GSM based an open access E-TICKETING system through mobile devices

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Abstract: this paper deals with the development of E-ticketing system by using GSM. This idea is developed as an application for passengers through whom they can reserve/cancel the tickets of buses, train and airline simply by siting in houses using mobiles. Along this, they can get information about nearby stations, timings and fares etc. By this, we can reduce the size of flooded crowd on counters of travelling companies. This can also be incorporated in upcoming Metro train projects. GSM has many advantages on other wireless techniques like IR and RF. This system is programmed in C-SHOP 290 software using SQL language and SIM300DZ is used as a GSM module. This module is used for the purpose of less power consumption.

Keywords— E-ticketing system, GSM based system, RS-232, MAX-232, DB-9, SIM300DZ.

I. INTRODUCTION

In 1984, first time in the history e-ticketing system is used for the purpose of ticket booking in united airlines [4]. Through E-ticketing traveller can easily book, pay for and print their tickets online from anywhere in the world. They can get the information of nearby stations, also the timings of different buses, railways and planes. They can choose the best train times which suits their needs by using GSM. By this passengers got three main advantages: one is secure traveling, second one is convenience and third is prevent from wastage of time. Before this system, travellers have to carry physical tickets all the time and in this they face many problems because there are less counters in sub-urban stations [1]. This system prevent a lot of time of professionals who waste it in standing long queues [1]. Booking expenses are also reduced because we can eliminate the need of printing and mailing paper documents. When we use this system, our all personal information is stored in central database and nobody can steal this data. Personal data is stored in a secure way and there is no chance of loss of it. A confirmation number is assigned to the passenger, along with the seat or berth number(s), date(s), departure location(s), and destination location(s). Passengers have to show only positive identification while checking at airports or railway stations.

Our developed system is a mobile operating application. GSM technology is used in this because other wireless technologies like IR and RF are limited to certain distances but GSM technology can work from all over the world so by using this technology users can access application from all over the world. Compare to other wireless technologies GSM is secure and consistent. System is programmed in C-SHOP 290 software using SQL (STRUCTURED QUERY language). It is an official purpose programming language for managing data. This system entirely depends on the signal strength of the Mobile. By this proposed system, passengers can independently choose the railway stations and train times which best suits their needs by using GSM. The final price of the ticket can be find including all taxes and fees also they have the power to compare prices of any required transport vehicle with any other of which is using same desired route. With geruxx, passengers don't pay service fees as they are their own travel agents and can make the reservations themselves.

Section II comprises the brief detail of two important components used in the proposed system. The hardware description of system is described in section II with the Block diagram of prototype. Section III tells the working of the system. In section V, programming is also given. Section VI and VII are discussing the conclusion and references respectively.

II. DESCRIPTION OF USING COMPONENTS

Components used in this system are: mobile phone, DB-9 connector, GSM module (SIM300DZ), PC or LCD, MAX 232, RS-232 cable, computer and mobile. We programmed the instructions given to this system, in SQL language in C-SHOP 290 software. Here, the brief detail of serial communication and GSM module is given below:

A. Serial Communication

Serial communication is much important in today life. Serial port provides a physical interface to transfer one bit at a time in a system or out of system. By these serial ports data can be transferred from computer to other peripheral devices. Mostly PCs have two main communication ports, COM1 and COM2.Standard used for COM1 is a 9 pin connector which is DB-9. Transmitter circuit in our project is connected to computer through serial port. Serial cable is connecting computer with transmitter circuit through DB-9 connector Pin configuration for DB-9 connector is given in Fig.1.
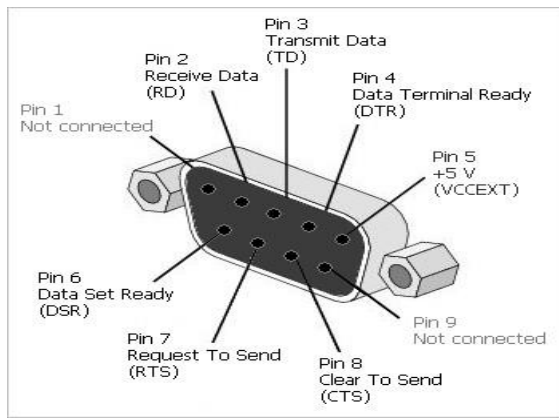
Fig.1 DB9 Connector female type

