

Bus tracking and Bus arrival time, location prediction system

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Abstract - As we know that there are number of factors affecting bus travel time, such as departure time, work day, current bus location, number of links, number of intersections, passenger demand at each stop and traffic status of the urban network, etc. This paper presents a statistical approach to predict the public bus arrival time based on GPS information Management system. The most of the time wasted by the people is on waiting for buses on the bus stops which is really horrible. Thus it becomes essential to track the buses real location using GPS and provide passengers predicted time of bus arriving at the bus stop and also people must get the bus information like where the bus is, is it in traffic. On route being anywhere like in house or on road, this can be happening only by using mobile computing. And for getting information about bus on mobility device (Mobile phone) first it must be there at some central monitoring and control side that must be updated from time to time. But to being with, the survey has to be done to design the proposed system. Many researchers have paid a great contribution for the same since last decade but still the scopes for improvement continue. Thus this paper contains the survey of various real-time issues faced by people and some survey about the latest researches in the same field.

Key Words: GPS, Mobile Computing, Routing, Bus Tracking, Bus arrival time prediction, Central Monitoring and Control, Traffic Monitoring.

1. INTRODUCTION

In the current era we know that traffic plays an important role in modern urban society. Based on report from United Nations Population Division, there are almost 64 billion people will live in urban in 2050, and the annual growth rate is around 1.5% [1]. It will cause an obviously increase of trip demand. Because of the limitation of the traffic resources, those increments will lead to urban traffic congestion. Traffic congestion, already costing United States of American 87.2 billion USD in 2007, is only getting worse, according to a new report from the Texas Transportation Institute [2]. In order to relieve the congestion, and provide buses on time for the passengers while waiting long time and passengers want be able to bus arrival time of their bus. Because of too much traffic in the road bus arrival time might be late and have to wait long time still bus arrived. Public transport is a shared passenger transportation service which is available for use by the general public.

The governments or public transport authorities are developing public transportation system. A key problem in the development process is to provide adequate public

transportation service or enhance the service level. The problem is also faced by public transportation planners and operators. For example, the accurate prediction of bus arrival times and the timely dissemination of the information to transit users may reduce their wait time, and thus increase the service quality.

As per the survey made by our team regarding the PMT bus public transport, we met many passengers on the bus stop and enquired for the troubles that they are facing currently. The troubles that the passengers are facing are as mentioned below:

The first comes troublesome issue is about the passengers don't have any idea exactly when the bus is going to reach their bus stop. So they don't know till when they have to wait on bus stop for the bus.



Figure1. Bus breakdown Issue

The second major issue is that the passengers are not aware about the bus for which passengers are waiting on the bus stop, is coming or not. Many passengers said that we waited for bus on the stop for around 1 hour and then came to know that the bus has broken down mid-way and there was no way to know about the running status of the bus. The third major issue passengers faced due to current PMT transport is that even if the bus destination station is the one which they are waiting for, still the bus routes are different for e.g. a bus from Hadapsar to Swargate has two routes to follow, and the passengers don't really know which route the bus will be following. The passenger's has to rely on the announcers of the bus stops for getting the information about the buses and the bus routes which is not always audible to traffic noise. So to resolve the issues faced by existing system problems and to overcome the disadvantages of the previous researches, the proposed system will be implemented.

2. Literature Survey

A. Public Bus Arrival Time Prediction Based on Traffic Information Management System

The main factors which affect public bus arrival time are traffic conditions then come sequences or the bus time and the bus stops, then comes the number of intersections, and finally any other factors. By analyzing the historical data, authors found the public bus arrival time are combinations of two main parts: residuals and linear parts. In Figure 1, taken from [1] authors have shown the relationship between the bus arrival time and the distance it has traveled. Both of 338 those bus lines (No. 61 and 75) have shown strongly linear relationship between travel time and distance. In this model, authors have considered the factors of traffic conditions, dwell time, intersections and departure time. Just as author mentioned above, the main part of the bus traveling time are affected by them. The public bus arrive time prediction model (1) is a formally linear model which has already described the main part of the bus travel time, but author have to estimate its parameters. Meanwhile author still need to improve its accuracy by considering the other factors.

