SMART ATTENDANCE SYSTEM USING RFID TECHNOLOGY

A PROJECT DOCUMENT

Submitted by

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in fulfillment of the main project on

INTERNET OF THINGS
IN
COMPUTER SCIENCE ENGINEERING

Under esteemed guidance of

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ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES
(Affiliated to Andhra University)

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BONAFIDE CERTIFICATE

Certified that this project report "**SMART ATTENDANCE SYSTEM USING RFID TECHNOLOGY"** is the bonafide work of "K.MANASA(314126510033), N.H.VAMSIKRISHNA(312126510069),B.SAITEJA(314126510015), K.S.B.S.KRISHNA(314126510047)" who carried out the project work under my supervision.

Dr.R.Sivaranjini   T.Anitha

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Engineering   Engineering

ANITS   ANITS

DECLARATION

This is to certify that the project work entitled "**SMART ATTENDANCE SYSTEM USING RFID TECHNOLOGY**" is a bonafide work carried out by **K.MANASA,NH VAMSI KRISHNA,B.SAI TEJA,K.S.B.S.KRISHNA** as a part of **B.TECH** final year 2nd semester of **computer science Engineering** of Andhra University, Visakhapatnam during the year 2017-18.

We,**K.MANASA,NH.VAMSIKRISHNA,B.SAITEJA,K.S.B.S.KRISHNA,** of final semester B.Tech., in the department of Computer Science Engineering from ANITS, Visakhapatnam, hereby declare that the project work entitled **SMART ATTENDANCE SYSTEM USING RFID TECHNOLOGY** is carried out by us and submitted in fulfillment of the requirements for the award of **Bachelor of Technology in Computer Science Engineering** , under Anil Neerukonda Institute of Technology & Sciences during the academic year 2017-18 and has not been submitted to any other university for the award of any kind of degree.

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ABSTRACT

The conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. Radio Frequency Identification (RFID) based attendance system is one of the solutions to address this problem. With real time clock capability of the system, attendance taken will be more accurate since the time for the attendance taken will be recorded.

Radio frequency identification (RFID) refers to the use of radio frequency wave to identify and track the tag implanted into an object or a living thing. RFID system usually consists of RFID reader and tag. It is very useful because it can uniquely identify a person or a product based on the tag incorporated.

Keywords: RFID, Frequency Reader.

CONTENTS

1.INTRODUCTION

1.1 PROBLEM STATEMENT

Radio frequency identification (RFID) refers to the use of radio frequency wave to identify and track the tag implanted into an object or a living thing. It is a wireless mean of communication that use electromagnetic and electrostatic coupling in radio frequency portion of the spectrum to communicate between reader and tag through a variety of modulation and encoding scheme. Modulation refers to the variation in the amplitude, frequency or phase of a high frequency carrier signal to convey information. Encoding is a process of converting information from one format to another. RFID system usually consists of RFID reader and tag. It is very useful because it can uniquely identify a person or a product based on the tag incorporated. It can be done quickly and this usually takes less than a second.

1.2 CONTRIBUTION

Arduino is a tool that we have used in our work. Microcontroller we used in this is Arduino. We have used some unique RFID cards and a RFID reader to read those cards using which the student can enroll his/her attendance for the day.

2. LITERATURE SURVEY

2.1 Introduction to RFID

Radio Frequency Identification (RFID) based attendance system is one of the solutions to address this problem. This system can be used to take attendance for student in school, college, and university. It also can be used to take attendance for workers in working places. Its ability to uniquely identify each person based on their RFID tag type of ID card make the process of taking the attendance easier, faster and secure as compared to conventional method. Students or workers only need to place their ID card on the reader and their attendance will be taken immediately.

2.2 Network Components:

ARDUINO UNO:

The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

ETHERNET SHIELD:

The Arduino Ethernet Shield R3 (assembled) allows an Arduino board to connect to the internet. It is based on the Wiznet W5100 ethernet chip (datasheet). The Wiznet W5100 provides a network (IP) stack capable of both TCP and UDP. This keeps the pin layout intact and allows another shield to be stacked on top.

Arduino uses digital pins 10, 11, 12, and 13 (SPI) to communicate with the W5100 on the ethernet shield. These pins cannot be used for general i/o.

The shield provides a standard RJ45 ethernet jack. An Arduino is necessary to use this shield.

RFID READER RC522:

RC522 is a highly integrated read and write card chip applied to the 13.56MHz contactless communication.

It communicates with the host machine via the serial manner which needs less wiring.

HEX KEYPAD:

The Hex Keypad is used to input the required data, which in our case is allowing the student or concerned faculty to register their rfid card sequence into the database and associate it with the unique id of the student or faculty. It contains numbers from 0 to 9 and alphabets from A to D.

LCD DISPLAY:

LCDs are useful for creating standalone projects. This LCD Display utilizes an I2C interface, which means that fewer pins are necessary to use this product than would be needed with a regular 16x2 LCD Display (just four connections, VCC, GND, SDA & SCL are required). And it is backlit. I2C address is usually decimal 39, hex 0x27. These devices can sometimes be found at decimal 63, 0x3F.

3. SYSTEM REQUIREMENT SPECIFICATION

3.1 SOFTWARES USED IN THIS PROJECT:

Language: Arduino coding, HTML (Frontend),PHPmyAdmin(Backend)

OPERATING SYSTEM: Windows/Linux/MacOS

3.2 HARDWARES USED IN THIS PROJECT:

MICROCONTROLLER: Arduino UNO

RAM: 2 GB or above

HARDDISK:500 GB or above

3.2.1 USER INTERFACE:

The work of the user is to get his/her RFID card scanned and post his/her attendance.

3.2.2 HARDWARE INTERFACE:

MONITOR: The outputs are displayed on the LCD display.

3.2.3 SOFTWARE INTERFACE:

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers -

students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.

There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package.

4. EXISTING TECHNIQUES

The conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. For a more efficient system, biometrics came into use where a student scans his/her fingerprint which is then recorded and the attendance is given. For this system, many institutions use the method of sending messages to the registered numbers saying that the ward is absent on that particular day. This, however is inefficient because it requires manual sending of messages. The existing system requires the admin of the system to manually enter all the details of the student and matching the fingerprints to the student which is a long and tedious process. And also, the present system supports to take note of only one student at a time. To overcome these problems and automate the system, we propose the present project.

