

GPS and GSM based Passenger Tracking System

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ABSTRACT

Evolution in transportation technology makes the necessity for increasing passenger safety. Today women safety is more important when they are travelling in public transport. So we want a tracking system for passengers so that we can monitor at anytime from anywhere. Mostly passenger tracking systems are Radio Frequency Identification (RFID) based but they are not cost effective. In this paper a cost effective Global Positioning System (GPS) and Global System for Mobile communication (GSM) based passengers tracking system inside buses is introduced here. It tracks the passengers by using ticket number and displays location on Google map.

Keywords

GPS, GSM, SMS, Ticket Number, Google map.

1. INTRODUCTION

Mostly vehicle tracking systems are based on GPS and GSM. Short Messaging Service (SMS) [1] is a feature available on all mobile phones which allows a small amount of text to be sent between one user and another. GPS consists of a [3] network of 24 satellites in six different 12-hour orbital paths spaced so that at least five are in view from every point on the globe. Today, GPS has a [2] [3] wide range of other applications including tracking package delivery, mobile commerce, emergency response, exploration, surveying, law enforcement, recreation, wildlife tracking, search and rescue, roadside assistance, stolen vehicle recovery, satellite data processing, and resource management. CELL PHONES become [10] more ubiquitous in our daily lives, the need for context-aware applications increases. One of the main context information is location, which enables a wide set of cell phone applications including navigation, location-aware social networking, and security. Automatic vehicle tracking (AVL) is a system [6] that provides the tracking of vehicle. Location Based Service (LBS), Navigation and Intelligent Transportation are the hot research topics now. Daily millions of passengers travel in buses to reach his/her destination. A major concern is the family members who wish to monitor to each other when they are moving in buses. For passengers safety point of view a passenger tracking system is required. Which can track of passengers between source and destination? Mostly passenger tracking system use RFID tags for tracking. But these tracking systems are not cost effective. So a cost effective system is introduced here by using GSM and GPS, which track passengers those are inside buses. It tracks passengers on the basis of bus ticket number. Only users need to enter the valid ticket number of passengers. Users of the system can track passengers at anytime and anywhere by using mobile phone and laptop/desktop. The users of this system can get location information of passenger, only if they know ticket number. For this tracking system its duty of passengers to tell your

ticket number to his/her known and family members before starting journey.

The rest of paper explained as follow. The section II described the related work for GPS and GSM based passenger tracking system. Section III shows proposed system. The section IV describes the conclusion of the paper.

2. RELATED WORK

In urban traffic problems [7] and city planning problems combines the General Packet Radio Service (GPRS) and Bluetooth technology, realizing the intelligence in some aspects just like the management of bus passengers in modern city, the data collection of passengers in the bus, the management of the driver, the GPS location of the buses, the formulating plans, the real-time monitoring of bus, the inquiring information and the statistical analysis about the passengers, the services of electronic [4] platform. An Automatic Vehicle Location System (AVLS) is a system [8] which takes the advantages of new advancement in both wireless communications as well as mobile computations. System uses Global Positioning Systems (GPS) and Geospatial Information System (GIS) data to locate vehicles and get additional information about the location and features of the vehicle location [5]. It composed of there main features: 1) positioning, 2) data transfer and 3) data visualization. Prototype of AVLS is based on widely accessible technologies. An AVLS uses GPS for localization of users and Pocket PC for communication with data servers. Since other wireless technologies like GPRS has not been established very well in Iran, therefore, it is decided to design a GSM based system. It integrates GPS installation [6] in vehicles, data transmission through wireless network services (e.g. SMS, GPRS); direction promotions supported by the GIS based way-finding algorithms; and Web real-time video capture systems. This methodology gives us the possibility to solve total Location Based Service (LBS), Intelligent and Navigation Transportation questions. Multi Agent System (MAS) [14] architecture implementation used to solve these two important problems in the Web integration of the GPS+GIS+GPRS Tracking System and Real-time Monitoring System. The transit information [11] on an Open Street Map (OSM) web interface and sends this information on the Google Android mobile device. The content is in the form of predicted arrival and departure times for buses at user-selectable geographic locations within a transit region. This application uses the real-time information such as current location and timestamp of both bus and users to provide bus route information. The public interface of system provides graphical views which used to updates and display the vehicle locations and to allow users to see routes, stops and moving buses. This system helps in case of traffic speed violation, a GPRS message [16] containing information about the vehicle such as location and maximum speed is sent to a hosting server located in an authorized office so that the violated

