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Suburban Transport Tracking using Geofencing

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***Abstract*: With the ever-growing population, Suburban Transport load and unreliability of transit networks due to delays, it becomes more important to plan travel before starting from home/office. A system to track Suburban Transport systems is proposed, which uses the concept of geofencing to determine the stops on the route the transport vehicle has crossed and calculate delay for the further stops.**

***Keywords*: geofencing, android, transport, tracking, location.**

1. Introduction

A main part of a suburban transport system is the rail network in the city. Majority of the population use trains to travel to various corners of the city. These trains are generally mired with delays due to the complexity of the system. It becomes important to provide the passengers a Currently, the apps available to users only show the static Timetable of the train and some have a chat option to discuss each suburban railway line. [8] The chat in the app is highly inefficient to know the status as it has more questions than answers to delays and timings. The Indian Railways currently tracks the Mail/Express Trains running all over India in Semi- Real-time with delayed accuracy [7]. The Objective is to design a dynamic user driven platform that serves to identify the next Suburban train a user can catch to reach the desired destination. This Application uses concepts of geo-fencing and android activities to monitor the location of a train and display it to the user. It also uses the concept of customer Data aggregation to drive the system of Train tracking by asking the user to turn on GPS tracking when they enter a train so that others can see track the train.

2. Literature survey

As referred from A GPS-GSM Predicated Vehicle Tracking System, Monitored in A Mobile App based on Google Maps paper, it states. A vehicle tracking system is the solution to the number of questions user has in his mind. Say, the user forgets the parking position of his vehicle in a mall or say the vehicle is lost. The GPS module which consists of the GPS Antenna generates the coordinates on the request of the user. The data (coordinates) is then passed on to the user with the help of GSM modem. Finally, the vehicle is located on the map (pointed by a marker) using the coordinates (longitude and latitude) sent to the users' mobile from the GSM modem via an SMS. The vehicle tracking system consists of a GPS antenna that generates the coordinates, a GSM modem for receiving requests from the user and sending the coordinates (viz. latitude and longitude) of the vehicle generated by the GPS antenna via SMS, an Atmega microcontroller as an interface and a mobile application based on google maps to point out the location of the vehicle. In our proposed system, we use android devices instead of GPS module in the vehicle.

3. Proposed system

The existing system for commuters is looking at static timetables of services and waiting for the next service they can catch. This does not allow them to plan ahead in case of delays. The Proposed system is to design a dynamic user driven platform that serves to identify the transport service a user can catch to reach the desired destination. Also, the user can help others at the next stations by Turning on tracking for the service they are in. This Application uses concepts of geo-fencing and android activities to monitor the location of a train and display insights from the data to other users. The user will enter the app and select a source and destination for the commute and the next incoming service in real-time is shown to him. When they decide to board the service, they select which one they are entering, and we use that to show other users dynamic data for the trains.

There are two android applications, both serve different purposes:

- *Android phones in the suburban transport vehicle:* For example, if we want to track a local train and give real time updates to other users, the user selects the train he is travelling in and starts tracking. This tracking uses android location functionality and gets the latitude and longitude, and the accuracy of the phone location. This data is then sent to a server using RESTful API which then processes the location by checking if the location is inside one of the predefined geofences along the route of the train. [9]. If a user is detected to be inside a geofence an event is triggered with the geofence and the unique ID of the train.
- *Processing server:* The events generated are then retrieved from the geofencing server using RESTful API and the data is processed to find the latest event i.e. Geofence the train has crossed, and store it in a real-time database like Google Firebase [10].
- *Android phones with the user:* The user (commuters) that use the services daily can open the app and select

the stop they are at, and the application populates a list with next scheduled services they can board with the real-time delay from scheduled time from the firebase server.

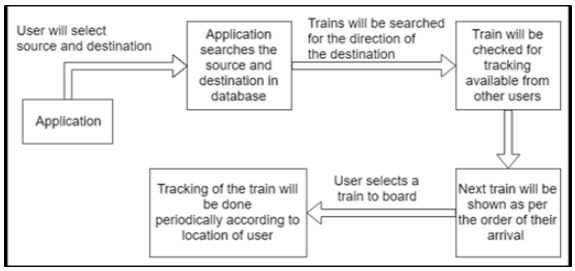

Fig. 1. Architecture of the system

4. Data flow diagram

A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated.

Fig. 2. DFD level 0

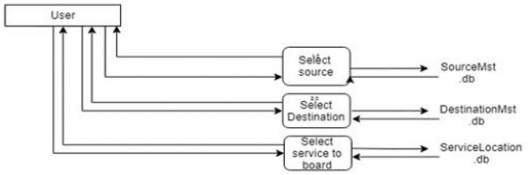

Fig. 3. DFD level 1

5. Conclusion

We have proposed a Tracking system for suburban local transport which can be scaled across services which have predetermined stops. As mobile phones get cheaper and more widely available, these apps could be installed on the driver's phones, and the extensive data connection networks can help the system to be used widely.

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