5. PROPOSED SYSTEM

In the Proposed system, we use the RFID technology which can record multiple students at a time. There is a buffer maintained for counting the number of attempts made by the student in case of malfunctioning of the system. The real time clock is made use of and the time at which the student accessed the system is recorded. The attendance is posted automatically to the registered numbers in case of absence of the respected student.

A basic RFID system usually consists of a RFID reader and RFID tag which contain a coil that serves as antenna for transmitting and receiving signals. All kinds of RFID system operate using similar concept. RFID readers generate radio wave that reaches the RFID tags. Then, RFID tags use backscatter technology to reflect back the radio wave which has been combined with the data through modulation to the reader.

ARCHITECTURE:
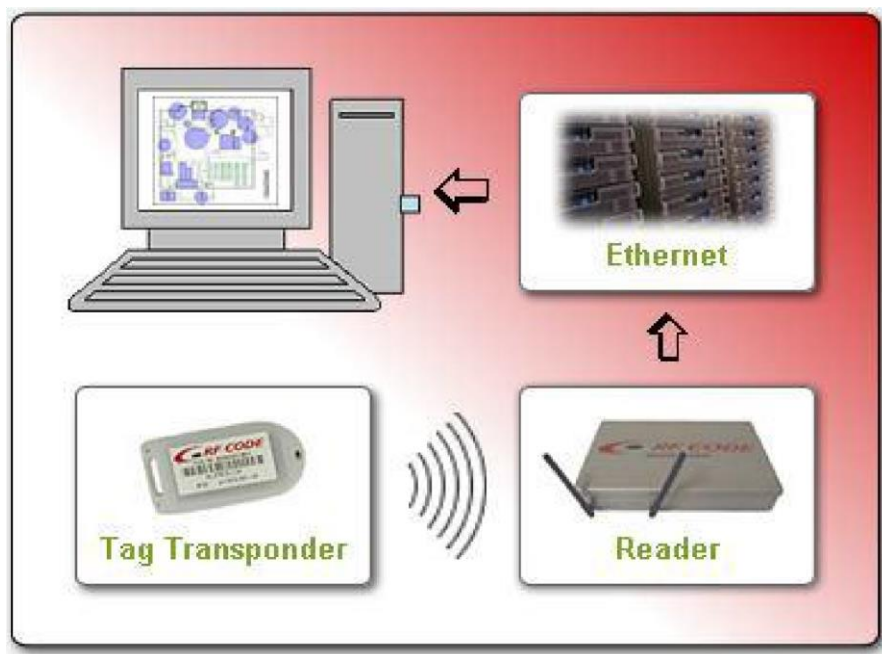
OPERATION:
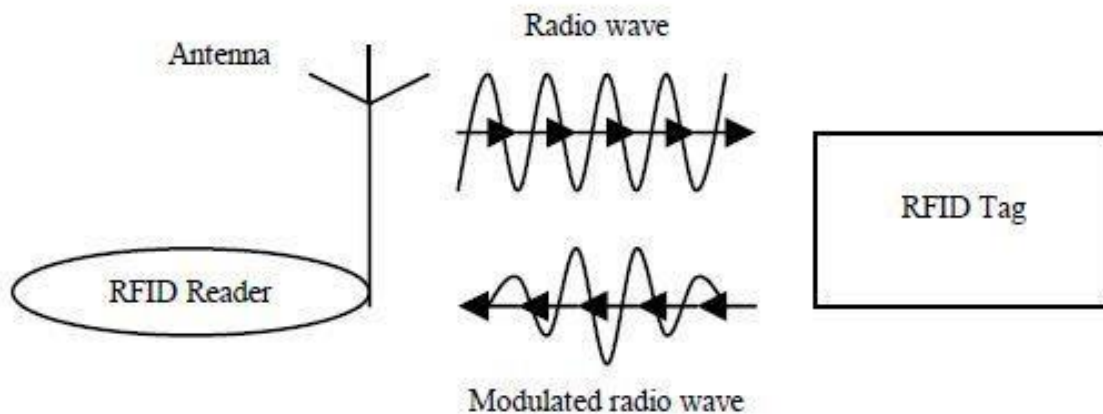
A prototype of the system has been designed and fabricated. The RFID reader used in the system is passive type which has maximum range of detection of around 5cm above the reader. It operates at frequency of 125 kHz and 12V power supply. The system has ability to uniquely identify and take attendance for persons.The users only need to place their RFID tag on the reader to take attendance. They do not need to go through the long list to look for their name. Hence, it is very time efficient. Attendance will be taken if the encoded tag ID scanned matches the tag ID stored in the memory. Otherwise, an error message will be displayed.

