Real Time GPS Tracking System for Transport Operations

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Abstract — It is a Dynamic GPS based auto-fare calculator made for India. This application helps in bringing fairness to Indian Auto rickshaw industry. This application enables the user to be in more control of his travel, check where exactly he is being driven to and checking the fare and the distance. It acts as a guard against faulty meters and is an application so simple which anyone can use easily. The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit. GPS works in any weather condition, anywhere in the world, 24 hours a day. Due to rapid advancement in the mobile computing field, the use of Mobile application is dramatically increasing. Thus, this project deal with finding the optimal paths and calculating the fare of Rented Vehicle by using Android SDK (Software Development Kit) and GPS (Global Positioning System) system.

Keywords: Dynamic GPS, Global Positioning system, Computing, Android SDK (Software Development Kit)

I. INTRODUCTION

Due to rapid advancement in the mobile computing field, the use of Mobile application is dramatically increasing. Thus, this project deal with the finding the optimal paths and calculating the fare of Rented Vehicle by using Android SDK (Software Development Kit) and GPS (Global Positioning System) system. Current Fare Calculator Systems are not real time and give the fare calculation, based on traditional formula. Also system does not determine the optimal paths. Thus, if customer has any complaint, then there is no immediate way to lodge a complaint against the driver. Our end project will help to overcome all these problems. The system does the extensive use of available Maps and libraries to calculate the Approximate Fare and Time to travel the distance. Based on the users choice the system track the users path throughout the journey. If the driver deviates from the optimal path the system will alert the user, then user will check whether the divergence is correct or not. If so user will continue with the new path. If path is not deviated, then after reaching to the destination the system will calculate the fare for the whole journey. At this time system will consider multiple factors such as type of the vehicle hired, the time duration, what time of the day, and total travelled distance. Based on all these factors, the system will calculate the Fare for the Journey.

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II. SYSTEM IMPLEMENTATION

A. about android SDK

The Android Software Development Kit, which is provided by Google and allows developers to use important Google resources such as the Android code library, GPS system, Google map, media, database, and user interface components. Specially, Android SDK provides the Location Manager class (included in android location library) which provide functionality to manipulate the GPS data.

B. About GPS (Global Positioning System)

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit. GPS works in any weather conditions, anywhere in the world, 24 hours a day. GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time, that a signal was transmitted by a satellite, with the time it was received.

C. Mathematical model

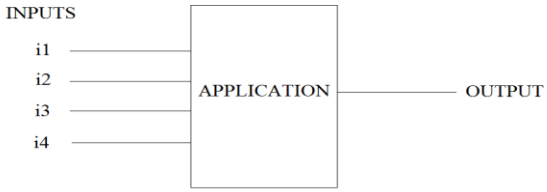

Fig 1: Mathematical Model

i1=automatically generated source location from GPS.
i2= destination location given by user
i3= rate per km as per city
i4= time

Fare = Distance * Rate

Where, distance is in km,
Rate and Fare in Rupees.

Spherical law cosines formula for calculating distance between two GPS co–ordinates:-

d=acos(sin(lat1)*sin(lat2)+cos(lat1)*cos(lat2)*cos (long2-long1))*R

Where,

Lat1 is latitude of source,
Lat2 is latitude of destination,

Long1 is longitude of source,
Long2 is longitude of destination,
R is 6371 (km radius of earth) and
d is the distance between source and destination.

D. System Architecture

The system architecture provides better understanding of the system in a detailed form as shown in fig 2.