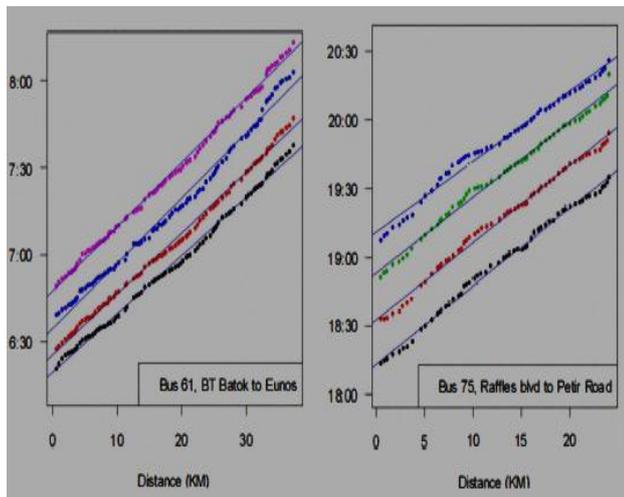


Figure 2.. Linear relationship between time and distance.

B. Automotive Navigation System

An automotive Navigation System is design for using in vehicle. It uses GPS device to acquire position data to locate the user on a road any unit MAP database. Using the road database unit can give direction to other locations along road also in the database for greater consistency there is use gyroscope an accelerometer as GPS signal are loss.



Figure3. Automotive Navigation System

C. How Long Time to Wait? Predicting Bus Arrival Time with Mobile Phone Based Participatory Sensing

Our early attempts to build practical applications on Star Track revealed substantial efficiency and scalability problems, with unnecessary data transfers, frequent client-server roundtrips, costly similarity comparisons involving thousands of tracks and poor fault-tolerance. To remedy these limitations, author revised the overall system architecture, API, and implementation. The API was extended to operate on group of tracks rather than individual tracks, delay query execution, and permit caching of query results. Track trees, New data structures were introduced to speed the common operation of searching for similar tracks. Map matching algorithms system were adopted to convert each track into a more compact and canonical sequence of road segments. And the underlying track database was divided and duplicate among multiple servers. Altogether, these changes not only simplified the construction of track-based applications, which author confirmed by building applications using our new API, but also resulted in considerable performance gains. Analysis of similarity queries, for example, show two to three orders of magnitude improvement in query times.

D. Bus Management System Using RFID in WSN Phones

These paper authors present a new approach to integrate RFID (Radio Frequency Identification) in WSN (Wireless sensor network).

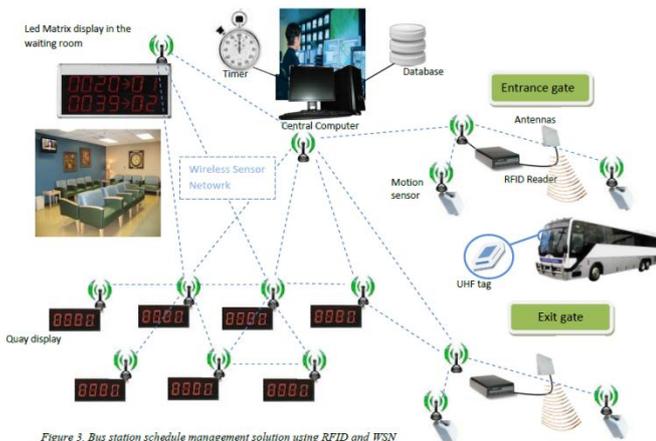


Figure 3. Bus station schedule management solution using RFID and WSN

Fig -4 : Bus station schedule management using RFID and WSN

WSN is used to support RFID identification process by prolonging the read range of an RFID system. Besides, by the access of the WSN author can monitor the environment of an object and optimize RFID reader's presentation and energy. Then, method to integrate RFID technology, wireless sensor network to form an intelligent bus tracking application is studied. The proposed system can monitor bus traffic secret expansive bus stations, and can inform administrators whether the bus is arriving on time, early or late. This bus information is then displayed on the different wireless displays outside and inside the bus station.

