbyte EEPROM.
- A programmable Watchdog Timer with Internal Oscillator.
- 2K byte SRAM.
- 32 general purpose I/O lines.
- 32 general purpose working registers.
- A JTAG interface is available.
- On-chip debugging support and programming.
- 3 Timer/Counters with compare modes.
- A serial programmable USART.
- A byte oriented Two-wire Serial Interface.
- An 8-channel, 10-bit ADC.
- An SPI serial port.
- 6 software selectable power saving modes.

3.4 Architecture and Pin Configuration of ATMEGA32

3.4.1 The following figure 3.2 is the architecture given by the manufacturer [13]

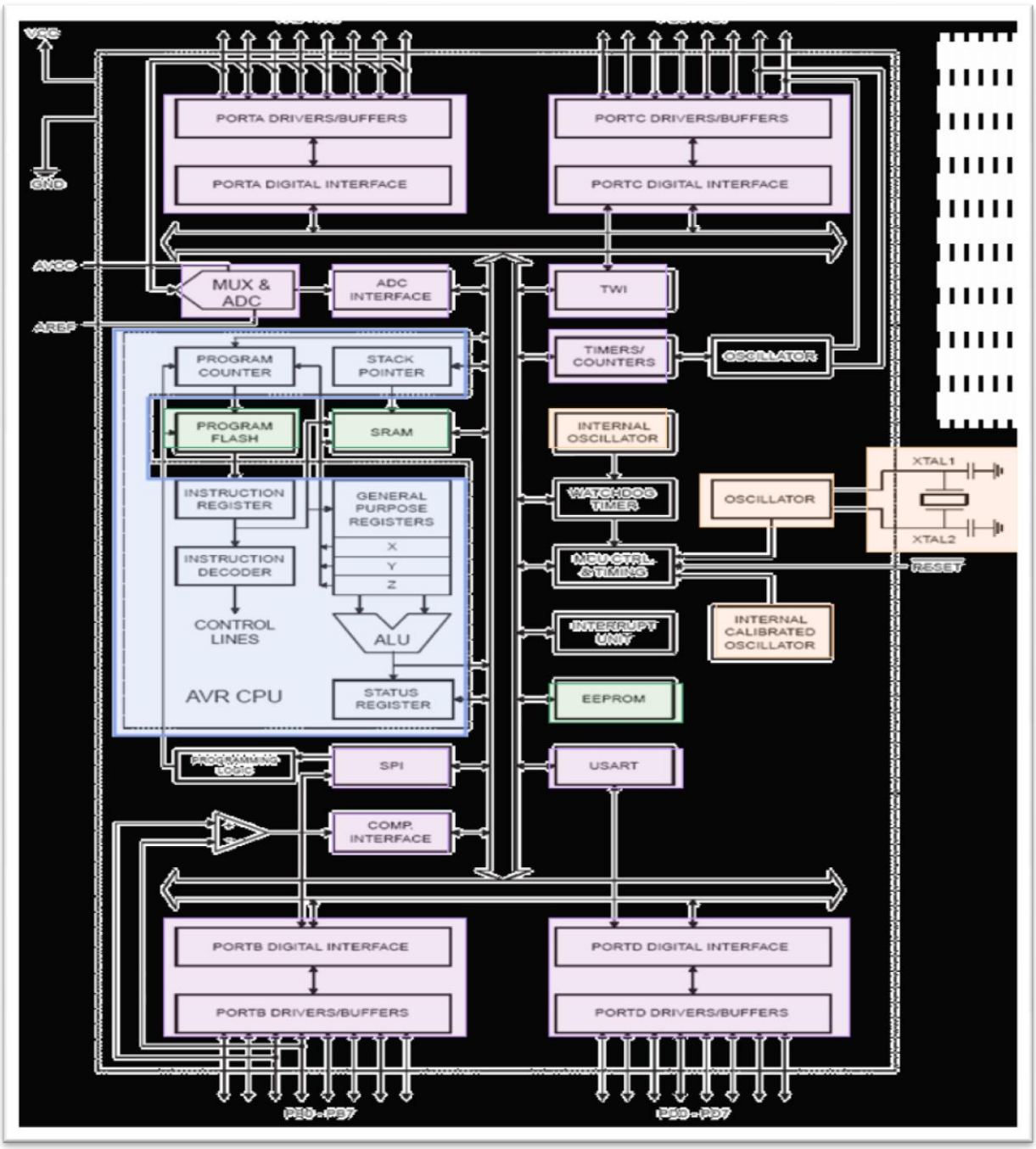

Figure 3.2 : Architecture of ATMEGA 32

3.4.2 The following figure 3.3 illustrates the Pin Configuration of ATMEGA 32[12]

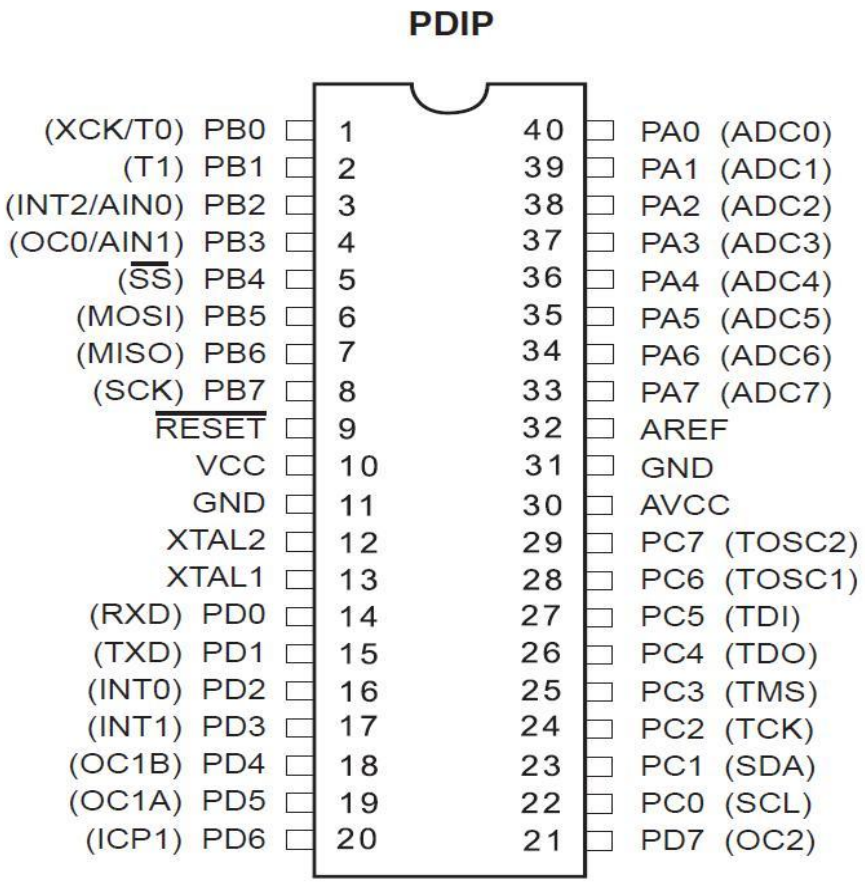

Figure 3.3: Pin configuration

Chapter 4

System Design

4.1 System model

The system using RFID is an automated version of manual student Management System. It provides all details about students and faculties that include institute details, their personnel details, and academic details, subject details etc. The manual system involved a lot of time, manpower etc. Our system has got almost all works computerized so that accuracy is maintained and maintaining backup is very easy. It can be done within a few minutes. This model uses a RFID reader, RFID tag, ATMEGA-32 microcontroller, RF Transmitter and RF receiver. The RFID reader requires a contactless RFID tag, which can be connected to a PC through RS232 to USB converter. ATMEGA-32 microcontroller unit is a integrated module with a RF Transmitter and RF receiver along with a relay and EM lock modules. This unit also connected to PC/Notebook through RS232 cable. The system model is shown in Figure which says about the connectivity of all the above modules.

