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Survey of Iot Based Prediction of Bus Arrival Time Using Gps System

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ABSTRACT: *While opting for the public-transport, time and patience are of more concern . We can also say, passengers travelling on public-transport found their loss of time due to waiting at the bus-stops. This system is providing a real-time vehicle tracking via Global-Positioning System (GPS) technology to detect the location of the bus and to use internet by a general-packet-radio service (GPRS) technology to display live images on the Google Map or website app for tracking location of buses anytime. we are using the GPS and GPRS modules, the GPS module will locate the buses via the satellite, and the GPRS module will collect all data and send it to the website . The buses will be monitored live using coordinates with this system. Also by implementing geo-fence, user get notify once bus entered in his/her predefined area. We are developing an Android-application which will give the real-time schedule of buses. Also, it provides quick and real-time replay for inquiry, via the server. Also in case of any unexpected activities or breakdown, the alert will be sent to the system, with Bus location.*

Keywords: *GPRS, GPS, google map, geofence, bus failure.*

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I. Introduction

The transportation system provide as the heart in the social and economic-growth of the country. As the population in India is increasing, rapid explode in rate of vehicles which results in a overload on traffic-management. Public transport is becoming an important part of transport system in urban areas, advance in easily available technology Can be enforced which help the passenger who recalculate between a rural and urban to-get the travelling information and it helps the passengers to comfort them with the final real time location. Public transport mainly the bus sluice has been properly developed in many parts of the world. For reducing the fuel-usage, snobby usage of car and comfort traffic crowding we can use the bus services. Passengers requires the exact schedule of buse. The anxiety of passengers increases while waiting for a long-time at the bus stop and change their mind to opt for the buses. many passengers are usually on-time for office and many students restarted to their classes as they determine to stop for the buses instead-of taking an other mode of transportation. Goal of system is to decrease the complexity and cost of content these services by implementing Easy-Tracker, an auto system for the transit-tracking and advent time prediction

While going out for the public transportation, time-patience are of more concern. Many passengers travelling via public-transport buses realizes time-loss due to waiting at the bus-stops. We implementing a real-time vehicle tracking-system using a GPS technology to obtain the location of the buses and to connect it to internet by a general-packet-radio service (GPRS) technology for displaying a real-time update on the web-map by Google which allows all time tracking of buses. The GPS-module will detect the buses using satellite, and the GPRS-module will collect the data and transfer it to the website. The buses will be monitored live with real time coordinates with this system. We are developing an android-application which will give real time schedule of buses. . Also in the case of any unexpected activities or breakdown, the alert will be given to the system, with Bus location. A geo-fence is a virtual-perimeter used on a real-world geographic area.[1] A geo-fence which is dynamically generated, as in a radius around a person or a point on the map, like school attendance-zones or neighborhood boundaries. This activity could trigger an notification to the device's user as-well-as alert to the passenger.

II. Literature survey

A] The work proposed by Zehra Naqvi. [1] titled “Smart Public-Transport System Using Mobile phone based sensing” . According to her the longitude and latitude values are analyzed for the distance of bus from destination and for estimating schedule of bus[1]. This information is sent to the server which informs the passengers having the smart phones to access this data from anywhere. The limitation of their work is that, it will not make user’s participation compulsory in the system. This system incurs high cost of

installation of GSM-GPS components inside all buses. And this system is complex also, as it requires different-different hardware modules .Moreover, it doesn't require extra location tracking devices to be installed on each bus. It is quite possible that there may not be many users willing to participate in this system as it can lead to security threats. So, it depends on the crowd, which is a major limiting factor.

