Bus Travel Guide Using GPS

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Abstract - Majority of the people depend upon public transportation system across the world. The main problem regarding with this is not knowing the actual schedule and wasting the time or often there are chances of missing the bus. The paper put forward a system that tracks and updates the position of the buses regularly using GPS & Google map. Then it sends the information to the user via 'MyBus' application. The above process is carried out using a unique identification code provided to each bus conductors. When the bus starts the trip, conductor logs in to the 'MyBusDrive'. As the bus moves, the location gets updated on the web server. The system also searches for the nearest bus stop and provides the bus schedule. It responds to most of the user requests within 3 seconds of the request. The use of GPS and Google map provides an accuracy of about 93% to 95%.

Keywords: *GPS, Google map, Mobile application.*

I. Introduction

Having hundreds of vehicles in a public transportation system employ numerous resources to keep them functional and efficiently serving the public's needs. However, the efforts of these entities are thwarted by inappropriate trip scheduling, which is issued in a like manner if necessary. This efficient method of message passing is ideal for optimal scheduling of buses, as drivers may be issued updated schedules, informed of anomalies and presented with a view of the wider network with reference to their location and points of interest. The main goal of this work is to improve the bus system by adding the necessary additional features into the application, like accurate bus timings, correct bus numbers and moreover adding a GPS tracker into it. This study accepts input in the form of a selection of the source and destination and selection of the bus traveling the distance to display the entire details about the routes and also track the location of the respective bus and give the map for the same.

There are buses made available for passengers traveling 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. This system proposes an efficient public transportation system. It effectively monitors public transport buses and also provides the current status and details of buses to the public. The location of the bus is determined by using GPS and then the information is transmitted. The transmission can be terrestrial radio or cellular connection satellite from the bus to a radio receiver, satellite or nearby cell tower. Once the location data along with other custom data is collected a wireless communication system is used for transmission purpose.

II. Previous Work

Suleyman Eken, Ahmet Sayar[2] A smart bus tracking system that any passenger with a smartphone or mobile device with the QR (Quick Response) code reader can scan QR codes placed at bus stops to view estimated bus arrival times, buses current locations, and bus routes on a map. Anyone can access these maps and have the option to sign up to receive free alerts about expected bus arrival times for the interested buses and related routes via SMS and e-mails. The C4.5 (a statistical classifier) algorithm for the estimation of bus arrival times to minimize the passengers waiting time. GPS (Global Positioning System) and Google Maps are used for navigation and display services, respectively.

Paul Hamilton, Suresh Sankarananrayanan[3] The mobile bus tracking system for the Jamaican Urban Transport Corporation as a case study has been proposed to enables commuters towards tracking the bus of their choice and also knowing their expected arrival times. In addition to tracking, the proposed system also notifies the passengers on their mobile towards topping up of credit in their RFID enabled smart tickets for traveling in a bus. The proposed system allows commuters towards tracking of buses and knowing the expected arrival time. In addition, the commuter has been reminded of their Android mobile handset towards topping their credit on their ticket towards traveling. The above two solutions would alleviate the challenges faced by commuters in respect of referring to the static bus timetable or looking into LCD display screen which would inform the expected arrival time of the next bus. The implementation of the system has been carried out using an Android emulator.

Shraddha Shah, Bharti Singh[4] The RFID Based School Bus Tracking and Security System recommends an

SMS based solution which assists parents to track their children location in real time. To track the location GPS module is used and to identify the identity of the child an RFID card is used which is inbuilt in the system. Whenever a child boards a bus, the RFID tag located in his identity card will be detected by the reader present in the bus and the system will identify the child and will send a text message to the parents consisting the current location and time. In this way, the parents will be able to keep a record of their kid's. The paper also proposes a security system such as drunk and drive prevention system and speed control mechanism.

Hu Niu, Wei Guan and Jihui Ma[5] The Beijing Bus Monitoring System (BJ-BMS) based on GPS can tell the exact location, speed, alarm condition and information of the overall distribution of the buses which were equipped with the GPS terminals. The BJ-BMS is composed of GPS satellite positioning system and ground moving control system. And the ground moving control system can be divided as on-board GPS terminals, GPRS mobile communication network, transmission center server, client background program and GIS interface. It chooses the GPRS network for its superiority in transmitting speed, it's forever on-line character and most importantly its reasonable cost. The system software platform is composed of two subsystems, GIS subsystem and communication control subsystem.

III. Proposed System

This system proposes an efficient public transportation system. The system effectively monitors public transport buses and it also provides the current status and details of buses to the public. The use of GPS and Google map will increase the accuracy. The bus tracking system must respond to 99 % of user requests within 3 seconds of the request. The proposed system has 3 modules:

- Bus module
- The central control unit (admin module)
- Client-side application (User module)

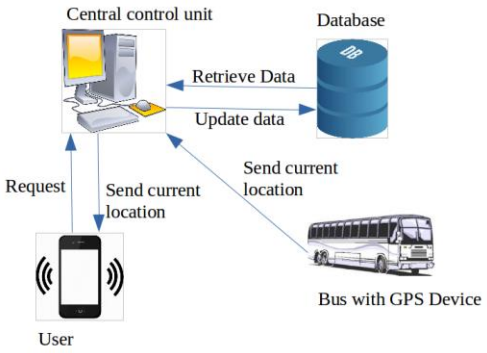

Fig 1 Architecture of system

A. Architecture

Bus module: The bus is tracked by installing a special device or GPS transceivers in the bus. GPS works in any weather conditions, anywhere in the world, 24 hours a day. To use GPS there are no subscription fees or setup charges. To calculate the position GPS receiver is capable of receiving signals from at least three satellites. This device receives the GPS data and sends the data at regular intervals to the server. Now the device is capable of receiving the latitude and longitude values of the location of the bus. At any point in time the