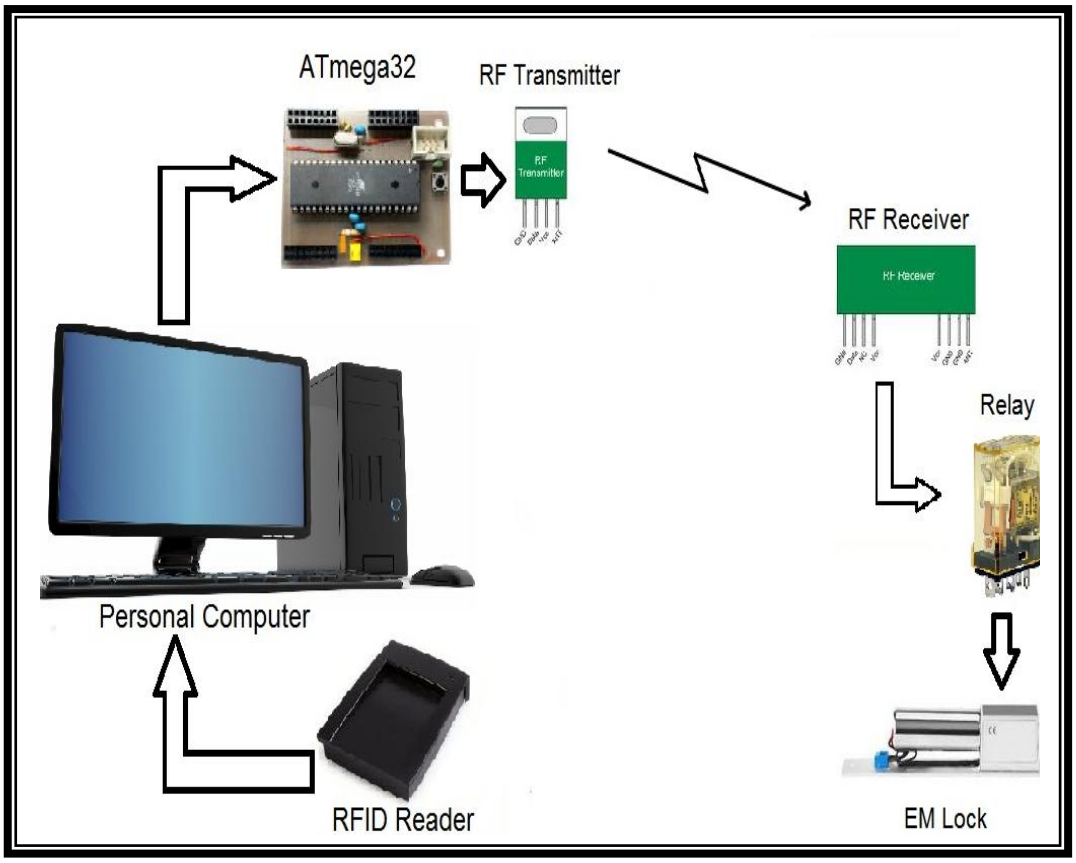

Figure4.1 : System Model

4.1.1 RS 232: RS-232 is a standard serial interface used for connecting serial devices.RS-232 is used for relatively low-speed serial data communication between computers and serial devices. RS-232 is the interface that is used by the computer to talk and exchange data with modem and other serial devices. The serial ports used on computers is a subset of RS-232C standard [8].

4.1.2 RF Transmitter/Receiver: This comprises of a **Transmitter** and a **Receiver**. The Tx/Rx pair operates at a frequency of 434 MHz. RF transmitter transmits serial data wirelessly using radio frequency through its antenna .The transmission rate is of about 1Kbps - 10Kbps.The transmitted data is received by a receiver operating at the same frequency [9].

RF Transmitter

Pin No	Function	Name
1	Ground (0V)	Ground
2	Serial data input pin	Data
3	Supply voltage; 5V	Vcc
4	Antenna output pin	ANT

Table 1 : Pin configuration of RF Transmitter

RF Receiver

Pin No	Function	Name
1	Ground (0V)	Ground
2	Serial data output pin	Data
3	Linear output pin; not connected	NC
4	Supply voltage; 5V	Vcc
5	Supply voltage; 5V	Vcc
6	Ground (0V)	Ground
7	Ground (0V)	Ground
8	Antenna input pin	ANT

Table 2: Pin configuration of RF Receiver

4.1.3 Encoder/Decoder: The encoder/decoder is used before and after transmitter and receiver. The encoder is used for encoding parallel data to serial data for serial transmission. The received data from the RF receiver is decoded to parallel data using decoder. HT12E-HT12D, HT640-HT648, etc. are some commonly used encoder/decoder pair ICs [9].