E. Real Time Web based Vehicle Tracking using GPS

1. This uses GPS receiver to arrest the current location and vehicle speed. Speed data and Location provided by GPS is not in human understandable format. This data needs to be processed to convert it into useful information that can be displayed on the map. To process this raw data CPU is required.

2. The raw data provided by the GPS receiver is taken by the CPU and processed to mine the required location and speed information CPU is also responsible for monitoring the microcontroller selected to serve as CPU for vehicle unit. When all required information is extracted and processed, it needs to be transmitted to a remote Tracking Server high will be able to display this information to the end user.

3. GPS (Global Positioning System) antenna get signals from GPS satellites and it must face towards sky for correct computation of the current location by GPS receiver. Area location data information is transferred to microcontroller through serial interface. Then processing of the data provided by GPS receiver, microcontroller pass on this information to remote location using GPRS Modem.

4. Microcontroller controls the operation of GPRS modem through serial interface using AT commands. External GSM antenna is required by the GSM modem for reliable receiving and transmission of data. When modem gets any command sent by tracking server, it passes this information to with respect to the PMT and others buses services. The survey there by concludes that the system is not ate developed and the researched system is not giving accuracy and too have lot of disadvantages so to get accuracy we have find the solution which will be implemented In proposed system

3. Proposed System

The propose system architecture as shown below:

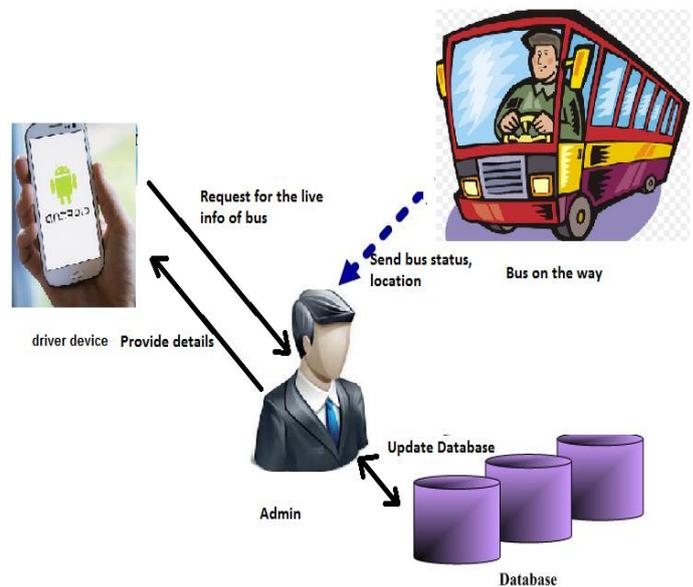


Figure: Proposed System Architecture

The proposed system modules:

Passenger or User Module:

- This is the main module of system for which we are developing this application.
- To get information by using application user needs to register to the system.
- User can search bus available and provide feedback about system.
- Whenever the user tries to query any bus location, server check whether bus is running or broken down by checking the status in database and if its running it sends its current latitude and longitude which is available in database.
- If the bus is broken down, the message is conveyed to user that the bus is broken down and the user

can then query for another bus is available or try another mode of transport if he/she is in a hurry.

Server Module:

- This is the superior user of the system.
- The functions of admin manager are different from user, he can add new buses to the depot, he also add new routes or change routes.
- The admin module is the one who acts as the intermediate between the bus module and the user/passenger module.
- Bus device send the latitude and longitude on every 30 seconds to server, and server sends this location to the user who queries about that bus.
- Also, if server gets the bus breakdown message, he/she can take immediate action to resolve the issue.

