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Nifty system for tracking bus and seat availability

M.K.Dharani
Assistant Professor
Department of CSE
Kongu Engineering College
Erode-638 052
dharani.cse@kongu.edu

M.Priadarsini
Assistant Professor
Department of CSE
Kongu Engineering College
Erode-638 052
priadarsini.cse@kongu.edu

K.Tamilselvi
Assistant Professor
Department of CSE
Kongu Engineering College
Erode-638 052
tamilselvik.cse@kongu.edu

***Abstract*— Contemporary approaches available to find the bus location does not predict the seat availability in bus when it reaches the boarding point. In the busy world, waiting for a public transport without awareness of either seat availability, or current location of bus are annoying for any common man. A person waiting for bus wants to know the current location of the next available bus and also the available capacity to travel. It is useless to wait for a bus without knowledge of current available capacity of bus. The proposed system will provide the current location of bus and the available seats when it reaches the person's terminal. This system can motivate passengers to travel in bus rather than spending for autos or taxis. Data from Automatic Ticket Vending Machine (ATVM) will be sent to database through GSM. Using that data, vacancy details shall be updated. This android system would help the passengers to have a satisfactory travel by catching the right bus at the right time with less effort.**

Keywords:Bus, Tracking system, ATVM, GSM, GPS, Android Application

I. INTRODUCTION

Public transports like buses are amply important for a common man. Population growth has caused the adequate need for regular and appropriate transport facilities. A person waiting for bus wishes to know basic information of arriving bus such as the current location of bus and the number of seats available. Deficit knowledge of such information causes mental stress for the passengers. If such information is gained then the person can decide whether to wait for the bus or to take up an alternative choice to reach the destination. A system that supports these needs is essential. The rapid growing population has created the enormous need for transport facilities and a suitable application to manage them.

Android applications are becoming popular in a common man's life. The chief reason behind that is most of the applications are open source and they are used in day-to-day life. GPS is predominantly used to track vehicles. Smartphones own GPS facility to provide the current user location which is widely used for finding routes to a destination. This GPS facility can be used to provide the current location of incoming buses for a destination.

This system uses GPS from mobile phones to keep track of buses nearing the boarding point and provide necessary information for the passengers waiting for bus. This application can be used by the bus conductor to update the number of seats available and by the passengers to find the bus location & vacant seats.

At specific pickup point the application sends current location of bus to the server, then server stores the current location. First module includes finding a nearest bus stop. For this, current location of the user was taken and compare it to the list of bus stops stored in the database and displays the nearest bus stop in the Google map. Second module includes displaying the exact time and distance to the location. Third module includes finding the vacancy of seats. When the user is at some point between the source and destination he can know the list of arrival buses to that point and the vacancy of seats available in the buses. Android and java platforms are used to develop the application using Android Studio.

II. LITERATURE REVIEW

San Joaquin Proposed a system called One Bus Away Transportation. This application serves the user by updating the arriving time of the bus at the server end by obtaining the periodical updation from the bus. The user can be able to find the nearby stops on a map, choose and set reminders for frequently used trips. Even though this application is very user friendly, it has some problems with arrival time of the bus because the updated time may vary with the real-time arrival information.

In order to obtain the current location of the bus a web application has been developed The web application provides information about bus like location of bus, which is obtained by fetching the co-ordinates through android GPS. The user, driver and bus database is stored in the database and maintained.

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The major problem in bus tracking system is to obtain the dynamic location using the dynamic data. The android application in the buses using the GPS finds the current location. The web application provides information about the bus which is obtained by fetching the co-ordinates through GPS

Smart Tracking System is an Android based application for traveller to obtain the geo-location and tag it with multimedia features. It allows users to create, store and view their Vehicles, Vehicle related information and all the memories that bring with it. Vehicle Tracker Combines places visited, notes taken and the images captured, and display all this information on a map at the exact location where it all took place.

Ambhore suggests that it is difficult for a new person to determine which bus is coming to the bus terminal. So the bus notification system was designed to determine the buses which are coming at the bus terminal and also give the information about the route through which they are going using the Bluetooth device in the bus end and the passenger end. This device gives the updates only within 100 meters which was the main drawback of the system.

The proposed system overcomes above drawbacks. The basic information about android is discussed in section 3-Preleiminaries. Section 4 discusses the proposed work. A sample case study is discussed in section 5 and implementation details are provided in section 6.Finally, section 7 discusses the conclusion and future work.

III. PRELIMINARIES

Before you begin to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

A. Android

Android is a free, open-source operating system for mobile devices. It is an open-sourcedevelopment platform for creating mobile applications. Devices, particularly mobile phones, runthe Android operating system and the applications are created for it.[]

More specifically, Android is made up of several necessary and dependent parts, including the following:

- Linux operating system kernel that provides low-level interface with the hardware,memory management, and process control.
- Open-source libraries for application development, including SQLite, Web Kit, OpenGL, and a media manager.
- Software development kit used to create applications, including tools, plug-ins, and documentation.
- An application framework that agnostically exposes system services to the applicationlayer, including the window manager and location manager, content providers, telephony, and

B. Proposed Work

Automatic Ticket Vending Machine with GSM and GPS facilities shall be used to provide tickets for the passengers. While tickets are being issued, the number of tickets for a particular destination will be updated and sent to server via

Fig. 1. Work flow

GSM communication facility.Algorithm1 and Algorithm 2 are used to find the vacancy of seats in bus for a destination. People waiting for bus can find the number of seats available in bus when it reaches the boarding point before the bus reaches the boarding point using this system.

