

## Bus Tracking using GPS and Real Time Prediction

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**Abstract** - Everyone is in hurry to reach their destination in this fast life. In this case waiting for the buses is not reliable. People who rely on the public transport their major concern is to know the real time location of the bus for which they are waiting for and the time it will take to reach their bus stop. This information helps people in making better travelling decisions. This paper gives the major challenges in the public transport system and discusses various approaches to intelligently manage it. Current position of the bus is acquired by integrating GPS device on the bus and co-ordinates of the bus are sent by either GPRS service provided by GSM networks . GPS device is enabled on the tracking device and this information is sent to centralized control unit or directly at the bus stops using RF receivers. This system is further integrated with the historical average speeds of each segment. This is done to improve the accuracy by including the factors like volume of traffic, crossings in each segment, day and time of day. People can track using , web application or Android application at bus stops. GPS coordinates of the bus when sent to the centralized server where various arrival time estimation algorithms are applied using historical speed patterns. This system has introduced many new concepts including direction where size of the database has reduced to half and it also predicts the average velocity of the bus using clustering and back propagation method which increases the accuracy of the system.

**Key Words:** GPS, GPRS, GSM, coordinates, average velocity

### 1.INTRODUCTION

As the numbers of vehicles are increasing day by day, which leads to a serious problem of traffic congestion, people are taking public transportation as an alternative. Consequences of congestion lead to low accessibility, loss of travel time and pollution. So far, there is a lot of solution to the traffic congestion, one of them is to improve and expand the use of public transportation system. In urban cities, it is expected that public transportation will become more important for many people. Subsequently, public transportation services should satisfy the customer need like arrival time and the travel time are the valuable information for both the customer and transport system. Nowadays, by the use of wireless communication, global positioning system

and other devices, passengers are able to get information about the arrival time of the transit vehicle. Travel time is the most important information for a traveler and cannot be measured directly. Measuring an accurate travel time is a challenging research problem which is still not achieved as the complexity of variations exists. Some metropolitan areas are providing real time information of the transit vehicle, but still there are difficulties to give accurate real-time information due to the complex nature of urban traffic.

It is even worse in developing countries as considering the traffic is not discipline, collected data is insufficient and the technology is outdated. Thus, for providing real time information, we need to develop an algorithm that can give accurate results. Hence the real time-travel time depends on the behavior of the traffic flow, which in turn depends on other characteristics such as road works, weather, accidents etc. A simple approach is to find average travel time that is derived from the historical data. This approach has a drawback as it does not capture the constant update of the traffic very well.

The measurement of an accurate bus arrival time is significant for both the traveler and transit services. Travel management is the major concerns in a passenger life, as scheduling the routine plays and the important need. Public Transportation system is not that efficient to provide user the comfort of planning their travel such as the bus services in urban and rural areas. This paper presents an efficient way of calculating the bus arrival time at a particular bus stop by making use of historical data and real-time values along with the other factors.

### 2. LITERATURE SURVEY

[1] Ajay Shingare , Ankita Pendole, Nikita Chaudhari and Parikshit Deshpande GPS Supported City Bus Tracking & Smart Ticketing System gives 1.Public transport and private buses tracked to citizens with traffic and transportation details like location, crowd , position of bus from remote location using The

location of the bus can be observed continuously using GPS system. Having limitations The given system does not provide the facility like ticketing and also it has shortcoming like passengers can't buy tickets, who don't have smart card

[2] Leeza Singla<sup>1</sup>, Dr. Parteek Bhatia<sup>2</sup> GPS Based Bus Tracking System .Current position of the bus is acquired by integrating GPS device on the bus and coordinates of the bus are sent by either GPRS service provided by GSM networks or SMS or RFID. Using Time Prediction using GPS and Artificial Neural Network having limitation The system is effective where Internet is accessible.

[3] Kaavya Srinivasan, Konstantinos Kalpakis Intelligent Bus Stop Identification Using SmartphoneSensors having objective Developing models for identifying bus stopsfrom trajectories for situations where accurate and current information is not available and traffic conditions are challenging using Machine learning techniques are used to design, extract, and select features from the raw data collected, and then use those features to design, train, and test classifiers Bus arrival time is not predicted.

