

College Bus Tracking Android Application using GPS

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Abstract - A College Bus Tracking android application enables the user to find out the bus location information so that the user does not get delayed. The main aim of this paper is to collect the data from GPS and delivering it to server from where it will be fetched by android application and the bus real time location can be viewed on Google map, which is integrated onto the android application. The users can log on to the application and can know about the scheduled routes of the college bus. This application is user-friendly and flexible to use as it is a time saving application to the user.

KEYWORDS: GPS, GPRS, GSM, ANDROID APPLICATION, GOOGLE MAPS.

I. INTRODUCTION

Android has become very popular in embedded market for two main reasons. First, it is open source software and moreover there are no royalty fees for Java VM (Virtual Machine)[10]. Second deriving from the first, Android is highly suitable for expansion as the developer sees fit. Being students ourselves, we have been motivated to develop this project for the benefit of the student masses, by the idea of providing an easier means of accessing various web resources related to the college bus, thus providing them with a better, richer experience of travelling to college. Further, the recent advent and popularity of Android technology motivates us to create an Android application for the same. [1][7]

The students and the faculty use the college bus to travel to the college and back. The problem that arises is that the student or the faculty may not know the exact location of the college bus. And that's where this application comes to picture. This system will make use of GSM and GPS modules to give exact and real time location of bus and for that we are using a microcontroller along with GSM and GPS module.[4]

To achieve automatic Vehicle Location system that can transmit the location information in real time, Active systems are developed. Real time vehicular tracking system incorporates a hardware device installed in the vehicle and a remote Tracking server. The information is transmitted to Tracking server using GSM/GPRS modem on GSM network by using SMS or using direct TCP/IP connection with Tracking server through GPRS. Tracking server also has GSM/GPRS modem that receives vehicle location information via GSM network and stores this information in database. This information is available to authorized users of the system via website over the internet [6].

The GSM module will be provided with a SIM card for communication purpose. GPS will give the longitude and latitude values and that values are transmitted to the server with the help of Global Service for mobile (GSM module). Once the longitude and latitude values are uploaded on the server, the user with the help of android application will be able to download it from server and get the real time location of the college bus, which he can see it through the Google maps integrated in it.

II. EXISTING SYSTEM

In the existing system, the user does not know the exact location of the college bus and whenever he needs to know about the location, he has to call and ask someone. Sometimes, the bus may also get delayed by few circumstances such as traffic congestion. Then the user will not be able to decide whether the bus has arrived or not. Due to this, the user may face many problems such as late arrival to the college.

The ability to track the vehicle over the internet is done by utilizing Global Positioning Satellites. Data such as Global Position, Speed Velocity and Time (PVT) are transmitted over the Cellular network. The information transmitted from the tracking device is disseminated and stored on your private confidential account or sent over the wireless network. The data is cross referenced on a street level map for viewing. The positioning information provided is cross reference to the closest geographic address and displayed in residential /commercial address format.

The main disadvantage of the existing system is that the system provides only a broad layout of the geographical address, providing and does not provide street wise address. Speed of the vehicle and engine is no way controlled by the existing systems, thus exposing the vulnerability of a system that provides only tracking.[9]

III. PROPOSED SYSTEM

3.1 Description of Hardware Unit:

Global Positioning System (GPS):

Technology has rapidly advanced in the past few years and it has become very easy for the average person to use a tracking system. GPS stands for Global positioning system has wide number of application today popularly in the field of navigation, tracking etc. A GPS is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.[5]

Global System for Mobile communications (GSM):

A GSM module works as modem for transmitting data to the server. The data communication is done by using the GPRS (General Packet Radio Service). One of the key features of GSM is the Subscriber Identity Module, commonly known as a SIMcard. The SIM is a detachable smart card. Here in this system, we have used SIM 900 which is a Quad Band Module.

Arduino Microcontroller:

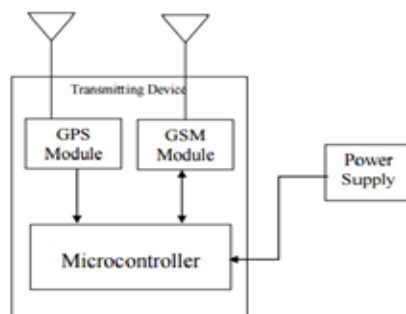


Fig1: Transmitting Unit

Arduino is an open-source prototyping 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. We can

tell the board what to do by sending a set of instructions to the microcontroller placed on the board. To do so, we here use the Arduino Programming language and Arduino software (IDE)

From the fig 1, we can say that the transmitting unit will transmit the data to the server with the help of GSM and GPS. This transmitting unit will be placed in the college bus and this unit helps to transmit the location to the server.

3.2 Description of Monitoring Unit:

The monitoring application is to provide users an easy, user friendly and comfortable tracking platform in which the students and the faculty will be able to locate the college bus. This monitoring application will be an android based application. For accessing the location of college bus, the user will need an android based phone with internet access. As the user opens this application, the application will download the values of longitude and latitude from server with static IP address via a GPRS network and shows the current real time location of the college bus. This application will automatically fetch the coordinates and shows the output in the form of Google maps integrated in it.