4.1.4 Relay Switching Circuit: A relay is an electrically operated switch. The current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages [10].

The relay's switch connections are usually labeled COM, NC and NO:

- **COM** = Common is the moving part of the switch.
- **NC** = Normally Closed
- **NO** = Normally Open

4.2 Working of System Model

When a RFID tag is tapped on the RFID reader, it reads the card number and verified with the database. If the user is already registered, it will be authenticated and a signal will be transmitted from PC to the microcontroller through RS-232 communication.AVR microcontroller works in TTL logic, so RS 232 logic from PC is converted to TTL logic through MAX 232 converter. The RF transmitter connected to the microcontroller sends a signal to the door lock system through RF receiver and relay unit. After getting the signal from relay unit, the door will be automatically opens for fixed time duration.

4.3 Algorithm and Flowcharts: The following are the algorithm and flowcharts

1. Registration

2. Attendance Report

3. Record Time

4. RFID reader connection check and Card Detection

5. Time keeping and door open

A. Algorithm for user registration with flowchart

Step1: Start the process.

Step2: Verify the user.

Step3: Check whether the user exists or not.

Step4: If user exists then register the user else terminate the process.

Following figure 4.3 demonstrates the flowchart for user registration:

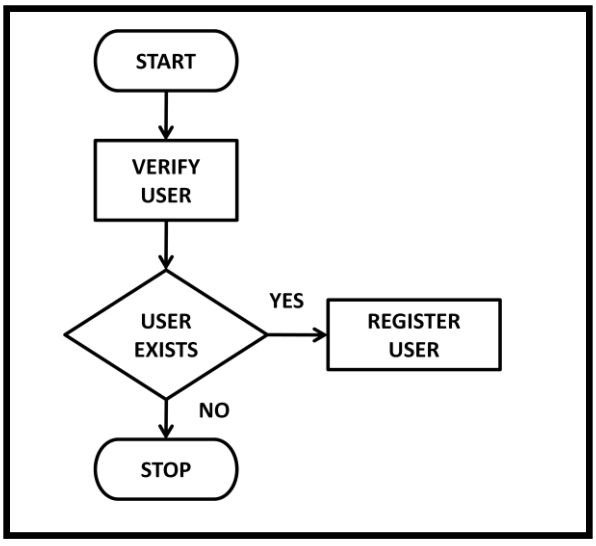

Figure 4.2 : Flowchart for User Registration

B. Algorithm for Attendance report with flowchart

Step1: Start the process

Step2: Enter the user name

Step3: Verify user from the registration form

Step4: Check whether user present or not.

Step5: If user is present, then shows the attendance report else stop the process.

Following figure 4.4 demonstrates the flowchart for Attendance Report:

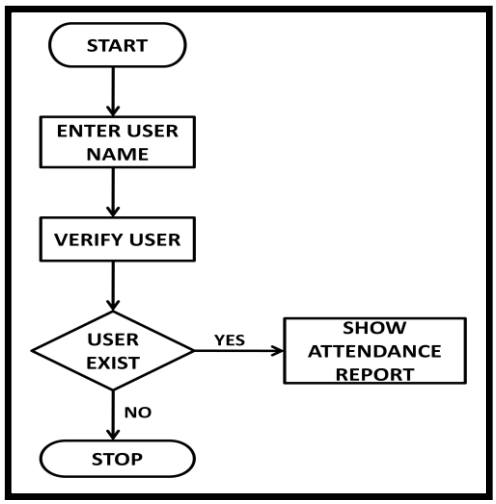

Figure 4.3 : Flowchart for Attendance Report

C. Algorithm to record time of entry with flowchart

Step1: Start the process

Step2: Read the card ID number through USB port of PC

Step3: Check whether user exists or not

Step4: If user exists then record time of entry of the user else stop the process

Following figure 4.5 demonstrates the flowchart for recording time of entry:

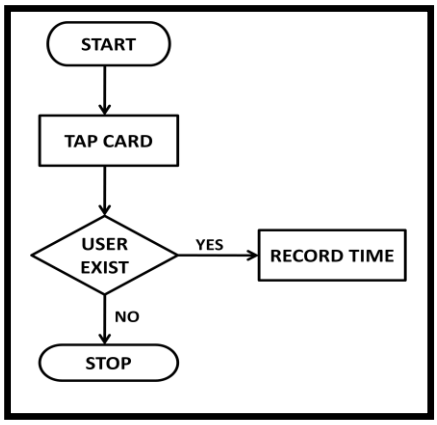

Figure 4.4 : Flowchart to Record Time of Entry

D. Algorithm for connection check and RFID card detection with flowchart

Step1: Start the process

Step2: RFID reader is connected to the PC

Step3: Check the communication port number.

Step4: RFID reader is connected to the communication port through PC based software.

Step5: Read the card ID number through USB Port of PC.

Step6: If user exists then stop the process else register the user.

Following figure 4.6 demonstrates the flowchart for connection check and RFID card detection:

