Real Time Bus Tracking Android Application with ETA for the B.E.S.T buses in Mumbai

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ABSTRACT: Bus travelling in Mumbai has been exceptionally tiresome than any other mode of public transport, mainly due to its belated and uncertain nature with respect to time. Hence, in this paper we are trying to propose a system that can keep a track on the bus and give live updated status of the location of the bus along with its Expected Time of Arrival (ETA). So, one can plan the journey in advance and reach the desired destination on time.
Certain Features of the System are: Live updated location of the required bus, Location and details of the nearest Bus stops and Details (timing, bus no., bus stops) of the buses arriving and leaving from a particular bus stop. The system is an Android application that gives necessary information about the buses travelling in Mumbai.
The platform chosen for this kind of system is android, reason being Android Operating System has come up on a very large scale and is owned by almost every second person. Also, Android is a user friendly platform, thereby enabling ease of access for all the users. A number of applications made for the Android Operating System is increasing on a large scale ever since its advent.

KEYWORDS: android application, bus tracking, expected time of arrival (eta), live tracking.

I. INTRODUCTION

There are buses made available for passengers travelling distances, but not many passengers have complete information about these buses. Complete information namely the number of buses that go to the required destination, bus numbers, bus timings, the routes through which the bus would pass, time taken for the bus to reach, maps that would guide the passenger with his/her route and most importantly, track the current location of the bus and give the correct time for the bus to reach its bus stop. The proposed system deals with overcoming the problems stated above.
Do you know the average time a Mumbaikar spends in travelling to work? It is 47.26 minutes which is fairly greater than any of its counterpart cities. BEST (Brihanmumbai Electric Supply and Transportation Company limited) is the largest public transport undertaking in Mumbai with more than 3800 buses running on more than 365 routes in Mumbai covering more than 6000 bus stops. People in Mumbai have to face lot of hardships daily due to long travelling hours accompanied by uncertain arrival time of buses. This leads to people either getting late for work or preferring other modes of transport which might be costlier.
    The primary target of the proposed system is to provide the ETA of the bus to the commuters so that they can plan their journey accordingly and have a better experience every day. This will help people to avoid any delays and

influence them to take public transport instead of private vehicles. The system will provide dual benefits i.e. convenience to the commuters and improved public transport which will in turn benefit the environment.

II. LITERATURE SURVEY

The idea comes from the tram tracking system already developed in many of the western and European countries which we are trying to implement it for Indian public transport mainly for Mumbai.

The paper presented by PankajVerma and J.S Bhatia (International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol.3, No.3, June 2013) describes:

A system that has Global Positioning System (GPS) which will receive the coordinates from the satellites among other critical information. Tracking system is very important in modern world. This can be useful in soldier monitoring, tracking of the theft vehicle and various other applications. The system is microcontroller based that consists of a global positioning system (GPS) and global system for mobile communication (GSM). This project uses only one GPS device and a two way communication process is achieved using a GSM modem. GSM modem, provided with a SIM card uses the same communication process as we are using in regular phone.

The system is not limited to find the location of the target but also calculates the distance travelled b/w two stations. This system is user friendly, easily installable, easily accessible and can be used for various other purposes. After installation system will locate target by the use of a Web application (HTML based application) in Google map. The system allows to track the target anytime and anywhere in any weather conditions.

The paper presented SüleymanEken and AhmetSayar (Kocaeli University Kocaeli, Turkey) presented following information:

USER SERVICES AND INTERFACES
General flow of the proposed application is as follows:
• Route numbers of buses are listed for corresponding bus stops. Passengers choose one or more of them to view interested and estimated bus arrival time current location of the selected bus.
• Passengers can view routes of buses on maps. The maps represent buses, bus stops and the route of the bus. Users can utilize Google map's mapping tools such as zooming in/out, panning, dragging and dropping to get better view for the selected route and buses.
• If users are registered to the system, they can be informed of the routes and the busses they are interested in, through e-mails and SMSs.

Estimation of Bus Arrival Time
We can use different algorithms to estimate the classes of new instance set by discovering the way the attributes-vector of the instances behaves. One of these algorithms is Decision Trees (DT's). A tree is either a leaf node labelled with a class linked to two or more sub-trees. If we classify some instance, firstly we have to get its attribute vector and then apply this vector to the tree. To complete the classification process, the tests are performed into these attributes until reaching one or other leaf.

The paper presented SeokJu Lee, GirmaTewolde,Jaerock Kwon (Electrical and Computer Engineering Kettering University) suggested the following information in their paper:

The basic purpose of a vehicle tracking system is to track a specific target vehicle or other objects. The tracking device is able to relay information concerning the current location of the vehicle. Most of such tracking systems consist of an electronic device as usually installed in-vehicle and can be used for tracking motor cycles, buses, and trains. The vehicle tracking system proposed in the paper has the following features:
• Acquisition of a vehicle's geographic coordinates and a vehicle's unique ID from an in-vehicle device in real-time using the GPS module
• Transmission of a vehicle's location information and a vehicle's ID to a web server after a specified time interval using the GSM/GPRS module
• Database is designed to store and manage received vehicle's location information
• Whenever a user requests the vehicle location, it can be accessed from the database and monitored on Google maps in real-time using a Smartphone application.