vehicle is ticketed. It can also track the vehicle's current location on a Google Map, which is mostly beneficial when vehicles should follow a specific road and in case of robbery. Some sensors attached to the air-bags in vehicles, are attached to the system that in case of accident, it will send notifications to the civil defense, nearest hospital and police station. An efficient automotive [15] security system is implemented for anti-theft using an embedded system occupied with a GPS and a GSM. The client interacts through this system with vehicles and determines their current locations and status using Google Earth. The user can track the position of targeted vehicles on Google Earth. Coordinates of GPS are corrected using a discrete Kalman filter. An integrated GPS-GSM system [12] also use Kalman filter to enhance the accuracy of measured position. After data processing, Google Earth application is used to view the current location and status of each vehicle. This objective of this system is to manage fleet, police automobiles distribution and car theft cautions. Due to some criminal activities Parents always worry about the possibility of kidnapping of their children. Android based solution [17] to aid parents to track their children in real time. It takes the advantage of the location services provided by mobile phone since most of kids carry mobile phones. The mobile application use the GPS and SMS services found in Android mobile phones. Some other several authors [13] [9] also have described GPS and GSM based vehicle tracking system.

3. APPLICATION DEVELOPMENT

The application is designed for passengers and who want to track passengers. Both must have mobile phones that Support GPRS and SMS. The application is mostly to be used passengers tracking users to track down the passenger's location. This section provides a more detailed description of the overall system and functionality of the main components of the proposed architecture. The system modal is designed in a way so that it provides the maximum accessibility for the users at anytime from anywhere by providing two types of end user applications, a mobile application and web application. In figure 1 GPS and GSM device are placed on buses. GPS device receives coordinate information from satellites. GPS device is also connected with GSM device and send the GPS coordinate information using SMS to administrator control area with the help of GSM tower. The system consists of two sides, passengers and tracking user's side. A tracking users device main duty is to send a request ticket number SMS to the server to get the location of the passenger. On the other hand, the passenger's device main responsibility is to reply the ticket number to his/her known before starting journey. When the users request location from the mobile and web application after registering and logging into web server, web server response corresponding user's request.