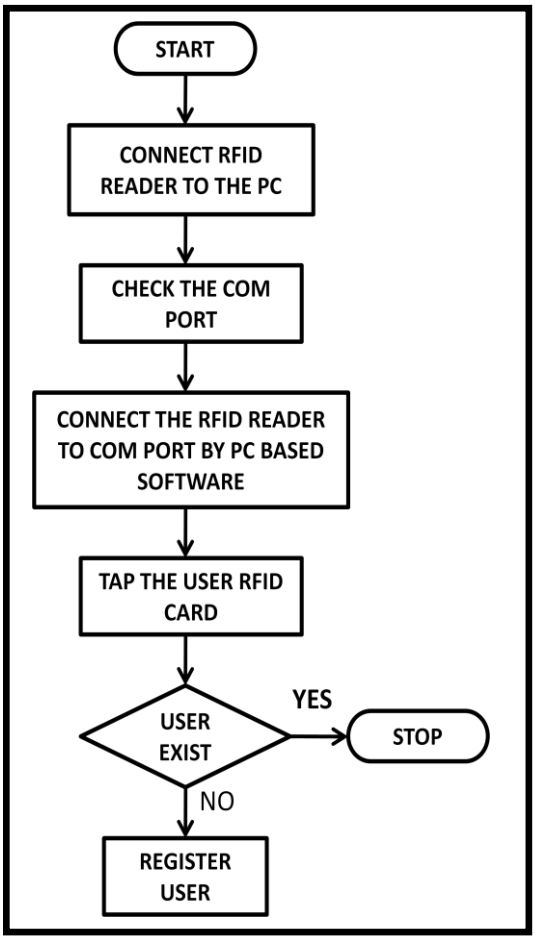

Figure 4.5 : Flowchart for Connection Check and Card Detection

E. Algorithm to record time and open the door with flowchart

Step1: Start the process

Step2: Read the card ID number through USB port of PC

Step3: Check whether user exists or not

Step4: If user exists then record time of entry.

Step 5: PC sends OPEN signal to microcontroller

Step 6: Microcontroller transmits the signal to RF transmitter.

Step 7: RF receiver receives the signal and relay circuit is activated.

Step 8: Stop the process

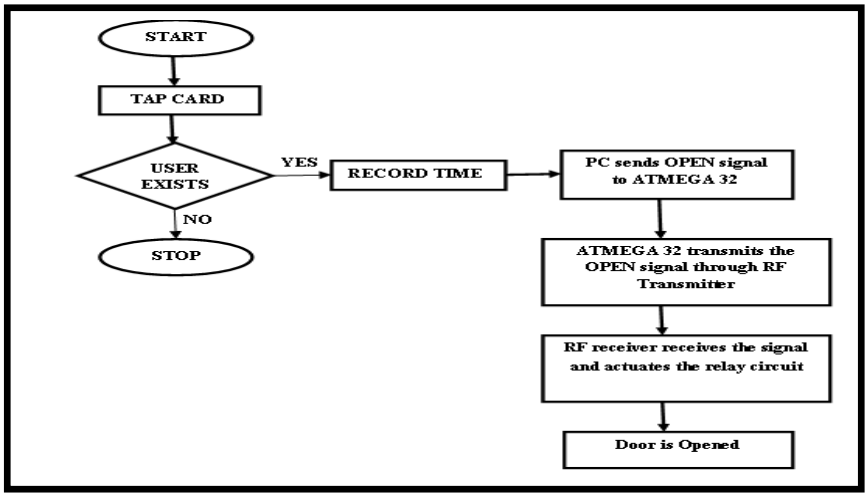

Figure 4.6 : Flowchart to record time and open the door

4.4 Software Implementation

Software Implementation is done in two parts:

1. We implemented Microprogramming using AVR studio. The following is the program code:

```
int main()
 {
 DDRA=0XFF;                    //output port declaration
 char data;                    //Variable Declaration

/*First Initialize the USART with baud rate = 9600bps
for Baud rate = 9600bps

 USARTInit(99);                //UBRR = 99
```

```
while (1)                                   //Loop forever
  {
  data=USARTReadChar();                     //Read data

   USARTWriteChar('[');          /* Now send the same data but but surround it in
                                 square bracket. For example if user sent 'a' our
                                  system will echo back '[a]'.*/

   USARTWriteChar(data);
   USARTWriteChar(']');

   if(data== 'o')
        {
        PORTA=0x01;
        _delay_ms(5000);
        PORTA=0x00;
        }

   else if(data== 'c')
        {
        PORTA=0x02;
        _delay_ms(1000);
        PORTA=0x00;
        }
   else PORTA=0x00;

  }
}
```

2. We implemented the communication protocol using C# programming language with MS Access database. We provided a front-end GUI for user verification, enrolment, view/delete user list etc. and for back-end we used MS Access database, where we created a table in order to store user information.

a) Reading the card ID number through USB port of PC.
b) Extracting the card ID number from the stream of data by discarding the start and stop bits.
c) Storing the extract number on MS Access database during user enrolment.

During Verification of user if the enrolled user tapped the card again, that will be authenticated and the message will be displayed on the system.

4.4.1 ***Reading card ID NUMBER***

The card number from the reader is obtained by programming the serial port according to the communication protocol.

Port Name	**COM#**
Baud Rate[1]	9600
Data Bits	8
Parity[2]	None
Stop Bit[3]	1
Flow Control	Hardware

Table 3: Communication Protocols

Com Port number may vary depending upon the system and port used (COM3/4/5….)

Baud rate – The baud rate is the number of times per second a serial communication signal changes states; a state being either a voltage level, or a frequency, or a frequency phase angle.

Parity Bits – The parity bit, unlike the start and stop bits, is an optional parameter, used in serial communications to determine if the data character being transmitted is correctly received by the remote device [14, 18].

4.4.2 ***Extraction of the exact card ID number***

To obtain the exact card number the start and stop bits should be discarded using proper methods. We have used the following cardRead() method which returns the 8 digit card number. The following is the code:

```
privatestring cardRead()
  {
   string readcard2 = " ";
   if (!myserialPort.IsOpen)
   {
   myserialPort.Open();
   }
  string readcard1 = myserialPort.ReadExisting();
  int len = readcard1.Length;
  if (len >= 10)
  {
  for (int i = len - 10; i < len - 2; i++)
     {
        readcard2 += readcard1[i];
     }
  }
   return readcard2;
 }
```

4.4.3 ***Linking with the database***

The database design includes creating an MS Access database and linked with Visual Studio 2008.

The database having a table "Student" is created.