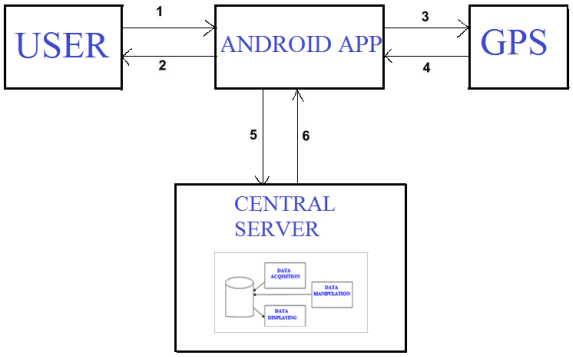

Fig 2 : System architecture

The flow of diagram is as shown below:

1 provides destination address
2 provides calculated fare
3 Request user location
4 Provides location
5 Request fare rate
6 Provides fare rate

The flow of a system is a described in the following way: User provides destination address to Android application. Android application requests for user location using GPS. GPS tracker tracks the current location & position of user. The navigation system helps the GPS tracker in locating the position of the user. Thus by tracking the current location and postion of user it provides this information to the android application. Android application checks the information provided by the GPS tracker and accepts it. Google maps provide a great source of help in obtaining the current address of the user . Android application then makes a request to the central server for appropriate fare results. Central server comprises of, data acquisation, data manipulation and data displaying. The central server or data base consists of prepared fare charts of different cities. Data base does the manipulation and acquisation of data and stores it efficiently. The central server stores the prepared Fare chart of different cities as These fare charts are can be added i.e. if someone enters in a new city he /she can add the fare chart of that city.In our project we have focussed on the major cities i.e. Pune, Delhi, Mumbai. The data base calculates the required fare for that particular state and provides exact fare rate to the android application. Android application accepts the fare rate and provide the exact fare rate to the user.

III. SYSTEM PLAN

This project calculates optimal path from source to destination and the Fare for the Rented Vehicle by considering the different parameters such as type of vehicle, the route traveled and total time for the journey. Our proposing system consists of six states: [1]System Initialization: System gets initialized and detects the current position of the mobile handset of user. As soon as it gets initiated it uses its GPS tracker to determine the current position and location. [2]Optimal Path Tracking: User enters the destination and then the system start determining the optimal paths and sorting by approximate time, distance and fare. The destination is provided by the user and the process of calculation starts itself. [3]Tracking the Path: Once user has selected the path, the system will track the path till user to the destination .If path is deviated from optimal path, then it will alert user reminding about the divergence. [4]Fare calculation: once the destination is reached the exact fare for the journey is calculated based on different parameter stated above.[5]Night fare calculation: The system keeps the track of the day and night charges itself and makes sure that the night charges are accurate according to different plans of night fare in different states.[6]Lodge Complaint: If driver is not agreed with the fare calculated by the system and asking for more Fare, user has the facility to lodge the complaint against the driver. The passenger can fill a small form having the details about him, the driver and his vehicle and the complaint he has against the driver. After filling all these information the user can upload this information to the central database and can send a SMS to higher authorities.[7]Report Generation: Based on the complaint lodged by the passenger the reports are generated and submitted to the higher authorities.