Gathering information from the above mentioned (References) technical papers the idea of B.U.S (Bus Under Surveillance) application has been chosen so that the public transport in Mumbai can be made more efficient and convenient. A GPS based system of tracking the bus via a smartphone application (Android application).

Currently there doesn't exist any system for live tracking of buses for public transport. We plan to develop this application considering the base of m-indicator for the database and layout. We also take help from the Ola and Uber applications in order to develop live-tracking of buses on Google maps.

Ola and Uber are two of the majorly used applications for hiring cabs in India and some of their common features which we have tried to map in our system are: Current location tracking, Live tracking of vehicle, ETA of vehicle, detailed map showing route from source to destination, Details related to the ride, nearby vehicles etc.

CURRENT DRAWBACKS IN THE SYSTEM

➢ Uncertainty in the time of arrival of buses.
➢ Long waiting hours for commuters.
➢ Commuters prefer alternative mode of transport over bus.
➢ Lack of information to commuters.

III. FEATURES OF PROPOSED SYSTEM

● Application that is capable of live-tracking of the bus.

● User can access the details of nearby bus stops and the buses arriving and departing from the bus stops, allowing one to plan and schedule the   travel.

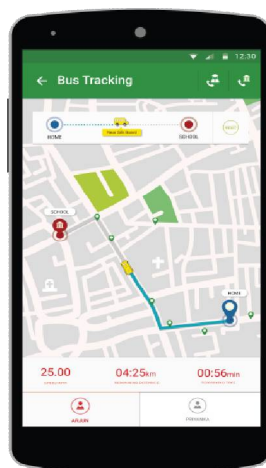● Display of total time and total fare needed to reach the destination.

Fig. 1 route from source to destination

Fig. 1 shows output of B.U.S. application displaying route from source to destination.

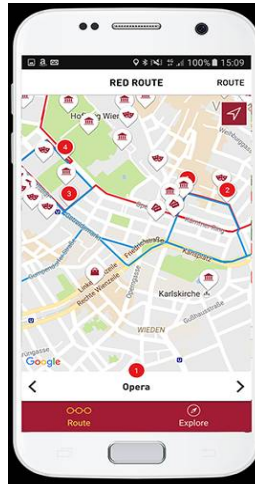● Influencing more people to travel by bus.

Fig. 2 bus stops displayed on map

Fig. 2 shows output of B.U.S. application displaying bus stops on which the bus halts.

IV. PROPOSED METHODOLOGY

B.U.S (Bus Under Surveillance) application is being created with the aim to reduce the tiresome nature of bus travelling especially in Mumbai. The app can be used by anyone, anywhere, anytime to plan their travelling schedule by bus and ensure that they reach the destination on time with ease and convenience.

This application contains the three modules
- Admin
- Client
- Driver

A. Admin
Admin can login to the admin account after authentication and authorization. He can enter new route details and also he can select the route from the list of routes and then the corresponding stops are displayed. He has the options to add or remove a bus route. He also has the option to modify or remove a stop from the route.

B. Client
Client has to enter the registered number and mobile number to login the application. To search for a bus, client has to enter the source and destination in the search bar. Then map is displayed which shows the current location of the bus and displays the route from source to destination. When the application is launched, the home Activity fetches the routes from the server and binds it to the spinner for the client to select it. When the client selects a route, corresponding stops are fetched from the server and is bound to the spinner for the client to select. If the client selects "Get Location" then the location details of the bus for that route is fetched. If the client selects "Show Map" then the location of the bus on the map will be displayed.

C. Driver
Driver has to enter the bus number, vehicle number plate, route id, and mobile number to login into the application. Driver's works is only start and stop the bus. When the application is launched, the home Activity fetches the routes from the server and binds it to the spinner for the driver to select it. If the driver selects "Start", the location of the bus will be uploaded to the server. If the driver selects "Stop" then the uploading of location of the bus is stopped.

- The passengers can easily select bus route number and their stop from the list of bus route numbers and know where the bus is and how long will it take to reach their stop.
- They can also know the exact location of the bus on the Google Map which gives them a better idea on the where the bus is.
- The list of bus routes and their corresponding stops can be managed using the website which gives the admin a better hold on the application.
- This application helps the client to track their buses and to plan the journey in advance and reach the desired destination on time.
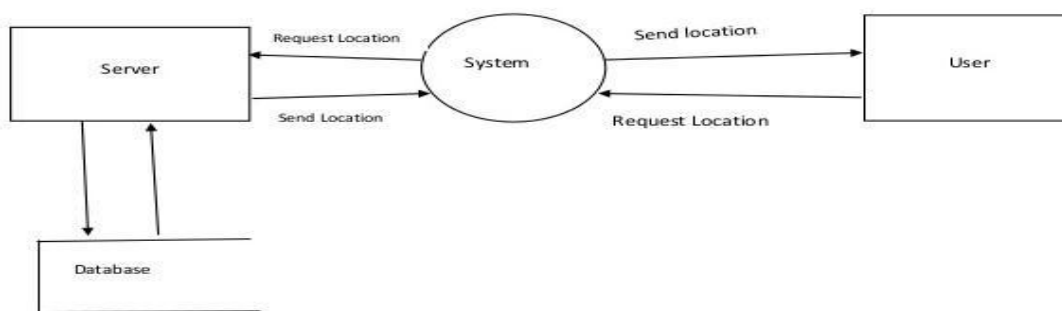