Column Name	Information
Card Number	Number
Student Name	Text
Roll Number	Text
Date of Birth	Number
Sex	Text
Department	Text
Course Opted For	Text
Semester	Number
Year of Joining	Text
Father's/Guardian	Text
Present Address	Text
Permanent	Text
Blood Group	Text
Phone Number	Number
Email Id	Text

Table 4: Student Database design

4.4.4 ***Storing in user database***

Verification of user is done by comparing the RFID card number with the Student ID of existing users. The algorithm used for verification and subsequent procedures:

If cardnumber != null

Select data from table having StudentID = cardno

Details textbox=details from student table;

If student exists with particular cardno

Show a message box displaying welcome message

Cardno.visible = false;

Details textbox.visible = true;

Else

Message = not registered;

Enroll button.visible = true;

If Enroll button.pressed = true

Redirect to registration page

Filling the form

Submit button.pressed = data entry to database with ID fromCardno textbox;

Else

Message=Tapcardproperly;

Chapter 5

Simulation Results

5.1 System Testing

5.1.1 *Interfacing LCD with ATMEGA-32:*

- The Port A of ATmega32 is connected to data pins of LCD i.e. to Port B and is defined as LCD_DATA.
- We use the 16x2 LCD, which means it has two rows of 16 characters each. Hence in total we can display 32 characters.

Following figure 5.6 shows the schematic of LCD interfacing with ATMEGA-32

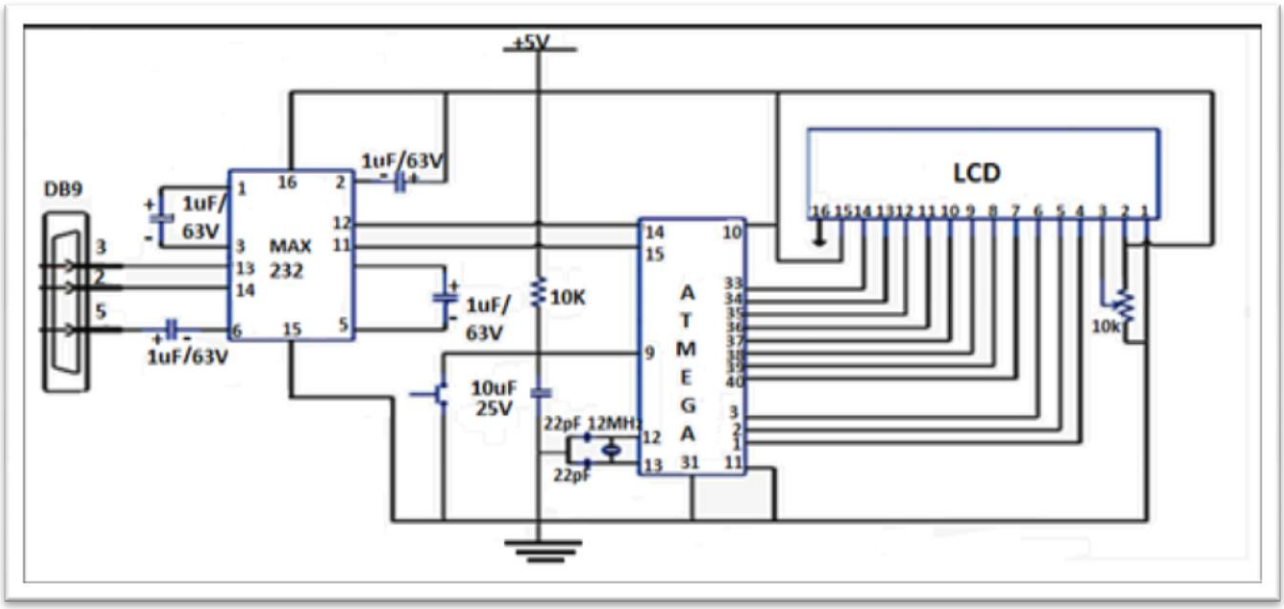

Figure 5.1 : Interfacing LCD with ATMEGA-32

Program Code for LCD interfacing:

```
 int main()
 {
  int cursor up=1;                    //Variable Declaration
  int cursor_down=1;
  char data;
  USARTInit (99);                      //UBRR = 99(for Baud rate = 9600bps)
 init_devices ();
 lcd_set_4bit ();
 lcd_init();
 while(1)                              //Loop forever
    {   data=USARTReadChar();         //Read data
       USARTWriteChar(data );
       USARTWriteChar(']');
    }
}
```

Result for LCD interfacing

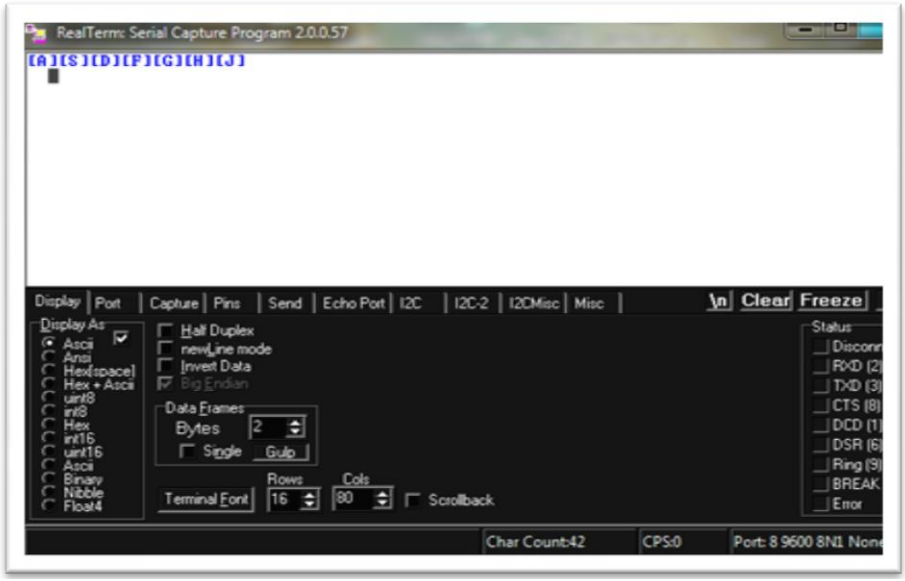

Figure 5.2 : Input given in GUI for LCD Display

Figure 5.3 : LCD of ATMEGA32 showing the same data as given in GUI

Program code for Relay Switching Circuit:

```
int main()
{   DDRA=0XFF;                    //output port declaration
 char data;                       //Variable Declaration
USARTInit(99);                    // Initialize the USART with baud rate = 9600bps,UBRR=99
while(1)                          //Loop forever
{   data= USARTReadChar();        //Read data
USARTWriteChar('[');              // Now send the same data but surround it in square bracket
USARTWriteChar(data);
USARTWriteChar(']');
if(data== '1')
{   PORTA=0x01;
_delay_ms(1000);
PORTA=0x00;
}
else if(data== '0')
{   PORTA=0x02;
_delay_ms(1000);
PORTA=0x00;
}
else PORTA=0x00;
}
}
```