Bus Device Module:

- Driver is the one who starts the bus and its location broadcasting by logging in to the device.
- The Module transmits the current bus GPS location to the server after every half minute.
- Driver also give intimation if bus fails, by pressing the button on screen of android device and the device send 3 information details to the server:
 - a. The location where bus has broken down.
 - b. The Bus number which has broken down.
 - c. The Driver name who is driving the bus.

4. Mathematical Model

Set theory of proposed system:

The various operations of the modules are mentioned below:

Set S = {s1, s2, s3, s4, s5, s6, b1, b2, p3}

S1= server connection with buses.

S2= getting bus latitude longitudes.

S3= computing the distance of user to queried bus.

S4= sending bus location and status to user.

S5= bus failure management.

S6= bus and user management.

Set B = {b1, b2, b3, b4, p2, p3}

B1= establish connection to the server

B2= send bus current location latitude and longitude to server.

B3= send bus failure status to server.

B4= update bus status.

Set P = {b1, p1, p2, p3, p4}

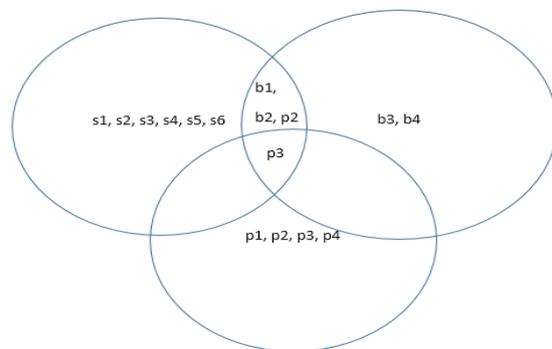
P1= Register to the server

P2= View available buses from server

P3= Query selected bus location from server.

P4= View predicted time and bus location.

Venn diagrams:



5. Result

This system should show the bus arrival time and distance as well as bus cancellation to the user. The results of the proposed system are as shown in below:

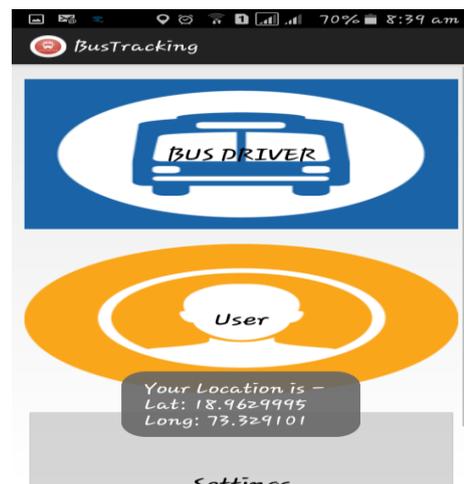


Figure: Login for User or Driver.



Figure: User Authentication.

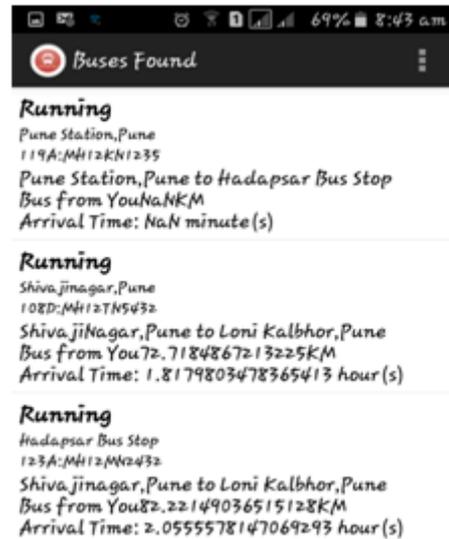


Figure: Bus Found details information.

