Integration of Microcontroller with GPRS and GPS System to Provide Passenger Information

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Abstract **—** This paper proposes the real time microcontroller based passenger information system to improve the intelligent road transport system. This paper describes the transport network difficulties and solution to recover the problems of the road network via the real time passenger information system. The GPS and GPRS are integrated with the microcontroller; the GPS provides a GIS functionality to provide better and updated road network information to the passenger. The operations are separated as different units to manage the large system and to reduce the complexity.

Keywords— GPRS, GPS, Mobile-view controller, Public transport , Passenger information system database.

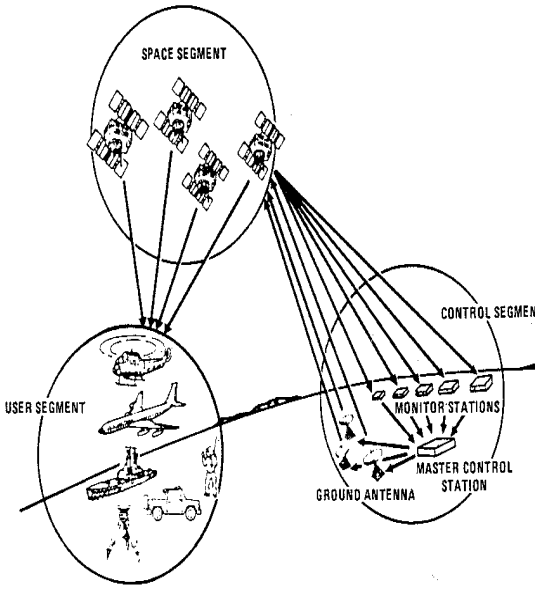
I.INTRODUCTION

Now days the traffic on the road network is increased due to the higher usage of locomotives. The need of intelligent transport system is emerged in all the cities of different countries. The passenger information system enables the users to access the transportation information. The transport locations are equipped with the database with updated transport information. With the help of Global Positioning System the transportation information are gathered, the GPS is functioned based on the satellite. The GPS system is placed on the vehicles to track and monitor the location and other activities of the vehicles of road network. This Passenger information system tracks the location of the buses and trains continuously to predict the bus and train arrival time and next stopping. The voice information and text display information are used to provide the transport information to the passengers of buses and trains. This information can be accessed by the passengers via wired or wireless connection and mobile devices. With this system the route information are automatically updated in the database of transport office and this information is accessed by the passengers via wired or wireless connectivity. The remaining portion of this paper describes about the GPRS, GPS, and Mobile view controller.

II. GLOBAL POSITIONING SYSTEM

The global positioning system is functioned based on around 12 networked satellites which are rotate behind the medium earth orbit. The GPS is normally used for navigation control, which provides the information about the location. The locations are identified by transferring signal from the specified location to the satellite and the base station GPS receiver will receives the signal from the satellite. The GPS receiver needs the signals at least from the three satellites to identify the location accurately. Normally the GPS receiver starts with three modes hot start, warm start and cold start. In the hot start the GPS system stores the last calculated position and the system is locked on to the same potion of same satellite and try to finds the new location information.

Fig.1 GPS system



With the warm start of the GPS receiver the receiver stores the last identified location and tries to find the new location with some other satellite not at the same satellite. In the cold start up of the GPS receiver all

the information is dumps after that the receiver will identify the new location.

III. GPRS

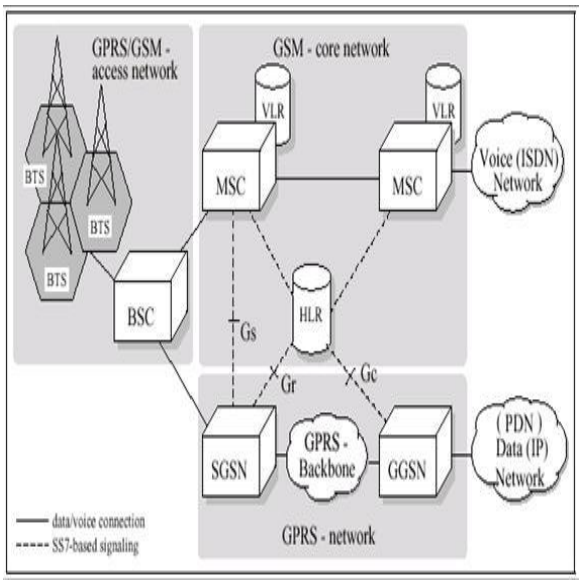
The GPRS stands for General Packet Radio Service for mobile phone. The services offered by the GPRS system are as follows

- SMS text
- WAP
- video chatting
- Multimedia message
- Internet
- Point to Point service

The GPRS system uses the coding scheme to transfer the data between the users, which are called TDMA. The TDMA (Time Division Multiple Access) the each user has allocated to some time slot to avoid the cross talks and increasing the data availability. The main components of the GPRS system are as follows