6.DESIGN

6.1 UML DIAGRAMS

6.1.1 ACTIVITY DIAGRAM

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modelling Language (UML), activity diagrams are intended to model both computational and organizational processes (i.e., workflows), as well as the data flows intersecting with the related activities. Although activity diagrams primarily show the overall flow of control, they can also include elements showing the flow of data between activities through one or more data stores.
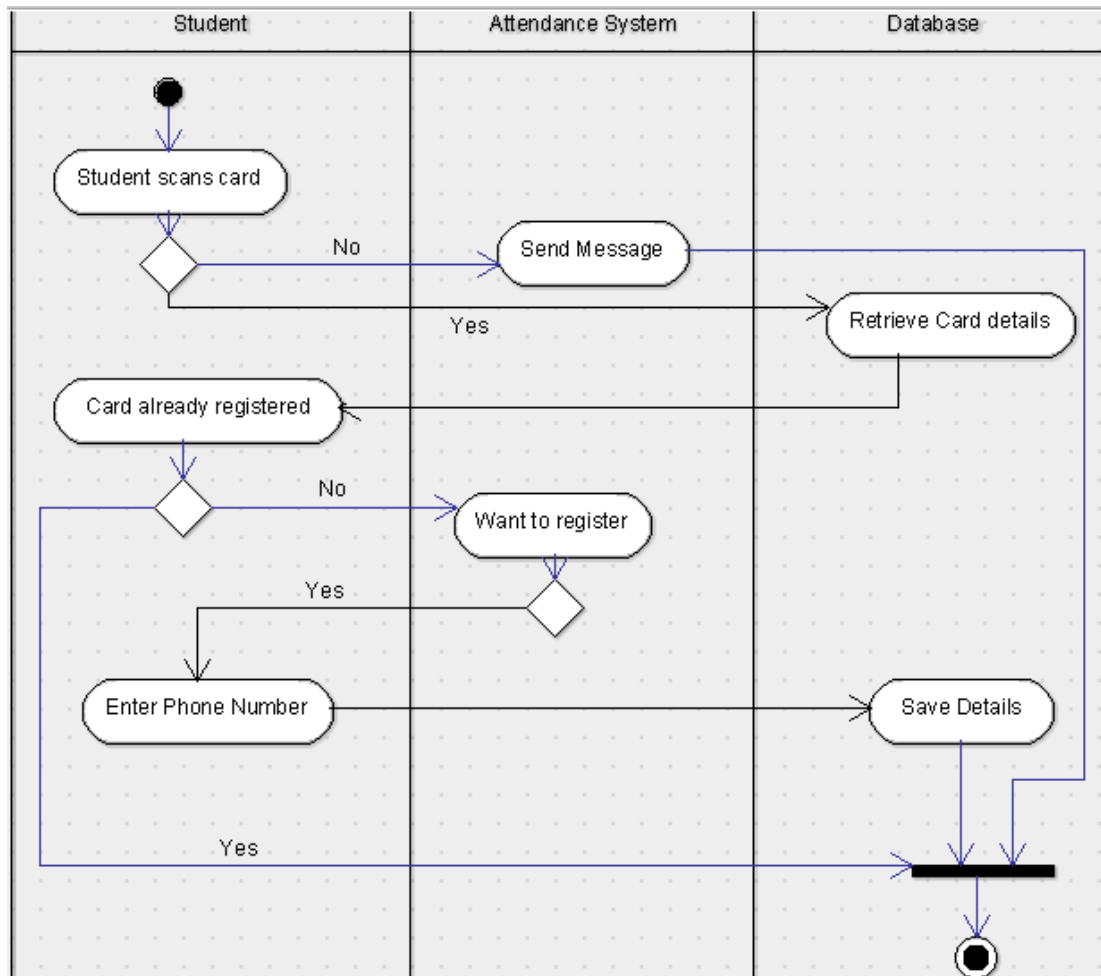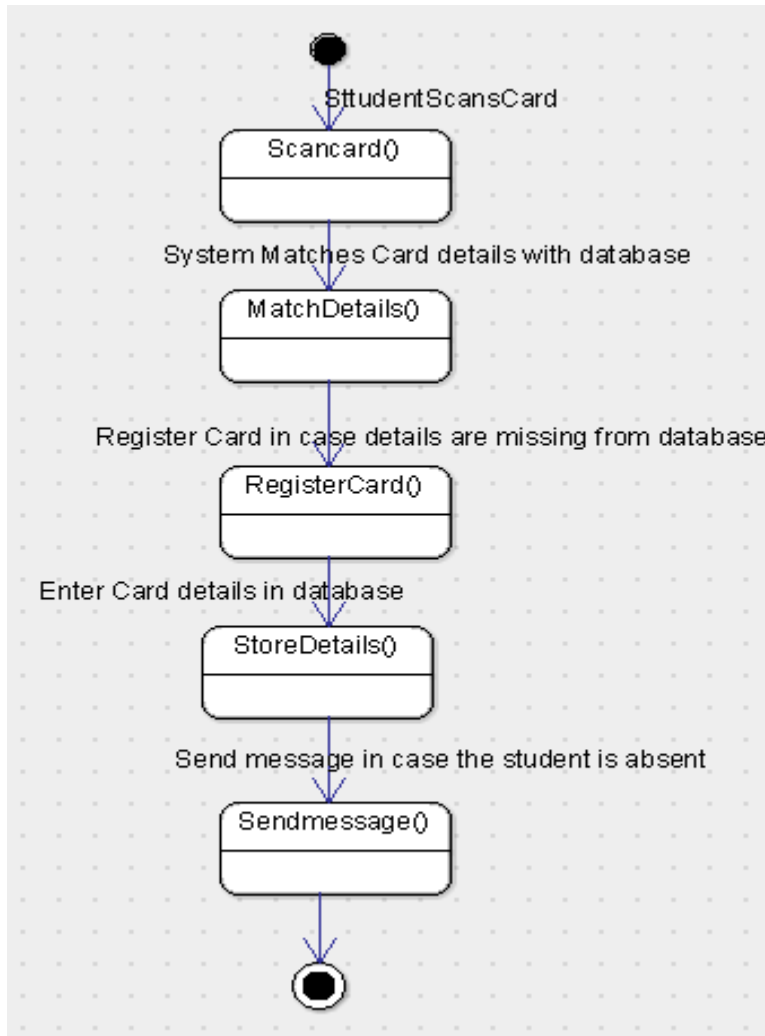
6.1.2 SEQUENCE DIAGRAM