GPS receiver gives the location values. Now the bus unit has the coordinates with a timestamp which is then compared with the previous coordinates and if there is any different then the coordinates are updated and sent to the server over GPRS network (internet). The bus number is used to identify each bus uniquely. Each bus has its own GPS device with a unique bus number. The server is the most important module in this system which acts as a central repository of the system. In this system, the whole information is stored and maintained by the server. The server is the intermediate between the bus module and the user module. This database consists of real-time information about the bus. It includes bus routes, actual arrival/departure time and real-time location of the bus. The server provides service to the user module by providing required information to it.

The Bus Conductor login the application with valid credentials. The second screen will validate the bus details and if all the details are valid then the conductor can log in to the application. Whenever the login is success application sending its latitude and longitude to the web server and Location will be updated in each second of time. The conductor can leave the application and do other jobs but still the application sending the location to the server until the user stops the application or log out the application. The status of the bus set as online when the conductor logged in to the application. And the status set as offline when the conductor logs out from the application.

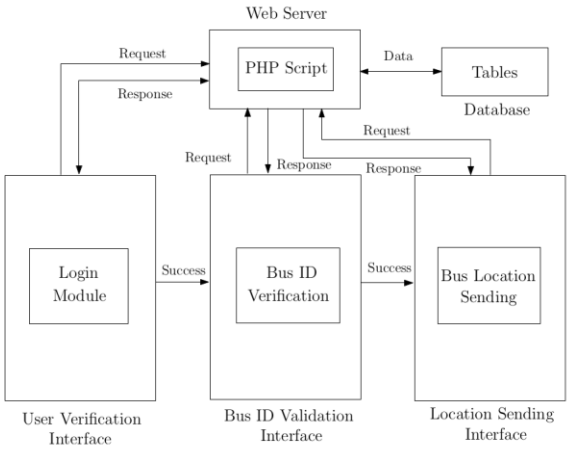

Fig. 2. MyBusDrive Program Flow.

Conductor still always login state until he logs out from the application.

Central control unit: The central control unit is nothing but admin module whose task is to upload all static information about bus i.e. to add stops, add routes etc to the database. User module The user side module is nothing but an interactive web-based application which services the various function of the system to remote users.

*User module:*The user side module takes an input of current location which indicates where the remote user is now. When the user sends a request the application fires a query to the server for accessing the information stored in the server database and gives the list of available buses. Users choose a particular bus number to know the real-time location of the bus or other information. After selecting a particular bus number the application shows the real-time location of that bus on Google map. This application gives support and interacts with various clients to provide service to user's requests. The system facilitates the real-time tracking of the bus.

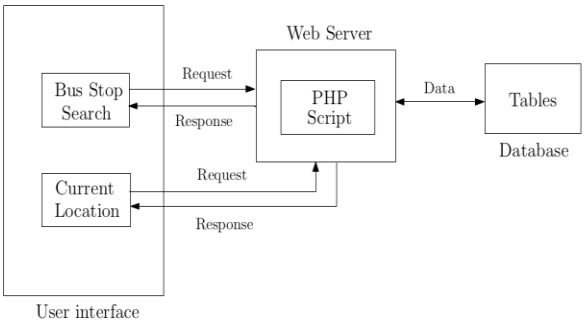

Fig. 3. MyBus Program Flow.

The user interface of MyBus Application contains a bus stop search area and the user can search bus stop name. Bus stop search module request to the web server for establishing the connection to the database. PHP script in the web server fetch the bus details, sort by the arrival time and sending to the application. The user can select the bus from the list of buses and this leads the user to the Google Map interface. It shows the exact position of the bus and distance and duration to reach the bus stop.

B. Experimental Settings

*Hardware:*The system is operated by GPS which is attached to the bus. Firstly GPS receives the satellite signals and then the position coordinates with latitude and longitude are determined by it. The location is determined with the help of GPS and transmission mechanism. After receiving the data the tracking data can be transmitted using any wireless communications systems. This device receives the GPS data and sends the data at regular intervals to the server. The server is the most important module in this system which acts as a central repository of the system. In this system, the whole information is stored and maintained by the server.

*Software:*The user side module and admin module is implemented using Android studio and MYSQL database for storing the necessary details.

C. Output

The output of the system includes Bus name, Arrival time, Expected time and the route of the bus. Upon clicking bus name, Google map shows the route connecting the current location of the user and the bus and also provides the distance and duration between the two.

IV. Conclusion

The system reduces the waiting time for remote users of the bus. The system tracks the bus at any location at any time. All the current information is stored to the server and it is retrieved to remote users via a web-based application. This system is more user-friendly to get information visually shown on Google Map. The user can freely get this web-based application for real-time tracking of the bus which provides interactive interface environment. So by using this application remote user can just wait or they may reschedule their journey according to the availability of bus. So this paper presents a system which provides high practical value in the modern fast era. The system has high practical value and cost efficient

V. Future Scope

This system has a great future scope. A web-based application which can be further modified using the cloud. It could be implemented into the existing State transport system which will be very useful to the public. A ticket booking system can also be added to this project. It would be better to incorporate intelligence in the dynamic scheduling of bus based on a request received from passengers using RFID smart card. The payment feature is included in mobile for topping their smart card from mobile.

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