IV. EXPERIMENTAL SETUP

System Specifications: The Hardware Interfaces for this application are Client PC with Internet Connection, Server with Static IP, GSM SIM Card with GPRS activated. The Software Interfaces for this application are Android Studio and Google Maps API.

Hardware Unit: The hardware unit is shown in below figure. This hardware unit consists of GPS module, GSM module and an Arduino microcontroller. The GSM is inserted with a SIM card and connected to the power supply.

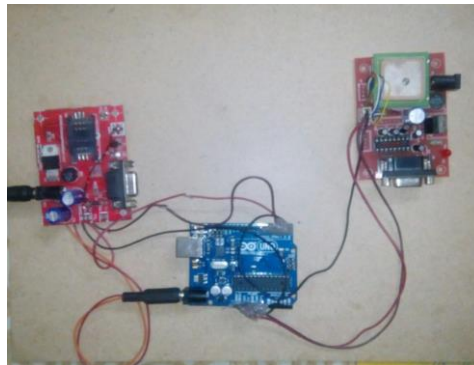


Fig 2: Hardware setup

From the fig 2, the microcontroller by using the commands dumped into it, it takes the latitude and longitude values of the current position from the GPS module and passes it on to the GSM module. The GSM will connect to the server via the GPRS. Thus the values get stored into the database in the server.

Software Unit:

The Android Application is shown in below figure. This application will show the output through the Google maps. As soon as the user opens this app, it shows the login and registration page. If the user is a new user, he can register by using the signup. If he is already registered, then the username and password is used to login.

After login, the user can locate the bus by using the Google map. The Google map shows the exact location of the college bus. The location is fetched from the database of the server where the coordinates are stored. This location is transferred as a Google map and is shown to the user. The coordinates of the position of the bus is refreshed and stored in the server database for every 30 seconds. [3]

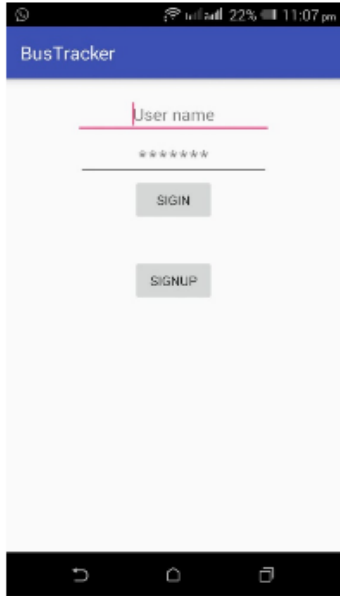


Fig 3: Login

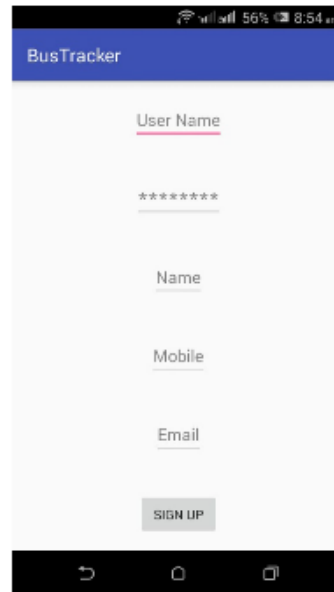


Fig 4: Register



Fig 5: Location of the bus

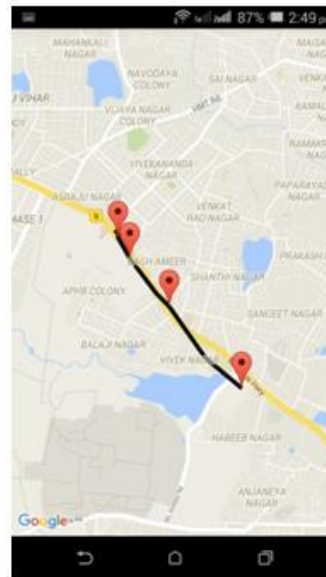


Fig 6: Bus stops

The figure 3 shows the login page. This page is displayed whenever the user opens the application. The user, if already a member, can give his/her username and password and log in into the application. Else, signup page can be opened for registering as a member. The registration page is shown in the figure 4.

The figure 5 shows the location of the college bus by using the Google Maps. The bus stops can also be viewed on the maps. The bus stops are marked throughout the bus route, as shown in the figure 6.

V. CONCLUSION AND FUTURE ENHANCEMENTS

This android application uses the help of GPS, GPRS, GSM and the Google maps in order to track and locate the college bus. This application successfully shows the location of the bus through the Google maps. This system can be further extended for multiple applications as follows:

- Anti-theft system for cars and bikes.
- Managing of public transports likes buses and trains.
- Tracking of valuable assets.
- As a vehicle management software for transport companies. [8]

And many more similar applications and thus, this system can prove to be very helpful in future.

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