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations in the Logical View of the system under development. Sequence diagrams are sometimes called **event diagrams** or **event scenarios.**
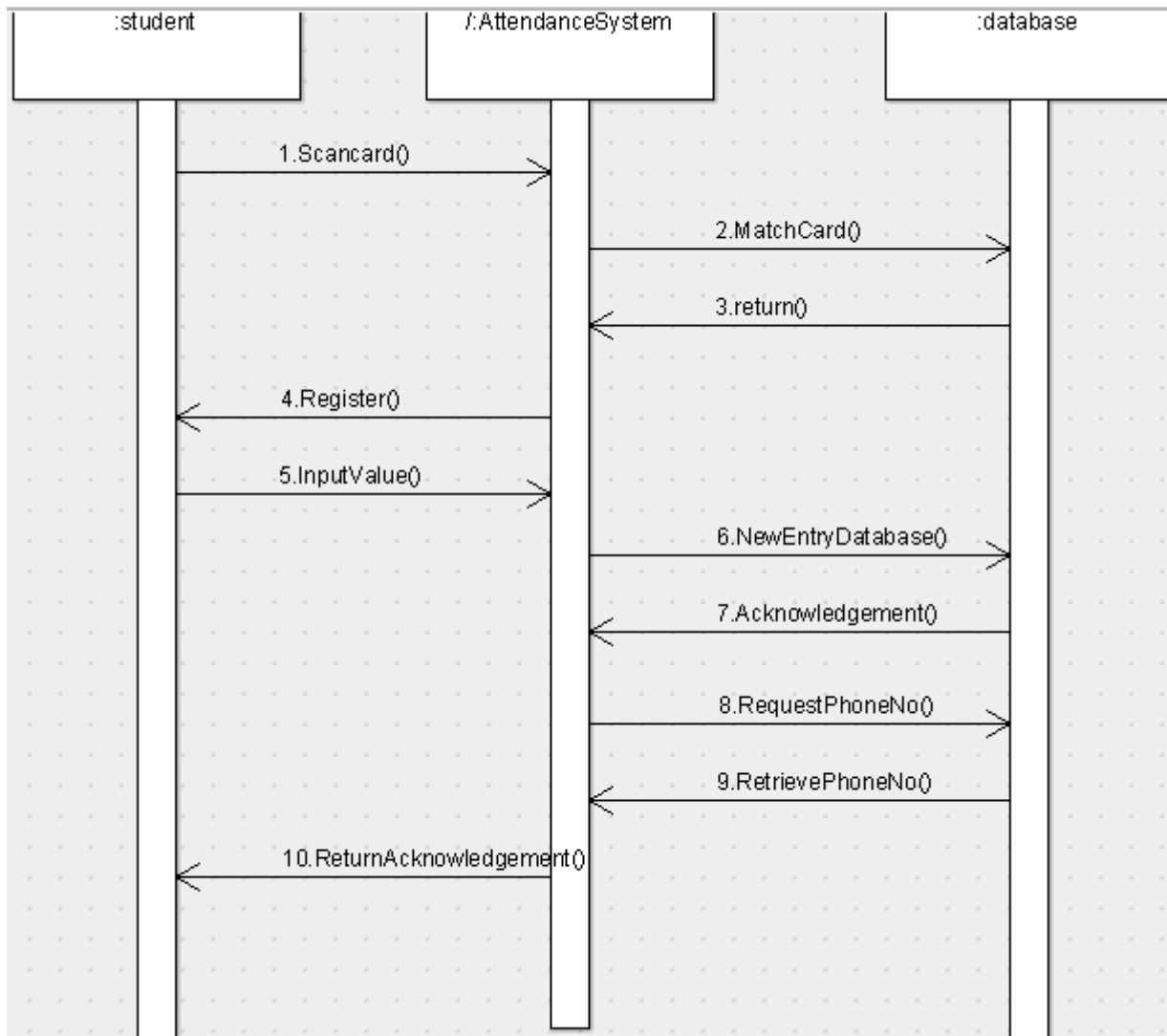
6.1.3 STATECHART DIAGRAM

State Diagrams are used to give an abstract description of the behaviour of a system. This behaviour is analysed and represented as a series of events that can occur in more or possible states. Hereby, "each diagram usually represents objects of a single class and track the different states of its objects through the system.

6.1.4 COLLABORATION DIAGRAM

A Communication diagram models the interactions between objects or parts in terms of sequenced messages. Communication diagrams represent a combination of information taken from Class, Sequence, and Use Case Diagrams describing both the static structure and dynamic behaviour of a system.
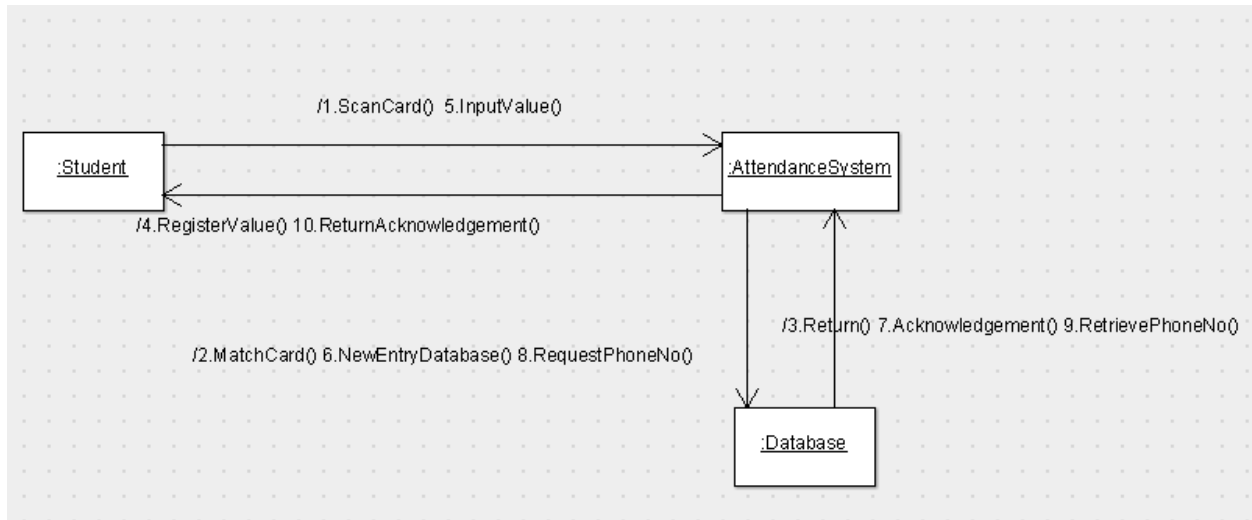
6.2.5 USECASE DIAGRAM