- Mobile station
- Base station
- Network nodes
- Database
- Registers
- Access point

Fig.2 Architecture of GPRS



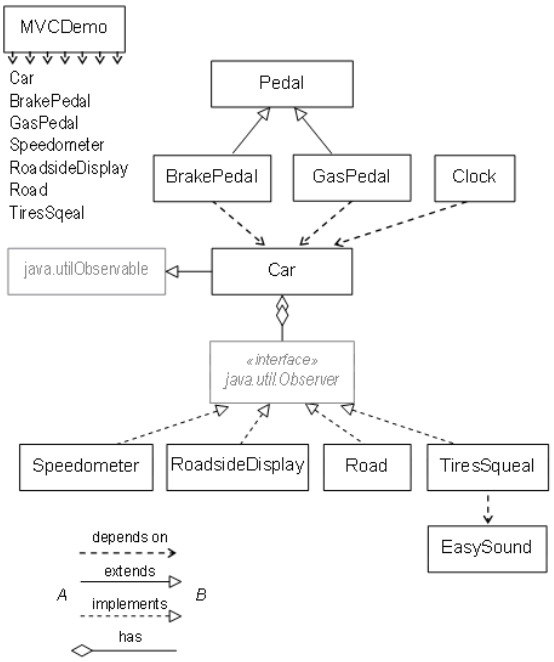
The data transfer rate of GPRS system is around 9.6 to 177 kbps. With the TDMA coding technology multiple users can access the single transmission medium simultaneously. Mobile station are needed to adopt the GPRS service, generally the mobile stations are cellular phones and some other mobile devices. The base transceiver is an antenna to provide the GPRS service to the mobile devices via wireless medium. All the base station transceivers are controlled by the base station controller (BTS). The BTS needs some of the software and protocol suits to interconnect with the BSS. The BSS (Base Station Subsystem) consist of two registers as a database which is called HLR (Home Location Register) and VLR (Visitor Location Register). The important characteristics of the GPRS are as follows

- Mobility
- Scalability
- Efficiency
- Availability
- Localization

IV. MOBILE VIEW CONTROLLER

All the web-based mobile application must need the model view controller. While designing the mobile application the designer must consider the screen resolution of the different devices. The size of the display will be different on different mobile devices and the functionality of the mobile devices may vary.

Fig.3 Architecture of MVC



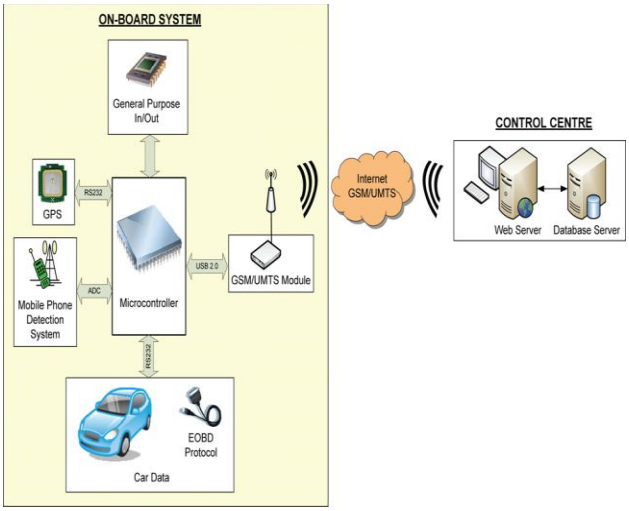
The mobile view controller plays an important role in mobile application and mobile services, which is used for view and modifying the information of mobile devices. The model is used for representing the data for the given mobile device. There is different controller for different devices to view and control the information presentation and flow. The model view controller makes the mobile application development easier and enables the developers to reuse the design.

V. SYSTEM OVERVIEW

The main components of the smart passenger information system are vehicle units, station unit and central database. The station unit is installed at most of the bus stations and railway station. The vehicle unit is installed at the mobility vehicles on the road which stores and updates the stopping details and coordinates of the trip is called pre-trip context. These vehicle units also have a context of on-trip which computes the current location of vehicle and send this current location information to the centralized database by using the GPRS connection.

There is a controller for the bus driver to indicate the current status to the passengers such as stopping display and announcement, breakdown intimation and route changes intimation. The vehicle unit is equipped with the GPS system to pointing and identifying the current location of the vehicle. With the longitude and latitude the bus location are identified and this information are transferred to the central database.

Fig.4 Architecture of Real time Passenger Information system



VI. CONCLUSION

The need of smart transport system is increased in different cities of different countries to manage and control the huge traffic. The real time passenger information plays an important role in public transport which reduces the traffic and people waiting for the bus on the road. This system provides predicted information to the passengers and provides an information access about the transport to the passengers to their mobile device. The time taken to update the information and the integration of different device is a more challenges, so it is taken as a future work.

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