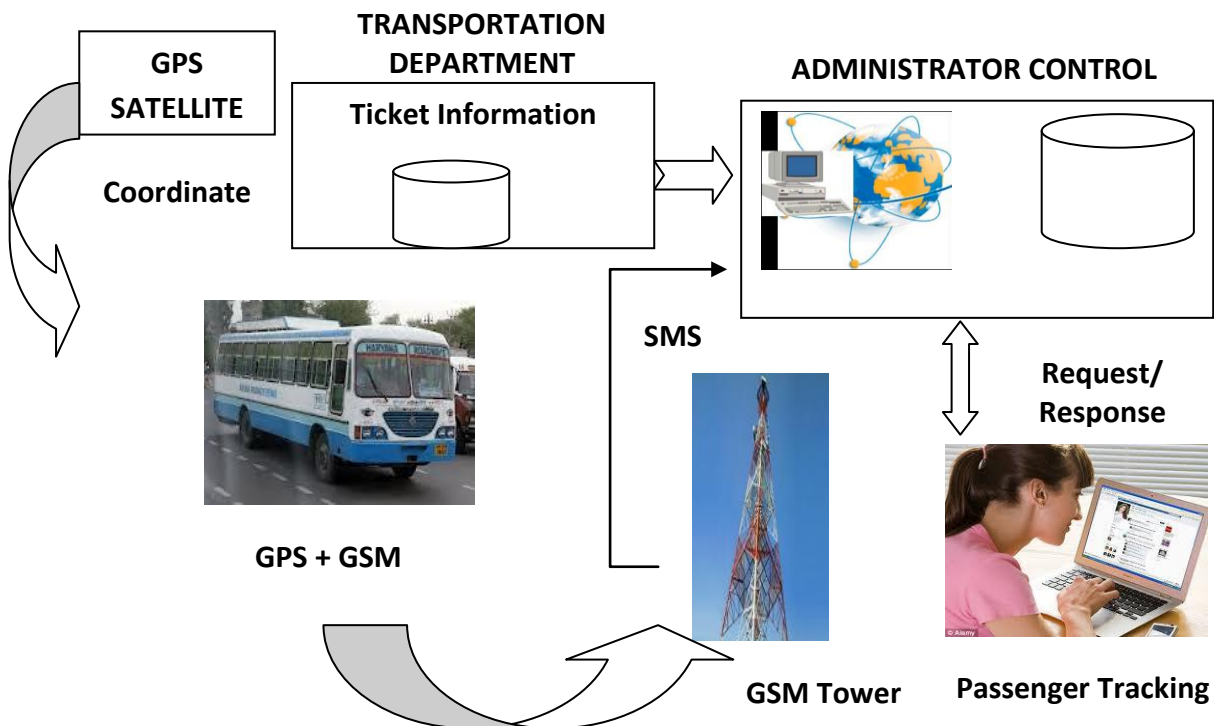


Figure1: Passenger Tracking System

All vehicle navigation and ticket number information is stored in database. Ticket number is unique ID for all tracked passengers. Server and database are connected to each other. For passengers tracking history of vehicle movement and information of ticket number are required. Vehicle movement history will store automatically threw SMS and ticket number information will store manually by transportation department at server side. During the time of issuing ticket to passengers

this information is stored by transportation department in data base corresponding to the particular buses ID and route. The input for the system is ticket number. Users of this system can send query with the help of SMS and web browser. After received users query as a ticket number server process the the history of passengers as starting journey time, journey date, ending journey time, last status and current status as shown in table 5.

3.1 DATABASE

From the client point of view data can be stored locally or acquired from the server. Data can be hold in a database, sent by devices or transferred from other data servers. Overview of database is given below. Table 1 shows route wise history of vehicle navigation. This information is obtained by using GPS and GSM devices. The values of latitude, longitude, data,

time and speed parameters are sent by SMS to server using GSM modem. Server automatically stores this information into database. Table 2, table 3 and table 4 shows route wise ticket number corresponding to bus ID. Table 5 contains the history of passenger navigation. Every ticket number represents unique passengers inside buses.

Table1: History of vehicle navigation.

Bus ID	Route	Bus Stops	Latitude	Longitude	Date	Time	Distance Covered	Speed
HR001AB	YnrtoDelhi	Radur	30.0320932	77.1485051	1-6-2014	5:08AM	23 Km	45km/hr
HR002AB	YnrtoDelhi	Ladwa	29.9955086	77.0488128	1-6-2014	7:30PM	30 Km	50km/hr
HR003AB	YnrtoDelhi	Karnal	29.7192979	76.9819346	1-6-2014	9:00AM	4 Km	55km/hr
HR011CD	AmbtoChd	Ambala	29.6797275	76.9904825	2-6-2014	2:00PM	15 Km	40km/hr
HR022CD	AmbtoChd	Chandigarh	29.6797275	76.9904825	3-5-2014	3:40PM	30 Km	75km/hr
HR033EF	PantoDelhi	Sonipat	28.9243676	77.1011065	5-5-2014	8:35AM	45 Km	64km/hr
HR044EF	PantoDelhi	Delhi	28.9243676	77.1011065	8-5-2014	9:10AM	28 Km	70km/hr

Table 2: Route1 (YnrtoDehli)