A use case at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well.
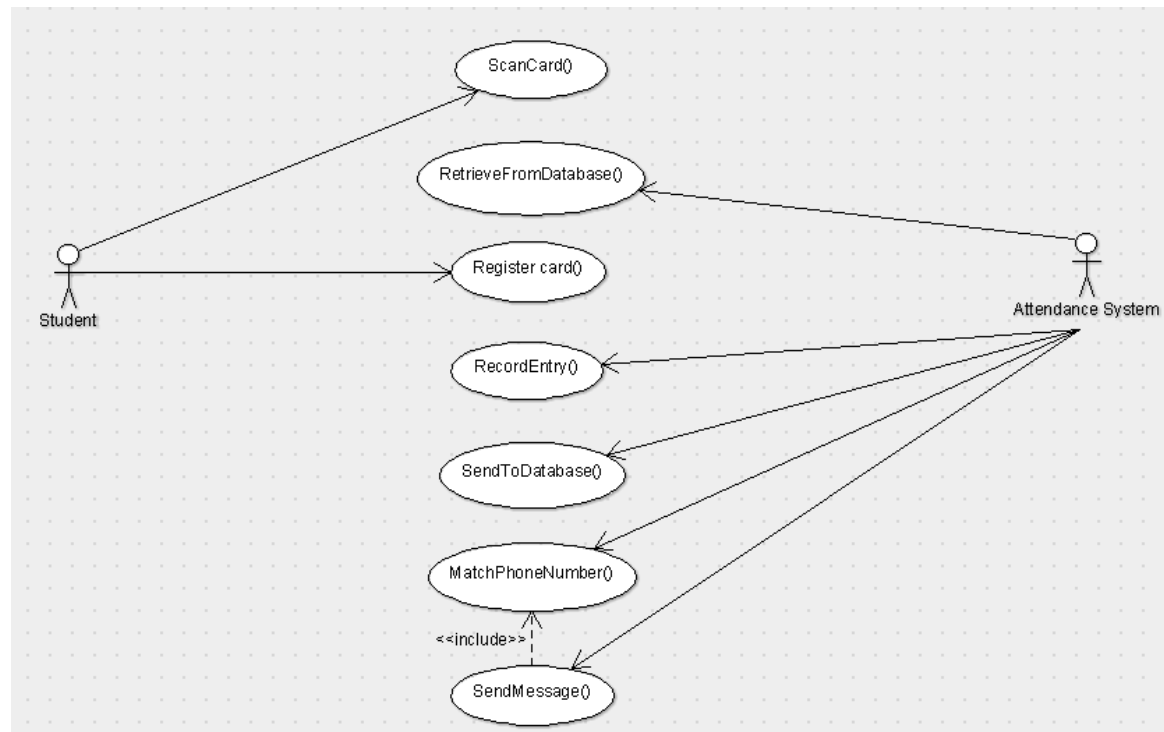
7. <u>METHODOLOGIES</u>

All the modules are interfaced with the arduino uno R3. Then the execution is done which is divided into three segments-RFID scanning, Student Registration using KeyPad, Sending SMS using GSM Module. Student first scans his/her RFID card to register the attendance on Smart Attendance Management System using RFID. The card number is then compared to the card numbers in the database. If the students is not yet registered, he can register using the hex keypad by providing his RFID id and phone number. These details are then inputted into the database as a new candidate. If the student hasn't scanned his card by the required time, then an SMS is sent to the registered phone number saying that the student is absent for the class on that particular day.

8. <u>IMPLEMENTATION</u>

8.1 Code for initialising RFID:

```
#include <SPI.h>
#include <Ethernet.h>
#include<RFID.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3F, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);
#define SS_PIN 8
#define RST_PIN 9

RFID rfid(SS_PIN,RST_PIN);
int serNum[5];
bool access = false;
byte mac[] = {
  0xDE, 0xAD, 0xBE, 0xEF, 0xFE, 0xED };
IPAddress ip(192,168,1,16);
IPAddress server(192,168,1,10);
EthernetClient client;
int temp;
void setup() {
  Serial.begin(9600);
  Ethernet.begin(mac, ip);
  SPI.begin();
   rfid.init();
   lcd.begin(16,2);//Defining 16 columns and 2 rows of lcd display
lcd.backlight();
}
void loop() {
  lcd.setCursor(0,0);
  lcd.print(" Scan Your Card");
  delay(1000);
  if(rfid.isCard()){
      if(rfid.readCardSerial()){
          Serial.print(rfid.serNum[0]);
```

```
            Serial.print(" ");
            Serial.print(rfid.serNum[1]);
            Serial.print(" ");
            Serial.print(rfid.serNum[2]);
            Serial.print(" ");
            Serial.print(rfid.serNum[3]);
            Serial.print(" ");
            Serial.print(rfid.serNum[4]);
            Serial.println("");
            int cards[][5] = {
   {rfid.serNum[0],rfid.serNum[1],rfid.serNum[2],rfid.serNum[3],rfid.serNum[4]}
};
           for(int x = 0; x < sizeof(cards); x++){
            for(int i = 0; i < sizeof(rfid.serNum); i++ ){
               if(rfid.serNum[i] != cards[x][i]) {
                  access = false;
                  break;
               } else {
                  access = true;
               }
             }
             if(access) break;
            }

       }
     if(access){
        Serial.println("Welcome!");
        lcd.clear();
       lcd.setCursor(0,0);
       lcd.print("Attendance");
       lcd.setCursor(0,1);
       lcd.print("Recorded.");
       delay(2000);
       lcd.clear();
       lcd.setCursor(0,0);
       lcd.print("Welcome!");
       delay(2000);
       temp=1;
     } else {
        Serial.println("Not Registered");
```

```
      }
    }
  if(temp==1){
 if (client.connect(server, 80)) {
  Serial.print("connected");
  client.print("GET /Main/test.php?");
  client.print("value=");
  client.print(rfid.serNum[0]);
  client.print(rfid.serNum[1]);
  client.print(rfid.serNum[2]);
  client.print(rfid.serNum[3]);
  client.print(rfid.serNum[4]);
  client.println(" HTTP/1.1");
  client.println("Host: 192.168.1.10");
  client.println("Connection: close");
  Serial.println("completed");
  client.println();
  client.println();
  client.stop();
  temp=0;
 }}
 else {
  Serial.println("--> connection failed\n");
 }
 lcd.clear();
 rfid.halt();
}
```