A database is maintained in the server for maintaining the route, available buses and the number of free seats for each destination. Table 1. Shows a sample of vacancy table. It maintains the alight Count(Number of passengers getting off the bus at that point) for each source and destination with the rid (route id) to reach that destination. A sample of routes table is shown in Table 2. Routes table is used to get the next route to visit to reach the destination.

TABLE I. VACANCY

bid	source	destination	alightCount	rid	places toVisit
B1	Cbe	Salem	5	1	3
B1	Cbe	Perumanallur	3	1	0
B1	Cbe	Bhavani	3	1	2
B1	Cbe	Avinasi	5	1	1

TABLE II. ROUTES

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Rid	Count	nextRoute
1	1	Perumanallur
1	2	Avinasi
1	3	Bhavani
1	4	Salem

Algorithm1: VacancyFinder
Input :busId, src, destn,cnt
Output : current Vacancy
Vacancy=cnt+
AlightVacancy(busId,src,destn)

Algorithm for getting alight vacancy
Algorithm 2 :alightVacancy
Input :busId, src, destn
Output: vacancy
Get placesToVisit,alightCount,rid from vacancy where Bid=busId,Source=src&Destination=dst
If placestoVisit==0
Return alightCount
Get nextRoute from route where rid=rid and count= placesToVisit
Vacancy=
alightCount+alightVacancy(Bid,src,nextRoute)
Return Vacancy

Algorithm 1 is used to find the count of free seats when bus_Id, source, destination and the number of current vacant seats are given as input. Algorithm 2 calculates the count of passengers getting off the bus when they reach their destination which is present in the current route of bus travel. Before the passengers get off, based on the source and destination stored when issuing tickets, the vacancy can be predicted which will be displayed to the end user. So, before the bus actually reaches the destination, the seats availability can be predicted using the proposed system. Christo Ananth et al. [9] discussed about a method, Optimality results are presented for an end-to-end inference approach to correct(i.e., diagnose and repair) probabilistic network faults at minimum expected cost. One motivating application of using this end-to-end inference approach is an externally managed overlay network, where we cannot directly access and monitor nodes that are independently operated by different administrative domains, but instead we must infer failures via end to-end measurements.

The count of places to be visited, alight count and route id are obtained from the vacancy table that matches the bus id , source an destination obtained. If there are no places to visit in the route, it implies that destination is closer. So the alightcount retrieved from database will be returned.

Based on the count of places to visit, the nearest route to the destination is obtained as the next route. The vacancy when the bus reaches destination is added with the nextroute vacancy recursively.

C. Case study

Consider a user wish to travel from Bhavani to Salem. Table 1 and Table 2 contain sample information. The user's boarding point is tracked using GPS in mobile phone. The user shall enter the destination as Salem.

All the available buses from database will be displayed with available seats and time it reaches the boarding point.

Algorithm1 will be called which takes source, destination, current vacancy in bus and bus id as input. So B1 is the busid, cbe is the source(of bus where it started), bhavani is the destination(boarding point) and current vacancy is 3.

AlightVacancy() is called in algorithm1 where B1, cbe and bhavani are sent as arguments.Now, placesToVisit,alightCount and rid are obtained from vacancy table whose values are 2,3 and 1.Based on these values next route is obtained from route table whose value isAvinasi. Then, seats availability at Avinasi is obtained by calling alightvacancy(B1,cbe,Avinasi) and added to 3(i.e. 3+alightvacancy(B1,cbe,Avinasi)).

Similarly,alightvacancy(B1,cbe,Avinasi)=5+alightvacancy(B1,cbe,Perumanallur) whose value is 3.

So alightvacancy(B1,cbe,Avinasi)=5+3=8

alightvacancy(B1,cbe,Bhavani)=3+8=11

Finally, vacancyFinder(B1,cbe,Bhavani)=3+11=14

The predicted value for available seats at Bhavani is 14.As the bus gets closer to the boarding point, the available seats can be predicted more accurately.

IV. IMPLEMENTATION

A. Conductor's view

Conductor will enter the number of seats and then the destination point while issuing the tickets. This data in the ATVM will be sent to the server using the GSM service.

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Fig. 2.ATVM

B. *Public view*

The end user location is sensed using GPS and the nearest bus stop is considered as the boarding point of the user. The user have to enter their destination point so that by using the GSM communication server and the boarding point the list of available will be displayed in the order of first come. The nearest boarding point can be found using Boarding point service as shown in Fig. 3.

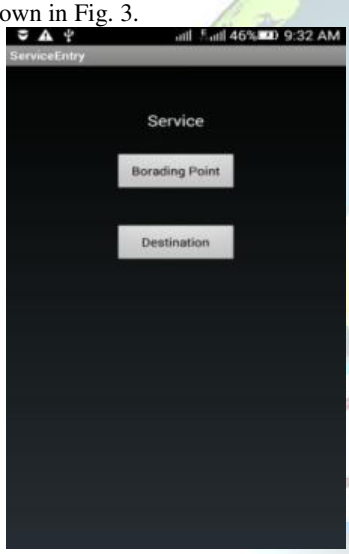

Fig. 3. Services Provided

Fig. 4. Buses available at boarding point with available seats and arrival time

Fig. 5. Location of bus arriving in map

The user can select the bus to view the location of bus in google maps as shown in Fig. 5.

V. CONCLUSION

This project helps the user to find the nearest boarding point, buses available with seat capacity and arriving time to boarding point. The device uses in-built GPS for processing the operation which reduces the cost. The nearest boarding point is displayed in the Google map which helps the user to find the route between current location and the destination.

This system has many advantages such as large capability, wide areas range, low operation costs, effective and strong expandability and easy to use in finding nearest boarding point. This system can further be upgraded by providing booking facility on the fly.

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