B] The work proposed by Qiang Zhang1 et.al. [2] titled "EasyComeEasyGo: Predicting bus arrival time with smart phone". In transit information system travel time is most widely used variable because it can be easily understood by the people. From the transport company's side travel time information is useful in routing and scheduling of buses. Hence, there is need to develop a real-time bus arrival time prediction algorithms that can provide more accurate information under now-a-days conditions. The bus arrival time prediction is a very complex problem, which involves many factors act upon random. The basic data we used to predict bus arrival time including bus numbers, real time, passenger count, longitude, latitude and next station number. The back-end server receives the information from all smart phones that have been already installed in bus and then provides the bus arrival time prediction. When travelers use smart phone log in ECEG system and sends its GPS references and the route number wanted to the back-end server, back-end server will sends back arrival time of the bus wanted. By using this system, travelers can adjust their travel plans based on these information, and they can save their time and go to their destination as quickly as possible. The GPS references of observed bus stop, which significantly reduces the initial construction overhead. Querying user. Our system implementation is that there exist a backend server and a smart phone installed in bus and an android-app for passenger The limitation of their work is that the android app installed in the smartphone can't provide the live information of the unconditional activities or factors which may influence the bus schedule austerity.

C] The work proposed by Rubina Choudhary et.al. [3] titled" Real-Time Predicting Bus scheduled arrival-Time A Review" Prediction of arrival time of bus by using an artificial neural network(ANN) and kernel filter.Time index, bus delay, arrival time, travelling time is considered the main parameters with these models for prediction of schedule arrival time. By studying data collection has done through historical-global-positioning (GPS) and to avoid missing data collection through GPS, Automatic-fare collection (AFC) system. It works in two components that are location and time wise components. Location features capture the location wise vehicle speed which considered the road conditions, dwell time. Timestamp feature capture the time wise vehicle speed, includeing the traffic also. The works establish that HD model performs 2.5 times better than ANN regression model and 2 times better than SVM regression model and achieving the accuracy 75.65%.

D] The work proposed by B. Dhivyabharathi et.al. [4] titled." Actual Bus Arrival Time Prediction-System under Indian Traffic Condition". The recent study proposed a model based prediction algorithm that used particle filtering technique, whose inputs are obtained by k-NN algorithm, to predict bus travel times and schedule under different traffic conditions that exist in India. The results received were compared with the existing spatially discretized model based approach and actual travel time getting from the GPS fitted buses. Also the developed model was capable to analyze the high variability condition of Indian traffic. Hence, it can be concluded that developed model can be viable one to implement for prediction of arrival times under highly variable heterogeneous traffic condition. The estimation accuracy is found to be better than the existing method with MAPE values around 17% with the accuracy of +/- 2 minutes.

E] The work proposed by Santa Maiti, et.al. [5] titled." Historical Data based Real Time Prediction of Vehicle Arrival Time". In this paper we have addressed industry transportation related vehicle arrival time prediction problem, specially applicable for developing countries where availability of adequate and accurate data is a big challenge To predict bus arrival time, we have proposed a simple, lightweight historical data based model. Analyzing the performed result we realize that the historical data based model retains prediction accuracy in limited dataset by considering both location and time component. The developing model, location component captures location wise vehicle speed which includes road condition, dwell time and time component captures time wise vehicle speed which includes traffic congestion The present model is capable to predict arrival time of a vehicle in a stop when arrival time of the vehicle in previous stop is givenThe proposed models also require longer training time to enhance the prediction accuracy.Though the experimental result is quite promising, we need to consider a longer range of data (throughout a year) to examine the performance of the proposed model over weather change.

F] The work proposed by Wenping Liu, et.al. [6] titled." WiLocator: WiFi-sensing based Real-time Bus Live Tracking and Arrival Time Prediction in Metro Environments".We design a scheme to leverage the mobility constraint of a bus, and the travel-time consistency of buses on the same road segment. We instantly track a bus by using the scanned WiFi information available for bus riders WiLocator is by no means exclusive; it can seemly integrate with GPS or Cell-ID based location systems. For instance, when a smartphone scans no WiFi information for a while, the GPS-module is activated so that the system can adaptively work from WiFi-coverage areas to GPS viable environments.In addition to the applications for

bus arrival-time prediction and traffic map generation, we also envision that the proposed SVD has the potential for facilitating navigation in metro environments where an inaccurate positioning of the vehicle might lead to a wrong turn instruction.