Bus ID	Ticket No.
HR001AB	HR0986345AS
HR001AB	HR0986346AS
HR001AB	HR0986347AS
HR002AB	HR0996335AS
HR002AB	HR0996336AS
HR002AB	HR0996337AS

Table3: Route2: (AmbtoChd)

Bus ID	Ticket No.
HR011CD	HR0886355AF
HR011 CD	HR0886355AF
HR011 CD	HR0886355AF
HR022 CD	HR0876355AF
HR022 CD	HR0876355AF
HR022 CD	HR0876355AF

Table4: Route3(PantoDelhi)

Bus ID	Ticket No.
HR033EF	HR0386325AG
HR033 EF	HR0386326AG
HR033 EF	HR0386327AG
HR044 EF	HR0486317AG
HR044 EF	HR0486318AG
HR044 EF	HR0486319AG

Table 5: History of Passenger Navigation

Bus ID	Route	Ticket No.	Journey Date	Starting Journey Time	Ending Journey Time	Last Status of Passenger	Current Status of Passenger
HR001AB	YnrtoDelhi	HR0986345AS	1-6-2014	8:30 AM	12:30 PM	Ladwa	Panipat
HR002AB	YnrtoDelhi	HR0996335AS	1-6-2014	6:00 AM	10:00 AM	Radaur	Sonipat
HR003AB	YnrtoDelhi	HR0996337AS	1-6-2014	1:20 PM	5: 30 PM	Indri	Karnal
HR011CD	AmbtoChd	HR0886355AF	2-6-2014	10:10 AM	1:00 PM	Ambala	Zirakpur
HR022CD	AmbtoChd	HR0876355AF	3-5-2014	4:00 PM	7:00 PM	Zirakpur	Chandigarh
HR033EF	PantoDelhi	HR0386325AG	5-5-2014	3:00 PM	6:00 PM	Sonipat	Delhi
HR044EF	PantoDelhi	HR0486319AG	8-5-2014	2:00 PM	4:00 PM	Panipat	Delhi ByPass

3.2 RESULTS AND DISCUSSION

This section presents the selected results of our experiments. The purpose of these experiments is show a functional prototype of proposed system. We mounted Bluetooth based GPS, which is connected to mobile phone into private buses. Mobile phone send tracking data at server by SMS. Laptop is used to track the passenger on Google map.