For connecting our hardware, we also used serial to USB converters. The MAX232 is available in integrated circuit that converts signals from an RS-232 serial port to the signals which is suitable for use in digital logic circuits. There are three types of transmission methods in RS-232. These are simplex serial communication, half duplex and full duplex. Here, simplex serial communication is using because transmission is occurring only in one direction and this is given in Fig.2.

Fig.2 Simplex serial Communication

Hyper terminal is used for serial communication of control commands. DB-9 female port is connected with transmitter board and an RS-232 cable is being used for serial communication purpose between PC and transmitter. Controlling commands are coming from computer as serial data into transmitter. These control commands are in the form of 7-bit ASCII which are further encoded and transmitted to receiver through antenna via RF.

B. SIM300DZ

It is a tri-band GSMLGPRS based engine which is designed for global market. It works on different frequencies like GSM 900 MHZ, PCS 1900 MHz etc. Due to tiny configuration, it can fit easily in small space in projects i.e wireless devices, mobile phones, car phones etc. It consists of 48 pins. It is designed for power saving techniques even the current consumption is as low as 2.5mA in SLEEP mode. For data transfer applications, customers should use TCP/ IP protocol easily. This easy use can be obtained by using SIM300DZ because it is integrated with simple TCP/IP and extended TCP/IP protocol.
In our project, we are using AT command and this can be configured by using two audio channels. These two audio

channels include two microphone inputs and two speaker outputs. It provides RF antenna interface. Passenger's antenna should be located in his mobile and connect to module's antenna through any type of RF traces or with micro strip line. Information of SIM card can be obtained by using AT command. Functionality of GSM Phase 1 and GSM Phase 2+ specifications are supported by SIM interface to use even in FAST 64 kbps. This is powered from an internal regulator in the module which normally has 3V voltage.