G] The work proposed by Mathieu Sinn, et.al. [7] titled. " Predicting arrival times of buses using real-time GPS measurements".This paper demonstrate the strong performance of Kernel Regression algorithms for the prediction of bus arrival times, which clearly outperform Linear Regression or K-Nearest Neighbor approaches. this is the first paper studying the choice of interpolation points to reduce the size of historical data sets, and predictions based on real-time updates at irregularly spaced locations. In our future work, we plan to investigate further strategies to reduce the computational burden, both in terms of memory and computational time. Note that computing Kernel Regression predictions requires linear time in the size of the training set. Hence, we plan to study how training data can be efficiently compressed to find a good trade-off between computation time and accuracy of the predictions. Further questions are how to assess the uncertainty of the arrival time predictions (e.g., by computing confidence intervals), and how to integrate additional regression variables.

H] The work proposed by Sharad S, et.al. [8] titled. " The Smart Bus for a Smart City - A real-time implementation"a prototype to make buses communicate to the commuters in a Smart City ecosystem has been proposed and developed. This system uses Internet of Things to build the ecosystem to connect the bus to the Internet and thus, to the commuter and transport managers. With Artificial Neural Networks and Statistical Modeling techniques, algorithms and models are built from historical data to predict the ETA efficiently.limitation of their system is that the buses are not connected to each other since they can't show the live tarffic update.For achieving the better result of their system they need to make an androide application to provide the real time schedule of the buses.

Figure 1: Working structure of system

I] The work proposed by Pengfei Zhou, et.al. [9] titled. " How Long to Wait? Predicting Bus Arrival Time With Mobile Phone Based Participatory Sensing ". In this paper, we present a crowd-participated bus arrivaltime prediction system. Primarily relying on inexpensiveand widely available cellular signals, the proposed sys-tem provides cost-efficient solutions to the problem. Wecomprehensively evaluate the system through an Androidprototype system. Over a 7-week experiment period, theevaluation results demonstrate that our system can accu-rately predict the bus arrival time. Being independent ofany support from transit agencies and location services, theproposed scheme provides a flexible framework for par-ticipatory contribution of the community. Limitation is the number of sharing passengers affects the accuracy of predicting time in our system.

J] The work proposed by Ta-Sheng Kuan et.al. [10] titled. " A Highly Efficient Method of Mobile Positioning Based on Commercial Vehicle Operation Data "A highly efficient method which deals with mobile positioning of vehicles is proposed to gather and analyze the cellular-network signals of CVO data. The proposed includes design of parallel computing and cloud computing techniques for mobile positioning method to quickly determine the location of an OBU for CVO. A case study determined that the general

location errors using the proposed method and the traditional cell-ID-based method were 163.7 m and 521.2 m, respectively. The signals of neighboring cells can be analyzed simultaneously to improve mobile positioning.

III. Limitation Of Existing System

As per the survey carried out the information uses the latitude and longitude parameters of the GPS to obtain the bus location, they involve the installation of several modules in the buses[1,2] which leads to a complex and expensive implementation. Prediction of bus arrival time is achieved by several algorithms such as kNN algorithm [4], kernel regression[7],linear regression[8].They have used historical data which is obtained by machine learning algorithm to predict the vehicle arrival time and location accurately. But this historical data based model retains prediction accuracy for limited dataset which considers the location and time component[5][3].In some of the system they have used Artificial Neural Network & Statistical Modeling technique in which buses are not connected to each other due to which it does not provide us with live traffic update. Some system which involves crowd participation [9] provides us with flexible framework to community ,but the number of sharing passengers increases will affect the accuracy in the system.