Result for Relay Switching Circuit

Figure 5.4 : Input given in GUI for Relay Switching Circuit

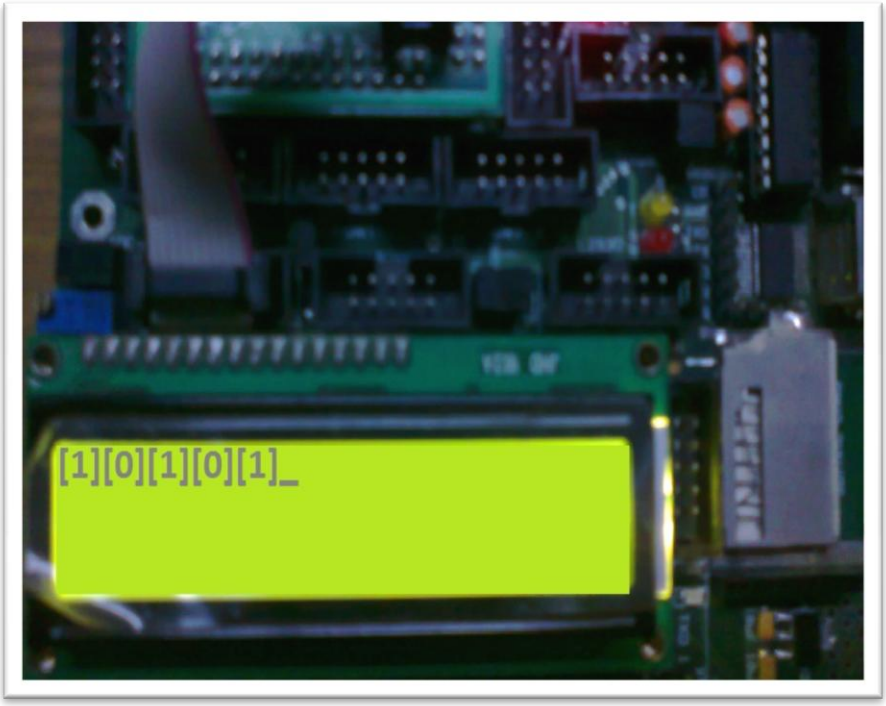

Figure 5.5 : LCD of ATMEGA32 showing the same data as given in GUI

5.1.2 *RFID Card Testing*

The following fig 5.6 shows the GUI for RFID Card Testing

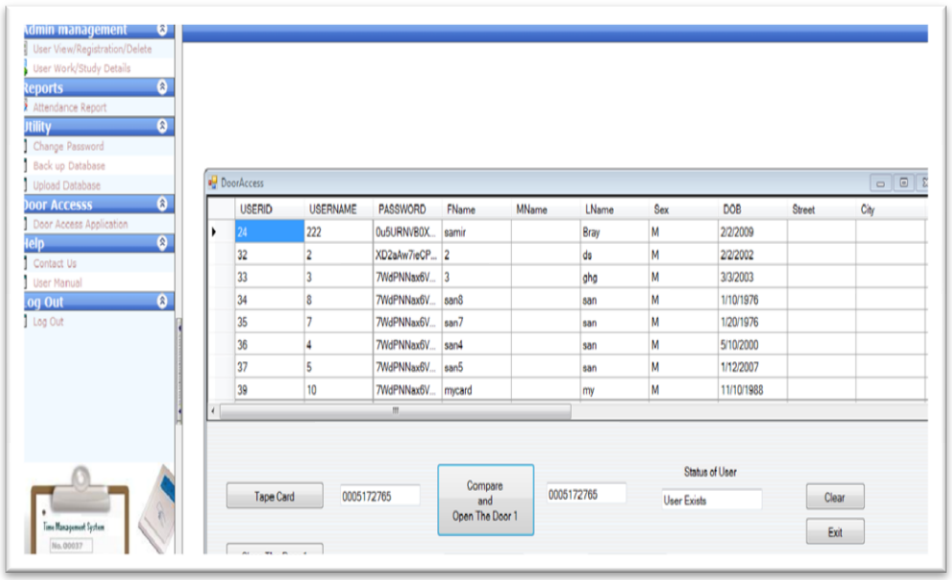

Figure 5.6 : GUI showing RFID Card detection

- Figure 5.7 below displays the hardware connectivity of the system along with the RF Reader module showing RFID card detection.

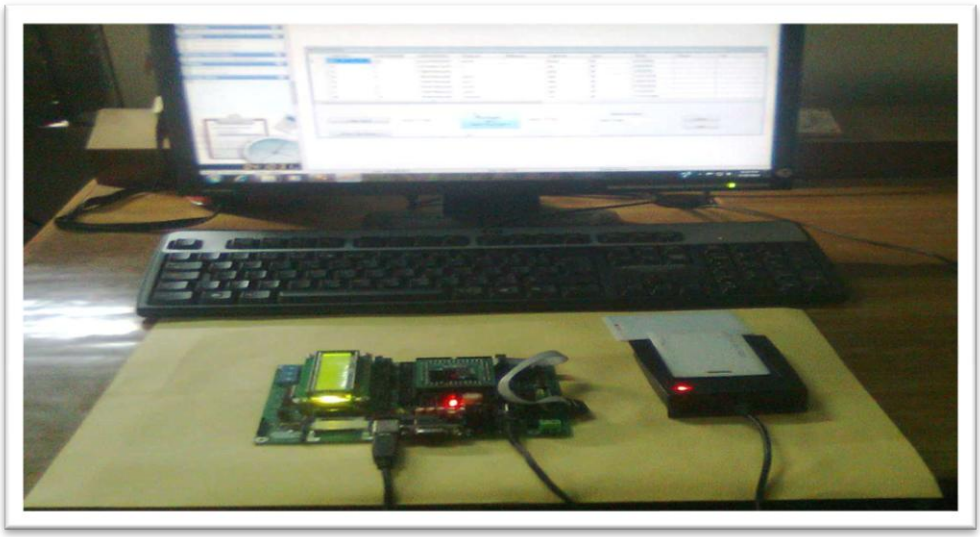

Figure 5.7 : Interfacing of RFID Reader, ATmega32 with PC.