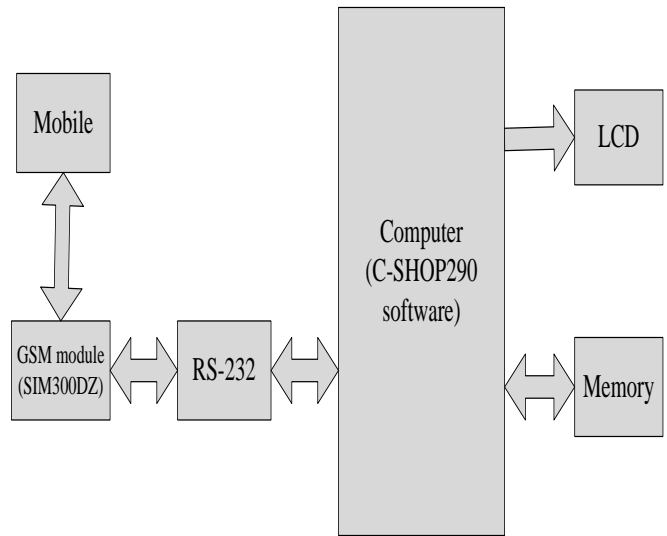## III. HARDWARE DESCRIPTION WITH FLOW CHART OF PROTOTYPE

Fig.3 Block diagram of proposed Prototype

Fig.3 shows the block diagram of our proposed system. Mobile is used for sending message. Transmitter circuit in our project is connected to computer through serial port. We fix GSM module in our hardware project and a SIM is inserted in this module. GSM module is not compatible to direct receive the message of computer. So, by using RS-232 cable we receive the data of GSM module and by the help of MAX232 data is converted to our required format. C SHOP 290 software is installed on the computer and data from GSM module is received to this software. A program is running on this software. By this the program C SHOP 290 software decides about the reply. SQL language is used for programming. Response is also shown on computer.
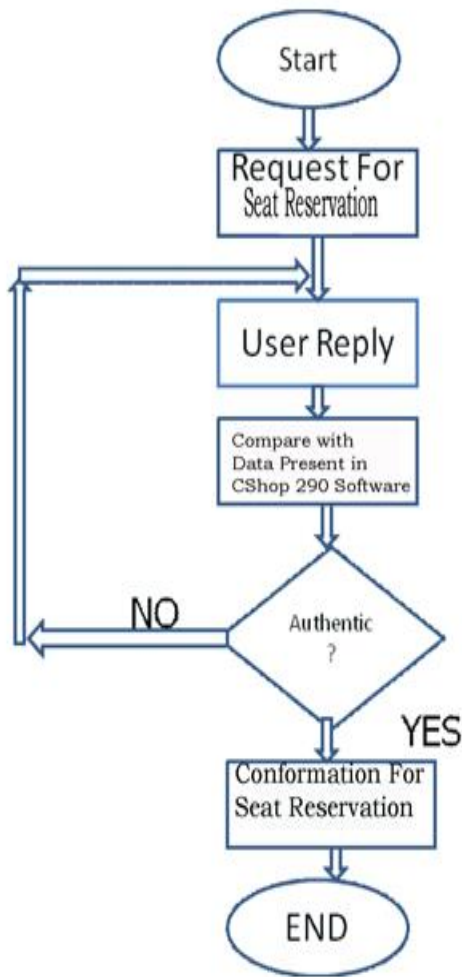
IV. WORKING OF PROPOSED SYSTEM

Fig.4 Working of Proposed system

When our project is active, anybody can get open access to it and reserve/cancel tickets. Passenger send request through mobile to the hardware of the proposed system for information about seat reservation or cancelation of a seat. GSM module receives this message and sends this further to computer through RS-232. Firstly, you can register yourself by sending a single message. After authentication, Computer sends a list of names of possible airlines/trains/buses. Now, user selects one of it according to his desired route. After this selection, computer sends the detail of vacant seats. After selection of seats/seat, computer demands for payment. User can pay through any available source i.e debit card. After payment, customer receives a confirmation message of reservation of seat/ seats. A copy of mobile message and response of C SHOP 290 software both save in memory.

APPENDIX

PROGRAMMING IN C-SHOP 290 (SQL software)

Code of reading customer's message:

```
namespace SIM900_SMS_READ_EX01
{
 public partial class Form1 : Form
 {
  string RxString = null;
  public Form1()
  {
  InitializeComponent();
  }
  private void Form1_Load(object sender, EventArgs e)
  {
  try
   {
   serialPort1.Open();
   button4.Enabled = false;
   button5.Enabled = true;
   if (init_gsm())
    {
    timer1.Enabled = true;
    MessageBox.Show("Timer Started");
    }
    else
    {
    timer1.Enabled = false;
    MessageBox.Show("Timer Stoped");
    }
    }
   catch (Exception ex)
    {
 MessageBox.Show(ex.Message ,"Error:");
    button1.Enabled = false;
    button2.Enabled = false;
    button3.Enabled = false;
   }
    }
private void Form1_FormClosing(object sender,
FormClosingEventArgs e)
    {/*Close com port if open in form closing event*/
    try
       {
        serialPort1.Close();
       }
       catch (Exception ex)
       {
       MessageBox.Show(ex.Message, "Error");
       }
       }
     private void button4_Click(object sender,EventArgse)
     {
     }
     private void
      button5_Click(object sender,EventArgse)
      {
     }//close com port
```