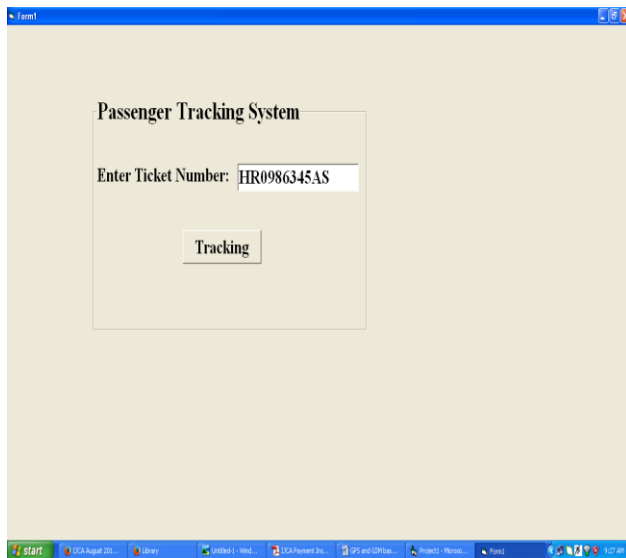


Figure 2: Tracking with Ticket Number

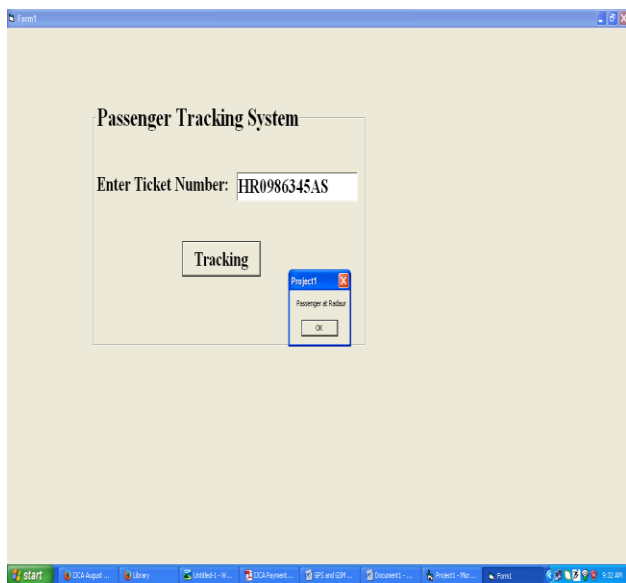


Figure3: Display Passenger Tracking Information

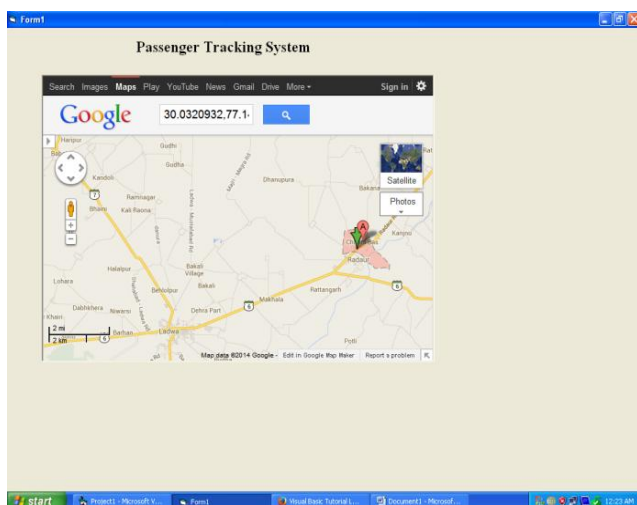


Figure 4: Display Passenger Location on Google Map [18]

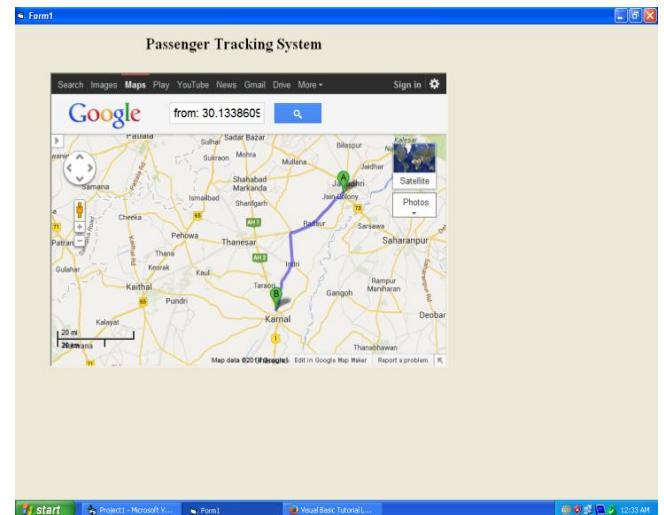


Figure 5: Distance covered by Passenger on Google Map [18]

The input for the system is ticket number as shown in figure 2. In figure 3 after enter valid ticket number it shows passenger tracking information. It also displays the location on Google map. Figure 4 shows passenger at Radaur city on Google map. Figure 5 represents how much distance is covered by passenger. The proposed system is cost effective because no any other costly devices are required for tracking, except Bluetooth enable GPS receiver and GSM mobile phone.

4. CONCLUSION

In conclusion, this project was developed to aid locating passengers. Proposed passenger tracking system is efficient in term of system cost. This system tracks the passengers on the basis of vehicle history and ticket number. It provides the history of passenger movement and displays location on Google map. Tracking is easy for the users of this system because they just need to enter the valid ticket number only. Features can be added to enhance the system such as Geo-fencing, emergency alerts and many others.

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