5.1.2 *Door Access Design*

- Figure 5.8 below displays the hardware connectivity of the overall integrated wireless security system along with the RF transmitter module.

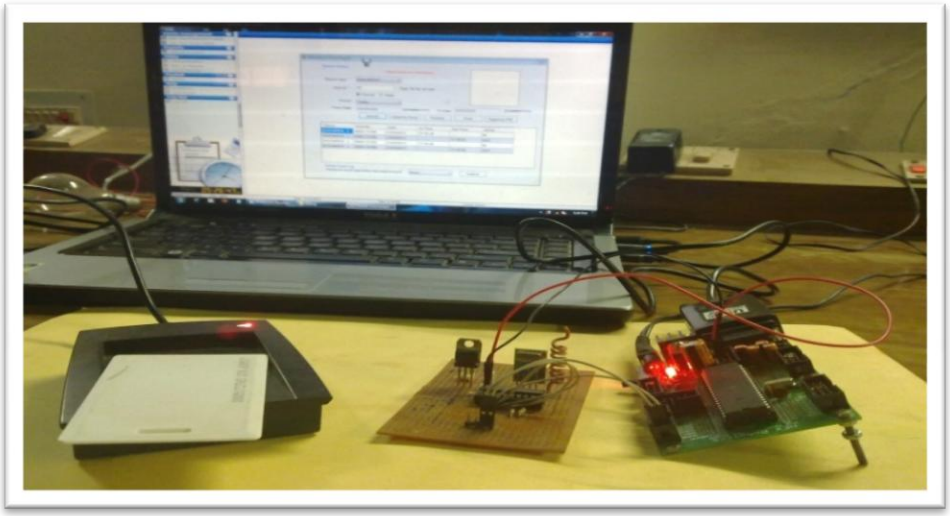

Figure 5.8 : Interfacing of RFID Reader, ATmega32 and RF transmitter with PC.

- Figure 5.9 below display about the RF receiver along with relay and door lock system. The RF receiver is interfaced with a relay module. Here we use electric bulb instead of door lock for testing only.

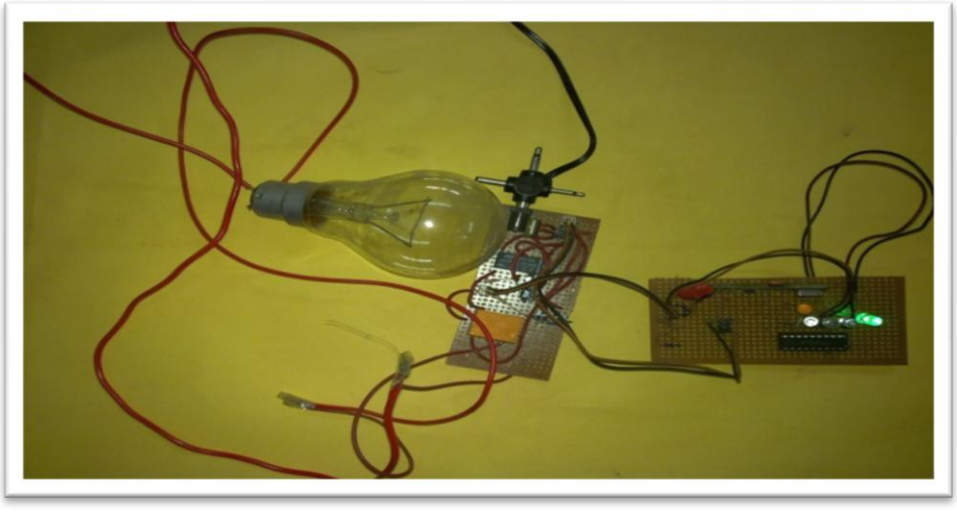

Figure 5.9 : RF receiver and Relay Switching Circuit at the door end with an electric bulb of 100w

5.2 APPLICATIONS

Student Database Management System:

Figure 5.10 is the main menu of our graphical user interface (GUI). In this GUI, user can login to the system and can see time attendance report in the form of txt, excel or pdf format.

Figure5.10 : Menu of student database

Figure 5.11 is for the user registration, by which user can register or modify his profile.

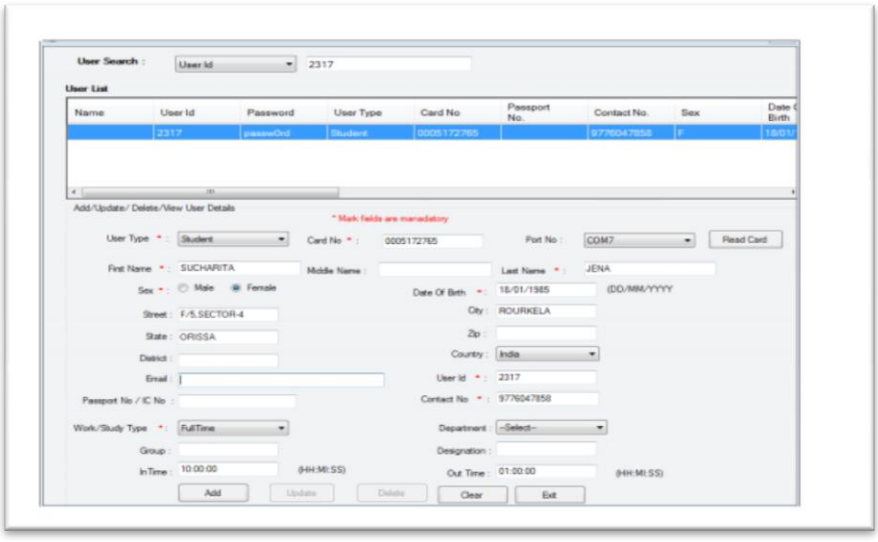

Figure 5.11 : User Registration Form

Figure below is the GUI for time attendance report. Using this GUI, user can extract his own report in different format. The time attendance report can be daily in/out time or weekly or monthly basis.

