"REAL TIME BUS TRACKING SYSTEM USING SMARTPHONE"

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ABSTRACT: *In this dynamic life where everyone is in a hurry to reach their destinations, waiting for bus is hectic and even many of us are unaware of the bus timing. To overcome this difficulty, an easy system is proposed in this paper to aid tracking real time bus location. The proposed solution takes advantages of the two main features in mobile platform nowadays which are location services, mainly GPS based and Google map services. Basically there are two sides of application client side and server side. Exact location of bus is tracked using smart phones held by driver as well as conductor in every bus. If clients' device is an android based smart phone, he can install our application to track bus location using internet service. The application is proposed considering a low budget mechanism for real time bus tracking including every possible road.*

***Keywords*:** Android, GPS based location, Google Map, Real time vehicle tracking

1. INTRODUCTION

Today mobile phones are becoming more technologically advanced and offer more features. One of them is the remarkable features and capabilities that new smart phones offer especially Android based smart phones. Android is becoming very popular in embedded market for two mainstream reasons. First, source code is completely free; moreover there are no royalty fees for Java VM (Virtual Machine). Second, Android is highly suitable for expansion as the developer see fit. With that many features, the need for resourceful applications rises. Vehicle tracking systems combine the use of automatic vehicle location in individual vehicles with software that collects these fleet data for a comprehensive picture of vehicle locations. Vehicle information can be viewed on maps via the internet or specialized software. Some related works where formerly done but there is a fact of high cost and there is more complexity. Fetching location using GPS from bus driver and conductor and displaying it directly to user is a solution.

The application is basically designed for local as well as private buses that are used for long distance travelling. Every bus has a driver and conductor (optional) .In today's scenario most of the people use android phones. Hence real time location of bus is calculated from values that are fetched by GPS in smart phones of driver and conductor.

2. LITERATURE SURVEY

A system was developed in [1], using GPS and GSM technologies. The system is micro-controller based that consists of GPS, GSM, Atmega microcontroller MAX 232, 16x2 LCD and software part is used for interfacing all the required modules and a web application is also developed at the client side. The GPS satellite gives the exact position of the device which is situated in the vehicle. This device is in turn which is connected to the local GSM service provider via a GSM network as it has SIM card present in it thus the GPS parameters which the device has are send to the tracking server. There is a fact of high cost as the devices they use are costly and there is more complexity in integration of those devices in a simple box.

A. Al-Mazloum et al. [2] developed an SMS based tracking system for tracking children's location. Parent's phone sends SMS to child's phone requesting a location information. Then child's phone replies with GPS data and after receiving the data, the parent's phone shows the location on map. Although the system was good for SMS based tracking, it does not provide online location tracking system using application software because it did not use any dedicated server. There is a system architecture as in [3], designed based on client-server. In server side, it contains a GPRS, a web and an SMS server along with database to store user details and

data. For client, it is a box that contains a GPS tracker and a GSM modem. When users request location from the web or application after registering and logging into the web server an SMS request will be sent to the GSM modem in client device. It requires internet connectivity on both sides of client and server which is not convenient for some cases where there is no internet connectivity at any of the server or client sides. Additionally, the relationship between the server and client should be controlled by both server and client.

Sonia C.V et al. [4] developed an android application to track mobile phones. It has SMS based location tracking system using GPS data. It did not incorporate online tracking system with which one can find the location without using SMS service. KuanYew Tan, and KokSheik Wong [5] implemented a campus vehicle tracking system with the help of WiFi proximity method and GPS data. They used a web site and web server to upload the information there, and display the tracking information on map. The system is very useful but it demands a working data network for a user to view the map and know bus location. There is no method to get bus location from a data network less device. SJ Lee et al. [6] showed an integrated system with microcontroller and smartphone for continuous tracking of a vehicle. Microcontroller is places on the vehicle of interest and then it sends location data to the server. A user can then find the vehicle location from the server in his smartphone. The system is very efficient and showed a promising outcome. But, as it needs GSM/GPRS module and GPS module along with other hardware for implementing the system, it adds additional cost.