8.2 Code for Frontend design:

```
<html>
<head>
<script language="Javascript">
<!--
function OnButton1()
{
    document.form1.action = "process.php"
}
-->
```

```html
</script>
<title>Smart Attendance Management System</title>
</head>
<body>
<style>
body{
background-image: url("Light1.jpg");
}
</style>
<center>
<img src="Capture.png" alt="ANITS" style="width:900px;height:145px;">
<h1><font face="Lucida Calligraphy" color="black">Department Of CSE</font></h1>
<h2>WELCOME TO ATTENDANCE SECTION</h2></center>
<center>
<h3>Enter your Login Credentials:</center>
<center>
<form  name="form1" method="POST">
<h4>Username:<input type="text" id="username" name="username"/></h4>
<h4>Password:<input type="password" id="password" name="password"/></h4>
<input type="submit" id="btn"  value="Login!" onclick="OnButton1(); "/>

</form>
</center>
</head>
</html>


<?php
$data=$_POST['rnumber'];
$conn=mysqli_connect("localhost","root");
$db=mysqli_select_db($conn,"rfid");
$h=mysqli_query($conn,"select regno from details where regno='$data'" );
$f=mysqli_fetch_assoc($h);
$g=$f['regno'];
```

```php
$sql="select * from details where regno='$g'";
            $records=mysqli_query($conn, $sql);
 ?>
<html>
<head>
<title>ANITS::Procturing</title>
<style>
body{
background-image: url("Light1.jpg")
}
</style>
<center>
<?php
while($student1=mysqli_fetch_array($records)){
     ?>
<h1><font face="Lucida Calligraphy" color="Black" size="1500">Student
Details:</font></h1><br><br>
<font         face="Baskerville         Old         Face"><center>STUDENT
NAME:&nbsp</font><font face="Britannic"><?php
echo  $student1['name'];?><br></font>
<font         face="Baskerville         Old         Face"><center>STUDENT         ROLL
NO:&nbsp</font><font face="Britannic"><?php
echo $student1['regno'];?><br></font>
<font         face="Baskerville         Old         Face"><center>STUDENT         PHONE
NUMBER:&nbsp</font><font face="Britannic"><?php
echo $student1['phno'];?></font><br>
<font         face="Baskerville         Old         Face"><center>STUDENT         RFID
SERIAL:&nbsp</font><font face="Britannic"><?php
echo $student1['tagserial'];?></font><br>
<?php
}
?>
<?php
$h1=mysqli_query($conn,"select time from tags" );
$f1=mysqli_fetch_assoc($h1);
```

```php
$g1=$f1['time'];
?>
<font face="Baskerville Old Face"><center>STUDENT ENTRY
TIME:&nbsp</font><font face="Britannic"><?php
echo $g1;?></font>
</center>
</html>
```

```html
<html>
<head>
<body>
<style>
body{
background-image: url("Light1.jpg");
}
</style>
<center>

<img src="Capture.png" alt="ANITS" style="width:992px;height:190px;">
<h1><font face="Lucida Calligraphy" color="black">Department Of
CSE</font></h1>
</center>
</body>
</head>
</html>
<html>
<script language="Javascript">
<!--
function OnButton3()
{
    document.form1.action = "test3.php"
}
-->
</script>
```

```html
<center>
<form  name="form1" method="POST">
<h3>Enter the Registered Number of Student to view details:</h3>
<h4>Registered Number:<input type="text" id="rnumber" name="rnumber"/>
<input type="submit" id="btn"  value="Find" onclick="OnButton3()"/></center>
</html>
<html>
<center>
</html>
</html>
```

8.3 Code for Database value entry:

```sql
-- phpMyAdmin SQL Dump
-- version 4.7.4
-- https://www.phpmyadmin.net/
--
-- Host: 127.0.0.1
-- Generation Time: Feb 14, 2018 at 09:19 AM
-- Server version: 10.1.30-MariaDB
-- PHP Version: 7.2.1

SET SQL_MODE = "NO_AUTO_VALUE_ON_ZERO";
SET AUTOCOMMIT = 0;
START TRANSACTION;
SET time_zone = "+00:00";


--
-- Database: `rfid`
--
CREATE TABLE `details` (
 `tagserial` bigint(20) NOT NULL,
 `regno` bigint(20) NOT NULL,
 `name` text NOT NULL,
 `phno` int(11) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

INSERT INTO `details` (`tagserial`, `regno`, `name`, `phno`) VALUES
```

```sql
(111222333444, 314126510033, 'Manasa', 1122334455),
(1133445522, 314126510069, 'Vamsi', 879087639),
(556677889900, 314126510015, 'SaiTeja', 947865123),
(77889966445, 314126510047, 'SaiKrishna', 78945612);

CREATE TABLE `faculty` (
 `username` varchar(100) NOT NULL,
 `password` varchar(100) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

INSERT INTO `faculty` (`username`, `password`) VALUES
('AnithaT', 'anitha');

CREATE TABLE `tags` (
 `value` double NOT NULL,
 `time` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP ON
UPDATE CURRENT_TIMESTAMP
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

INSERT INTO `tags` (`value`, `time`) VALUES
(1000, '2018-02-14 05:20:10'),
(151222567, '2018-02-14 07:41:55');
COMMIT;
```

8.4 Code for sending messages through GSM Module

```cpp
#include <SoftwareSerial.h>

SoftwareSerial mySerial(9, 10);

void setup()

{

 mySerial.begin(9600);

 Serial.begin(9600);

 delay(100);

}

void loop()

{
```

```
 if (Serial.available()>0)

    SendMessage();

}
 void SendMessage()

{

 mySerial.println("AT+CMGF=1");

 delay(1000);

 mySerial.println("AT+CMGS=\"+918790879328\"\r");

 delay(1000);

 mySerial.println("Your Ward is Absent today");

 delay(100);

  mySerial.println((char)26);

 delay(1000);

}
```

Sample Input:

Student scans his/her unique RFID card on the reader and wait for the message to be dispayed on the lcd display.

Sample Output:

The obtained output will be posted on to the LCD display of the hardware components. If the student is a valid student his attendance is recorded and posted on to the database. The message will be displayed to the student that the attendance is posted.