The following figure 5.12 shows the Daily in out Report:

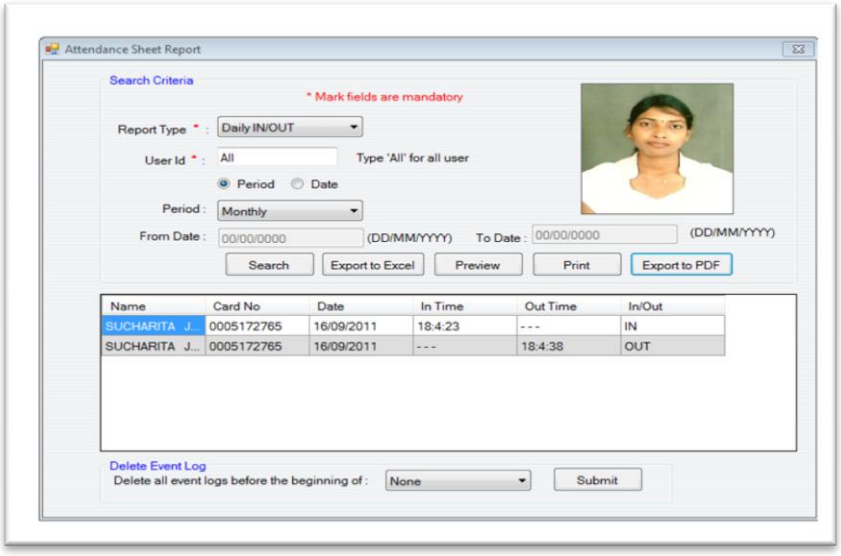

Figure 5.12 : Attendance Report (Daily In Out)

The following figure 5.13 shows the Late Report:

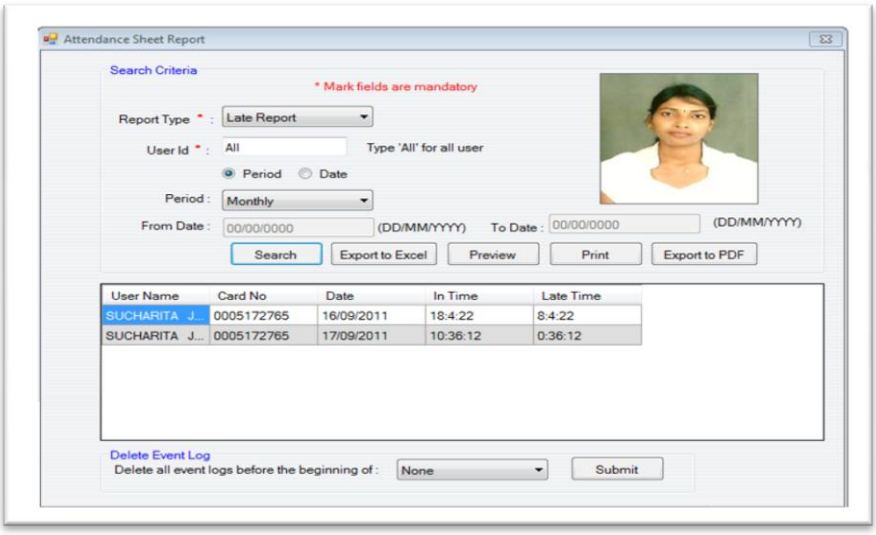

Figure 5.13 : Attendance Report (Late report)

The following figure 5.14 shows the Overall Report:

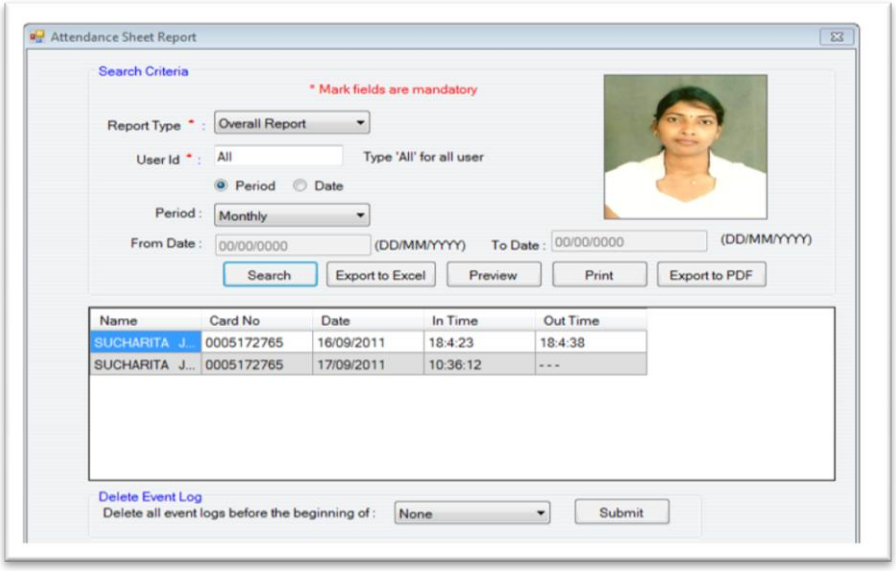

Figure 5.14 : Attendance Report (Overall Report)

Chapter 6
Conclusion and Future Work

Conclusion

The project includes the Interfacing of RFID Reader module with PC for Time attendance system using MS access database in conjunction with Visual studio C# programming language. In this, when the user taps the RFID card on the RFID reader, the card number will be displayed on the PC according to the design of the program. We also designed a simple and low cost wireless door security system by using ATMEGA-32 microcontroller unit. These types of products are commercially available in market, which are very expensive. As the designing hardware and software modules are not freely available. So, we integrated few commercially available hardware modules as well as interfaced with our RF transmitter and RF receiver module .The designed product module is at prelim stage and can be enhanced for more applications, which also can be cost effective.

Future Scope

1. The design of this project which uses RFID technology can also be replaced with Biometric Finger Print Device.
2. Our design is implemented for manual door access system, but we can also design it for automatic door access system.
3. We can also implement the design using ARM Processor for efficient applications.

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Dissemination of my Work:

[1] Santos Kumar Das, Sucharita Jena; "RFID AND PC BASED TIME ATTENDANCE SYSTEM", *NCVDES-2011, CEERI, Pilani,* October-2011.