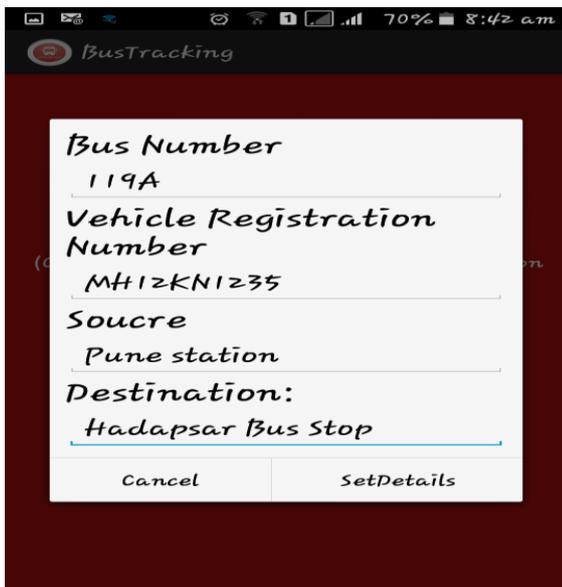


Figure: Providing Bus details.

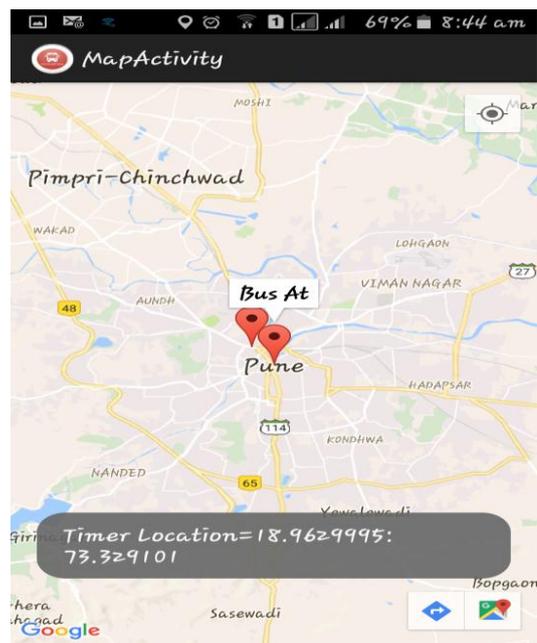


Figure: Showing bus location on the Map

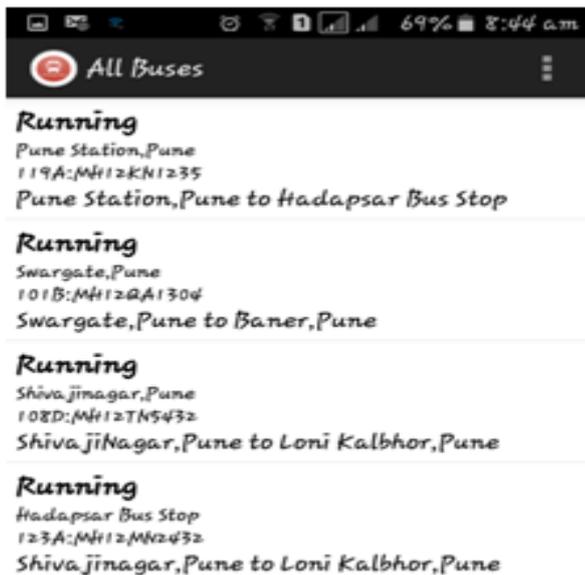


Figure: All buses details on the root

6. Conclusion

In this paper, a statistical approach was present to forecast the arrival time at each stop for public bus. Based on the assessment of all factors which will have impact on the bus arrival time prediction, a linear model was proposed. Thus the survey for the bus tracking and bus breakdown management is carried out with the help of previous research as the prevailing system in the market with respect to the PMT services. The survey thereby concludes that the previous system proposed could not efficiently make the bus tracking and passengers' service so convenient that the proposed system will be providing. Also a deep study regarding the prevailing system in the PMT bus transport system was studied to understand, the current information providing system to the passengers regarding the buses.

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