Code of initializing GSM module:

```csharp
private bool init_gsm()
 {
/*==Initialize GSM==*/
  string str_temp = "";
  serialPort1.Write("ATE0\r");
  while (str_temp.Length < 3)
   {
    try
     {
  str_temp = serialPort1.ReadTo("\r");
     }
     catch (Exception ex)
     {
MessageBox.Show(ex.Message, "ERROR");
textBox1.AppendText(ex.Message+"\r\n\r\n");
   return false;
     }
     }
 if (str_temp.Contains("OK"))
     {
// MessageBox.Show("ECHO IS OFFED SUCCESSFULLY",
str_temp);
 textBox1.AppendText("ECHO IS OFFED
SUCCESSFULLY" + str_temp + "\r\n\r\n");
     }
     else
     {
MessageBox.Show(str_temp,"failed Initialize");
textBox1.AppendText("Failed Initialization \r\n\r\n");
     return false;
   }
```

Code of writing reply to customer:

```csharp
 try
  {
   serialPort1.Write("AT+IPR=4800\r");
  }
   catch (Exception ex)
    {
MessageBox.Show(ex.Message, "ERROR");
        return false;
    }
while (str_temp.Length < 3)
   {
 try
    {
str_temp = serialPort1.ReadTo("\r");
    }
   catch (Exception ex)
    {
MessageBox.Show(ex.Message, "ERROR");
textBox1.AppendText(ex.Message+"\r\n\r\n");
   return false;
     }
     }
```

```csharp
 if (str_temp.Contains("OK"))
    {
//MessageBox.Show("BAUD SET TO 4800
SUCCESSFULLY", str_temp);
textBox1.AppendText("BAUD SET TO 4800
SUCCESSFULLY-"+str_temp + "-\r\n\r\n");
    }
    else
   {
MessageBox.Show(str_temp, "failed Initialize");
   return false;
    }
        .
        .
        .
        .
        .

  private void button1_Click_1(object sender, EventArgs e)
    {
       timer1.Enabled = false;
       if (init_gsm())
       {
          timer1.Enabled = true;
       }
       else
       {
          timer1.Enabled = false;
       }

    }//initialize gsm

  }//Class ends here
}//namespace ends here
```

REFERENCES

[1] Kishore Kumar S P , Kishore R , Deepak M , Somasundram M , Karthikeyan S P, "Instant payment for services through Mobile Devices", Green Computing, Communication and Conservation of Energy (ICGCE), 2013, IEEE.
[2] "Privacy-Preserving Billing for e-Ticketing Systems in Public Transportation", 4 NOV 2013. url "dl.acm.org/citation.cfm?id=2517848", Florian Kerschbaum SAP, Hoon Wei Lim and Ivan Gudymenko.
[3] A. S. Amoli, M. Kharrazi, and R. Jalili. 2ploc: Preserving privacy in location-based services. In IEEE 2nd International Conference on Social Computing/PASSAT'2010, pages 707–712, 2010.
[4] "E-Ticketing Strategy and Implementation in an Open Access System: The case of Deutsche Bahn", Grace Ng-Kruelle Paul A. Swatman, Oliver Kruelle, March 1, 2006.
[5] D. Bald, G. Benelli, and A. Pozzebon. The siesta project: Near field communication based applications for tourism. In IEEE 7th International Symposium on Communication

Systems Networks and Digital Signal Processing (CSNDSP), pages 721–725, 2010.

[6] F. Bao. "A scheme of digital ticket for personal trusted device". 15th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC04), 4:3065–3069, 2004. IEEE.

[7] Y. Y. Chen, C. L. Chen, and J. K. Jan. "A mobile ticket system based on personal trusted device". Wireless Personal Communications: An International Journal,40(4):569–578,2007.

[8] Abeyratne, R (2005, December 1). Electronic ticketing in air transport--commercial strategies and consequences. Journal of World Trade.

[9] Rosencrance, L. (2007, August 30). Airline body moves toward all-e-ticket system. Computerworld, Retrieved October 25, 2007, from http://computerworld.com.my/ShowPage.aspx?pagetype=2&articleid=6139&pubid=4&issueid=119.

[10] Ampelas, A. (2001). Automatic fare collection. In *2001 IEEE Intelligent Transportation Systems, 2001. Proceedings* (p. 1164–1166). doi:10.1109/ITSC.2001.948827.

[11] ATMs of Banks: Fair Pricing and Enhanced Access – Draft Approach Paper dated December 24,200.