IV. Proposed System

The limitations that includes unexpected bus arrival time, unknown info about the breakdown has given us the intuition for developing the reliable system that will inform the passengers about the arrival time of their destination bus. By using the Geo-fence in system which determines the nearby-location of the bus so that the passenger do not need to wait an undetermined amount of time at possibly unpleasant or unsafe bus stop. Passenger can easily get the arrival information remotely on sending a SMS to the server or the forecasting system. System will respond the estimation of bus live schedule or failure or breakdown along with location to passenger in SMS .In our propound system we present effective way of predicting bus schedule based on user location using GPS technology. The architecture diagram fig:4.1 contain five modules having individually significant role in the efficient working of the system The propound system eliminate overhead problem along with providing platform operator to monitor ,bus status and update latest information to the user. we have establish how lofty data such as route, stops, transmit schedule and blooming factors (traffic, breakdown, bad weather) can be determine spontaneously from simple GPS traces. Using Geofencing technology , defines a virtual boundary around a real-world geographical area. Geofencing allows automatic notification to be generated based on the defined coordinates of a geographic area. Passenger can determine exactly when to leave the home or the office and eliminating their waiting time.

The methodologies or functionalities if the modules in the system architecture diagram are as fallows:

a. **Android app:** This component of the system which enable the user and driver to set their location ,identity and the routes they are travelling on. Driver app will update the regular data on the server and in turn the user also. At the same time user finds all the available bus on his desired route at his convenient schedule via the same app itself.
b. **Admin portal :-** Access to the database of the system to make any required changes for the live time update and route of the buses as per the information provided by the driver and send the appropriate information to the user app.
c. **Web server** :- It accepts all the requests from both ends i.e. user and driver app. It in turn provide response to the user and driver app as per the instruction provided by the admin portal. Admin portal
d. **Database** :-Initially it store static time table of the buses running on the respective routes. Also store android's app data.

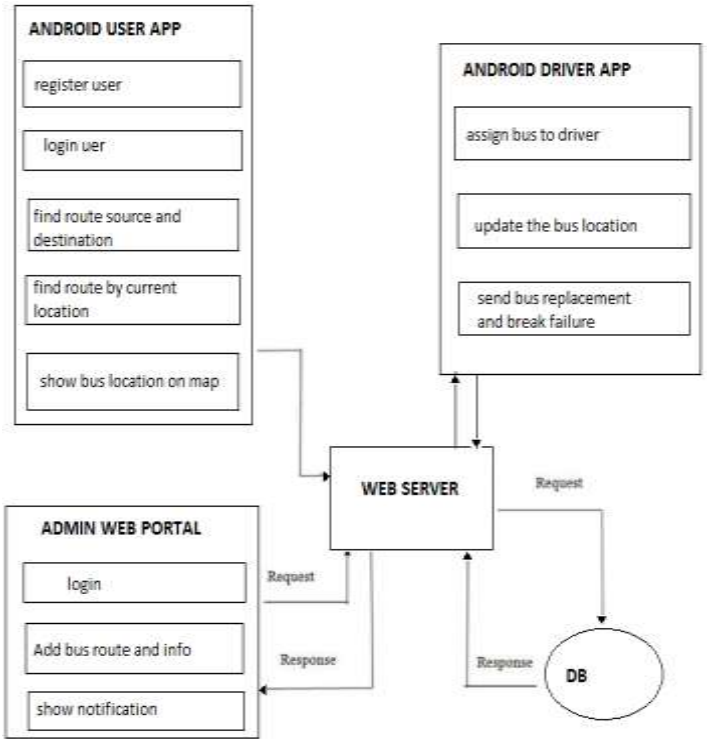

Figure 2: Architecture diagram of system

V. Conclusion

We are developing an android application for the passengers as well as for the bus driver. The system dynamically create geofence which notifies the passengers about live location of bus. This system is self-calibrating and functions everywhere and doesn't require any lab or manmade environment. Having a GPS is truly an advantage you can determine your location.

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