[4] Wenping Liu, Jiangchuan Liu, Hongbo Jiang, Bicheng Xu, WiLocator : WiFi -sensing based Real-time Bus Tracking and Arrival Time Prediction in Urban Real-time Bus Tracking and Arrival Time Prediction using WIFI using Signal Voronoi Diagram Gen. by WiFi APs, to divide a signal space into coarse-grained Signal Cells and fine-grained Signal Tiles, tackling the unstable WiFi signals having limitations Historical and lately travel time of the buses of the same/different routes traveling used to estimate the travel timeof next bus on the road segment

### 3. ARCHITECTURE OF PROPOSED SYSTEM

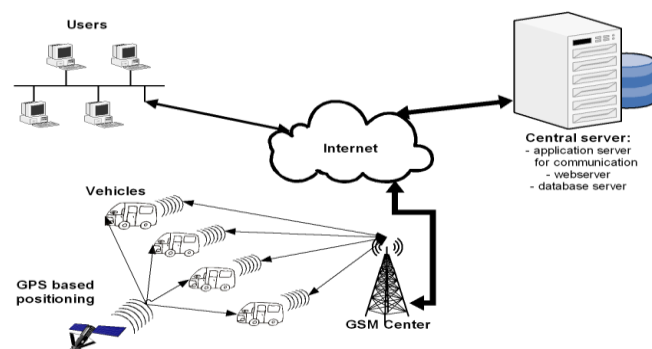


Fig -1 GPS based bus tracking system

### GPS BASED SYSTEM

GPS based system is further divided into 3modules which are as follows: Module 1 gets the current GPS coordinates in terms of Latitude and Longitude of the bus. Also calculates the speed with which the bus is moving. Module 2 finds the current location of the passenger in terms of Latitude and Longitude. Module 3 takes the information from Module 1 and Module 2 to find bus and Passenger's exact location on the route and distance between the two.

#### 3.1 BUS MODULE

Bus Module is the Client side of the Android application. This application is installed on the Android platform smart phone which is placed on the bus whose position is to be tracked. The Requirement for this application is GPS and GPRS. In the beginning of the route, bus driver initializes the application with the Route number, Direction and the bus number. Once this initialization is done it initializes the server side with this route number and bus number. This application uses Location based services (LBS) to get the current GPS location of the Bus. Location services automatically maintain the user's current location, so application has to retrieve it as needed. Accuracy of the location depends on the location permissions that have been requested and the location sensors that are currently active for the device. Once the tracking has been initiated Bus module submits its coordinates frequently, every 6 seconds to the server. These frequent submissions are used to track current location of the bus on the route.

#### 3.2 PASSENGER MODULE

This module is another type of the client application. This android application is installed by the passenger who wants to track the location of the bus and get its arrival time. The basic requirement of this application is the GPS and GPRS. This application uses Location based services to get the passenger's current GPS coordinates. These coordinates are sent to the server side where it is coordinated with the nearest bus stop because the bus will stop only at bus stops. The arrival time is predicted with respect to the distance between the bus's current location and the passenger's nearest bus stop. The passenger selects the Bus number from the drop down and request is sent to the server. After processing server

sends the arrival time also passenger can locate the bus's current location on the map.

### 3.3 SERVER MODULE

This module is the server side of the android application where most of the processing is done. Web service is used that facilitates the submission and request of information to the database server. MySQL server 5.6.23 is used where tables for all the routes are present. Each table comprises the *Coordinating point, Latitude, Longitude and Distance*. Points are set up along the route at the distance of 100 meters or at the bus stops, whichever is closest. These coordinating points are essential for easy calculation of the distance between the bus and passenger and results in increase in accuracy. Google maps were used to plot the location of the bus, but sometime plotting the real time GPS generated coordinates were inconsistent with the Google map road structure. To overcome this problem Coordinating points were inserted along the route. Bus's current real time coordinates are sent to the server where it is matched with the nearest coordinating point laid on the Google map. This increases the accuracy in the depiction of the real time location of the bus on the map at passenger side application. Also calculation of the distance has become more efficient. When database is prepared, along with each coordinating point number and respective coordinates, its distance from the next coordinating point is depicted. If distance between coordinating point 1 and 5 is to be calculated then using database query *Distance* from the coordinating point 1 to 4 is added. With the use of coordinating points it can also easily be found if the bus has been missed or still to come. Also by using the Direction of the bus as major component, the size of the database is reduced to half. Instead of creating different tables for routes from coordinating point 35 and 351, only one table could be used for both.

### 4. CONCLUSION

The conclusions of this study suggest that knowledge of specific domain improves the results. This Project has been implemented on Android platform. Also, different attributes have been added to the project which will prove to be advantageous to the system. The requirements and specifications have been listed above. This project is implemented using Android and the SQL domain. Using the GPS system, the application will automatically display the maps and

routes to the different locations and also track the bus location using client-server technology and forward it to the client device. It uses basic measurements of distance between two locations and provides necessary details of each and every route for people to easily pick up buses or any other conveyance possible on the specified route. Specific location details are provided to the user along with bus no. so that the person can identify the bus correctly. It uses remote server as its database. Due to this the records can be easily manipulated on the device itself and the server burden gets reduced.

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