Fig 3. Flow of Proposed System

In Above Fig. 3 flow diagram shows how the application works. When the user enters the B.U.S application, it has been provided with an option to select source and destination. After selection user can see a map with source to destination route highlighted on his phone with various search options.

User will be provided with various routes and buses on map corresponding to the entered source and destination, after selecting the bus the system will fetch the GPS location. Based on this, the system gets the latitude and longitude of the bus's location. Similarly, total traffic on that route can be fetched from which the system decides the total estimated time of arrival at that bus stop.

People can track the selected bus which they wish to travel by from a particular bus stop, this will save their waiting time and they can travel conveniently through bus which indeed is tiring task for people every day. This app will prove to be a good aid for those travelling by bus regularly.
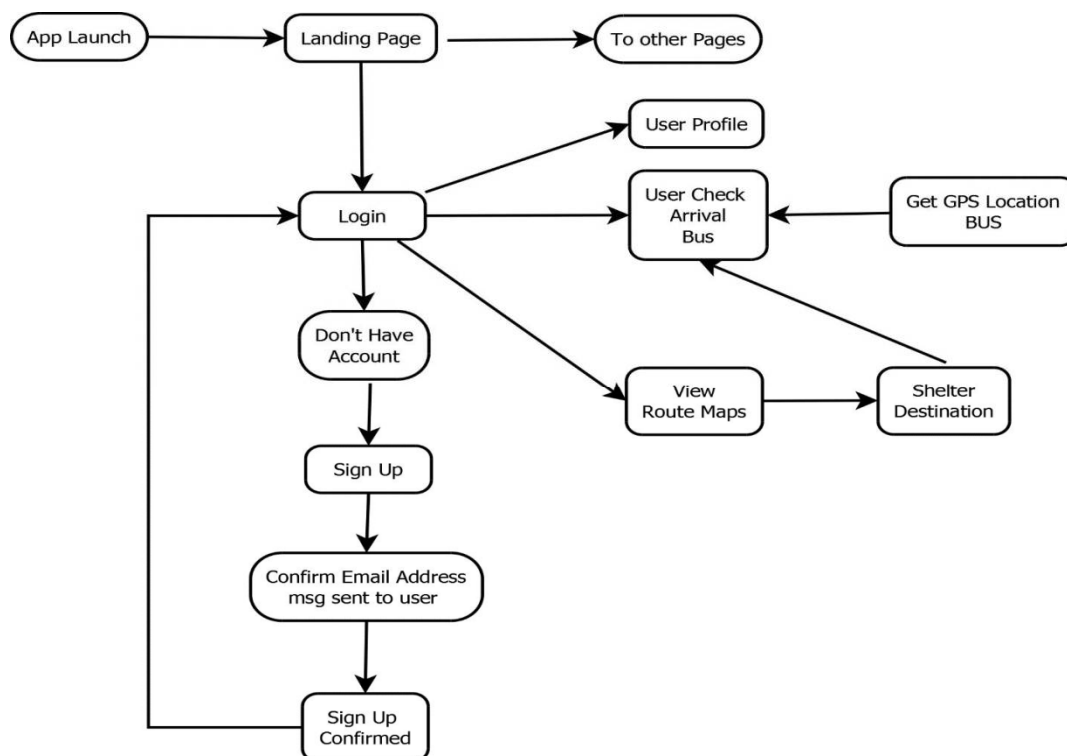
Fig 4 Interaction Diagram of Proposed System

V. CONCLUSION

Many cities have found that GPS tracking systems not only improve the efficiency of city bus operation, but also encourage commuters to take the advantage of city bus system. Many city bus systems have discovered that GPS tracking system which allows monitoring the location and arrival time of their bus actually increase the number of people using city buses for routine communing. The application is a user friendly one that anyone can access for free of cost. The basic idea for this project is to guide the bus travellers with the routes, all the possible stops that come on their way to the destination and moreover, display maps and track their locations and show the estimate remaining time required to reach. The proposed system has been divided into two modules as follows. Module 1 gives information about all the routes from the source to the destination and give maps for the same. Module 2 give information about all the buses along with the bus numbers that go through the selected stops, track the location of the selected bus and send this information to the passenger giving him/her the estimate time required for the bus to reach. This is done using the Client-Server technology.

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