9.RESULTS

The following results are observed.
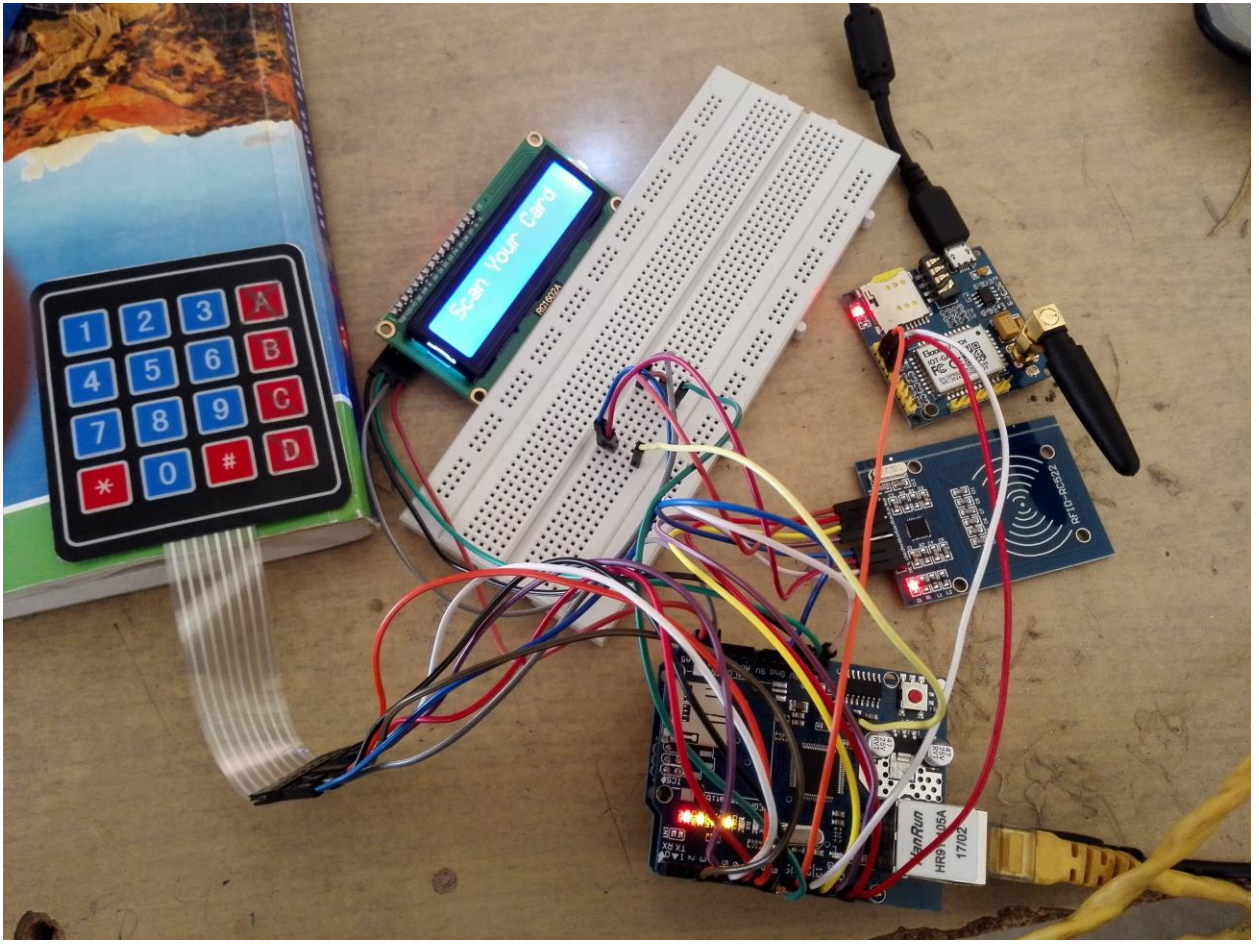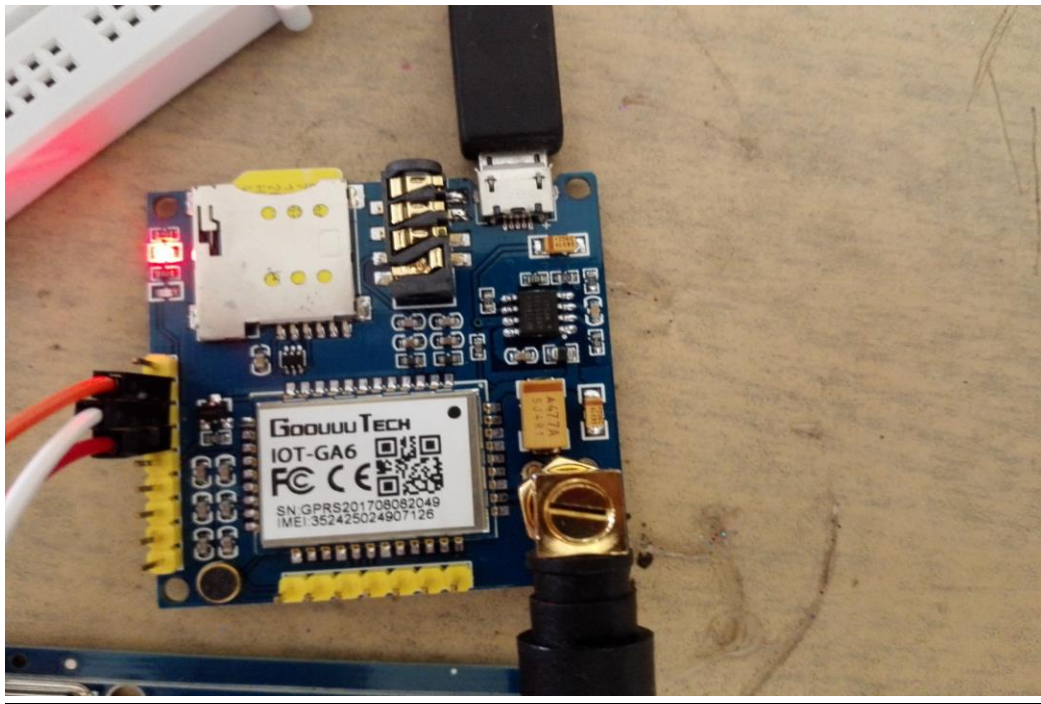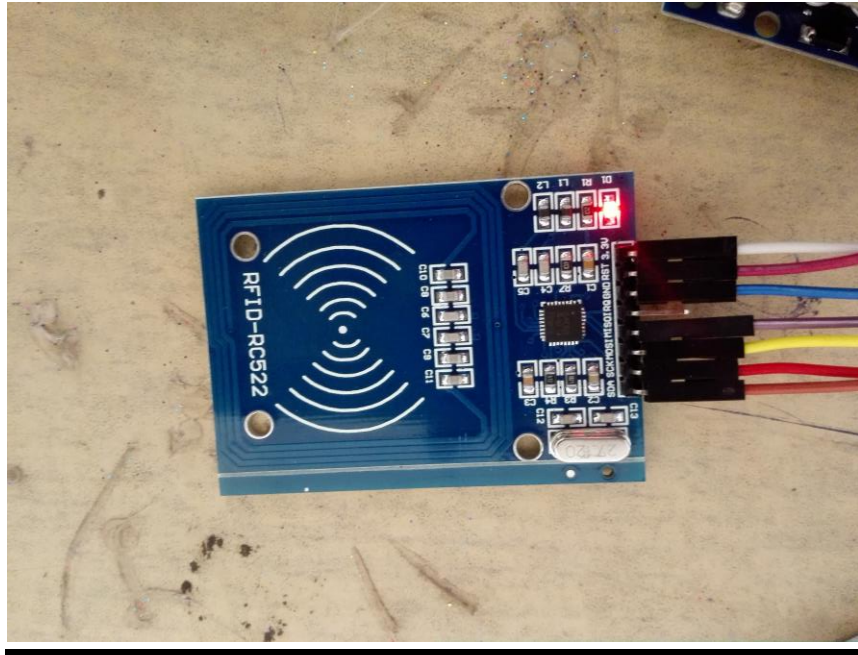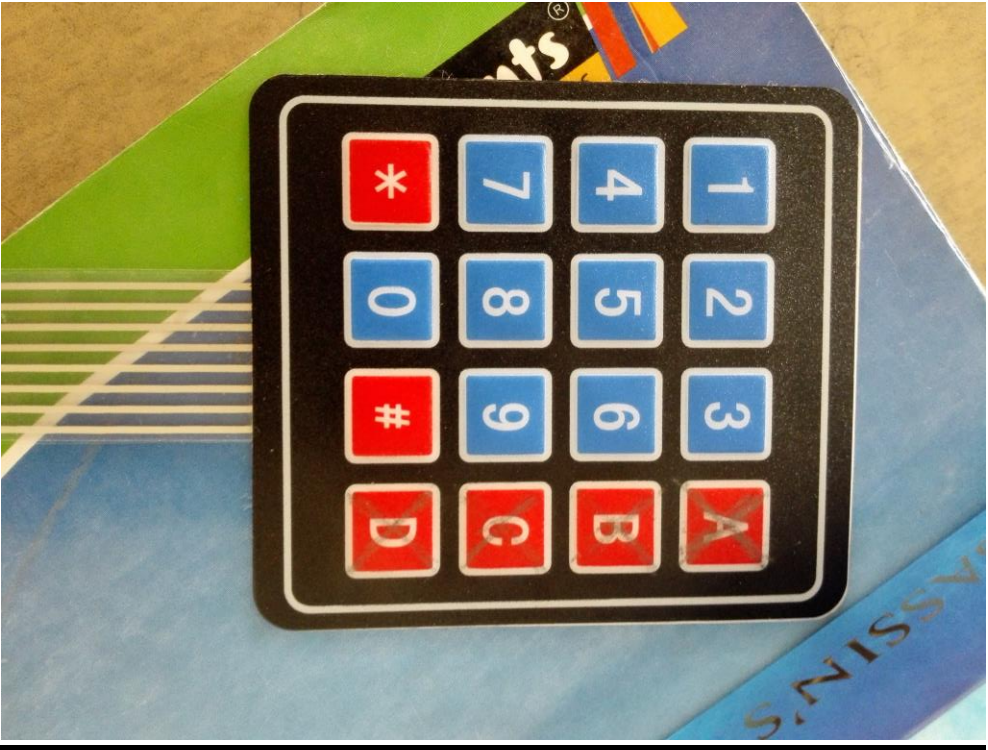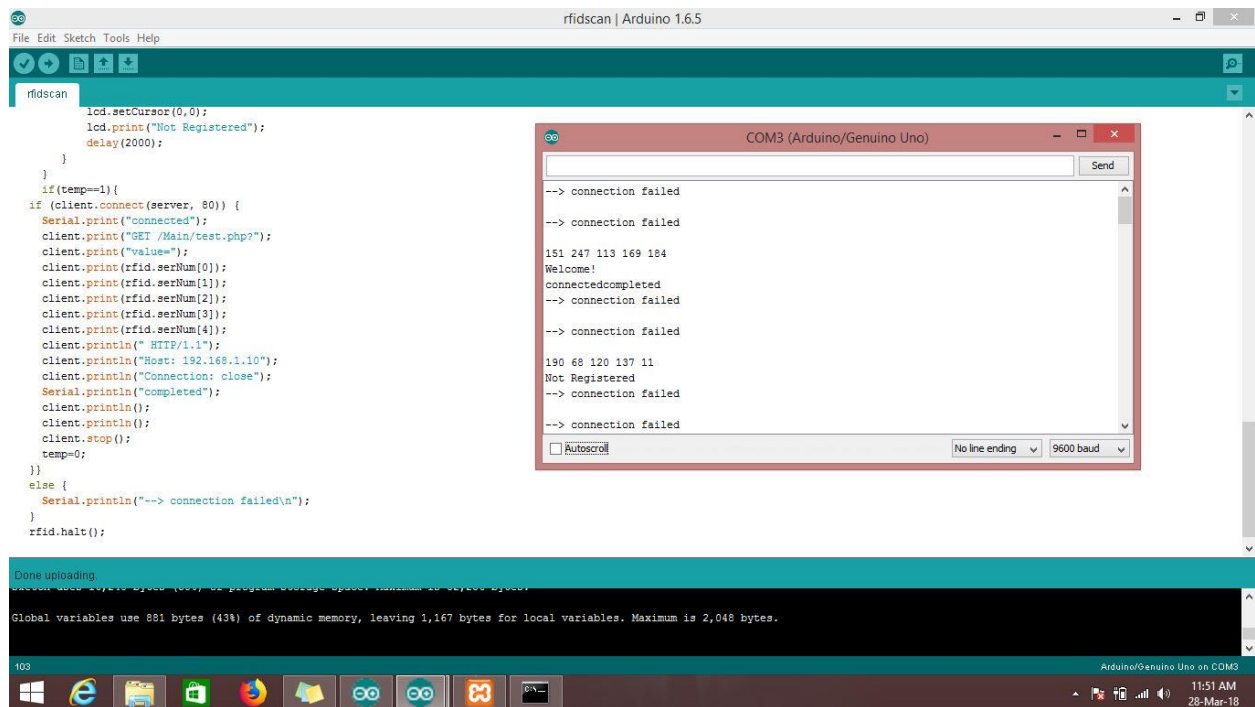
10.Testing

TESTING:

It is a way giving inputs to the system to find the difference between observed behavior and specified behavior of an application software system.

The   following   is   obtained   when   the   RFID   is   scanned.

When a registered card is scanned, the monitor and LCD display shows the RFID ID and the Message "Registered". In the similar way, when an unregistered card is

scanned, RFID ID is displayed along with the Message "Not Registered".

11.CONCLUSION

The smart attendance system is successfully implemented by automating the messages, and the registration of the student by the said student is successfully implemented by using hardwares like arduino Uno, LCD Display, Ethernet Shield, RFID Reader, HexKeypad, GSM Module and various softwares like Arduino, PhpMyAdmin etc.

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