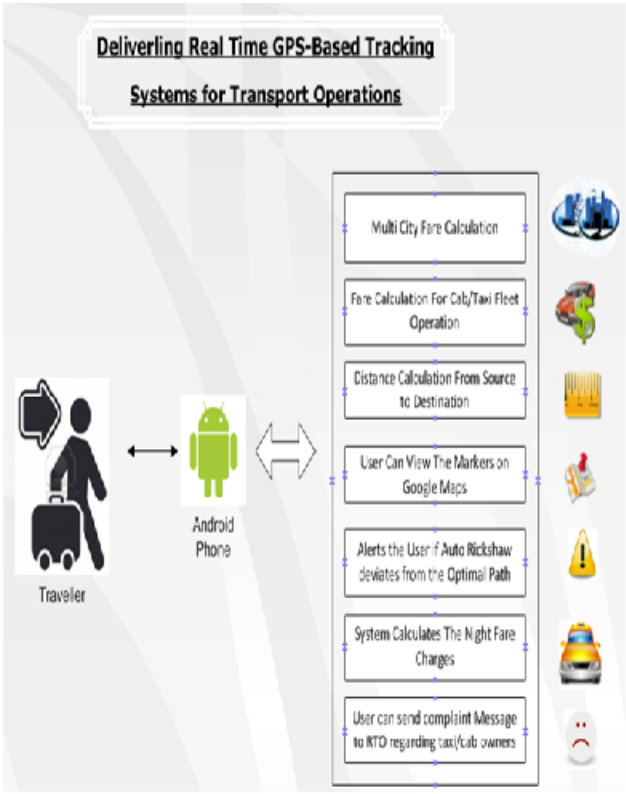

Fig 3: Specified System implementation plan diagram

IV. TECHNICAL SPECIFICTION

A. Advantages

Following are the advantages that make our application the best app:-

[1]System allows user to choose his route for the journey: By entering the source and destination, the system will determine the optimal paths based on approximate travelling time and fare. [2]Once user selects his path, the system will track the path till he/she reaches the destination. If driver deviates from selected path, then the system will alert the user about it. If reason is correct, the user will decide to continue with that

route or user can ask driver to come on the selected path.[3] This application reduces manual efforts of user and provides ease to the user in using this allpication.[4]We can also say this application provides a user friendly approach.[5]This particular application helps the user to get more accurate results. [6]It provides utility for measuring accurate distances.[7]It also provides easy maintenance that helps in managing the application. [8]The central database will contain complaints of users, and it will be used to generate the report of customer complaint. Also police can cross check the driver information by using these reports. The data collected from the users is also helpful to decide the Fare for the Prepaid Taxis/Auto-Rickshaw.[9]It provides a easy database management system.[10]This application is not that expensive so everyone can easily use it.

B. Limitations

Following are the limitations that effect our application: [1]A mobile phone which contains Android operating system. [2]Internet connection for connectivity.

C. Applications

Android market consisted of a few applications based on the same concept that has been used in "Real Time GPS Tracking System" but none of those applications is fully equipped to satisfy customer needs. Our system covers a few of the shortcomings of previous applications based on same concept. The distinct points of our project are as follows:

This system provides user with the optimal path, its distance, fare according to the distance and the city in which the user is travelling. Besides, the above mentioned points in "real time GPS tracking system" alerts the user if the driver is deviating from the optimal path by a limit of 2 Km. Also if the user feels cheated then instead of going through the hectic procedure of going to police station, the user can directly send a report generated automatically by our application.

V. FUTURE SCOPE

The future of global positioning system is bright as predictions range from its increased usage to expansion into new areas of application. Currently this software is only available with the Android enabled phones, Table PC's. The reports generated through the software are important for many government offices. This software can further extended to add real time traffic conditions to calculate the optimal paths, call a taxi/ Rickshaw, Plan a route, Advertisements. It is estimated that there will be 50 million users of global positioning system by 2020 that perform applications in the following fields like ships, aircraft, military systems, farm vehicles, Automobiles etc. positional accuracy and reliable calculations are also predicted in the GPS technology, it is hoped that additional civil frequencies and civil codes will be developed to meet the requirements of civil users .GPS users have also considered the benefits of inter operating the GALILEO and NAVSTAR systems. The advantages of interoperability include improved signal redundancy and more available signals that enable users to access satellites from remote areas.

VI. CONCLUSION

The increase in use of Mobile phones is leading to automation in every field of world. The current system is not available for the mobile phone and not especially for the Indian Roads. The passenger has to pay the bills by the traditional formulas and many time he ended up in paying the more Fare than the expected one. Also we cannot guarantee that he had traveled by the optimal way in order to save his valuable time. Using the Android SDK, Location Manager library, a robust library provides access to the system location services. These services allow applications to obtain periodic updates of the device's geographical location. Using this software, we can find out optimal routes for the journey and tracking of those routes, calculate exact fare calculation, and we can complaint and get the feedback for the same.

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