Md. Marufi Rahman et al. [7] demonstrated an Arduino based vehicle tracking system. It needs Arduino, GPS and GSM module to be placed on the vehicle. The latitude longitude data received from the system was used to display location of google map. It does not need internet connection, except for displaying google map. Ulhas Patil et al. [8] discussed a vehicle location detection system that uses some sensors to detect an accident.

When accident occurs, it sends the vehicle location to nearest police station and ambulance service numbers. It uses GPS, GSM module, Renesas microcontroller and RF endcode/decoder. Humaid Alshamsi et al. [9] implemented a real time vehicle tracking system using GSM, GPS with Arduino. Location data are fetched and stored in memory card. To get the vehicle location, on should send an SMS to the GSM module. The system then replies with the latitude and longitude of the vehicle. Dongjiang Li et al. [10] brought a vehicle remote monitoring system based on Android. The system comprises of ARM9 core processor, GPRS module, GPS module and sensors. Data collected by GPS and sensors are uploaded to a server. Android phone connects to the server via internet and fetch information to track the vehicle. [11] Nusrath Jahan, Kamal Hossen and Muhammad Kamrul Hossain Patwary implemented a system where live tracking through GPS is displayed to users by sending text SMS on users mobile phone or it is also shown on app if user has smart phone.

3. SYSTEM DESCRIPTION

The proposed android application consists of two modules. First module will be installed into that android phone which will be in bus. This module will serve as the server module. It will periodically find out the GPS co-ordinates of the bus by using location service of the android phone that is GPS receiver of that phone. The module also contains Google map for location display.

Second module is the application which will be installed into client's phone. It has three sub- modules. First one is live location module. It will show the location of particular bus along with its recorded time on the Google Map. Second is a progress bar which continuously fetches co-ordinates and show distance covered by a respected bus. Third part includes extended facilities such as detail information of bus seat availability, booking options and procedures.

A. Server Module

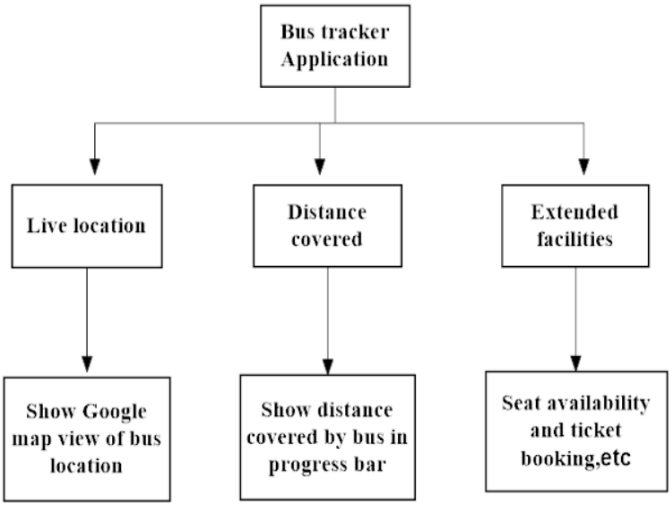

Figure 1: Block diagram of Application

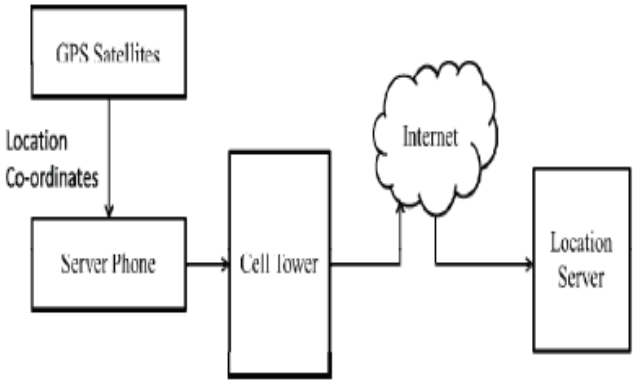

Figure 2: System Diagram of Location Tracking

In Location Server database, there will be storage of location co-ordinates that is longitudes and latitudes of bus positions which are sent by server module periodically. Their recording time will be stored too. Location information is requested to the Location Server and there will be feedback from the Location Server. After having GPS co-ordinates, reverse geo coding will be done for getting exact location name. After that, a pointer array will be created for saving all the location names along the route the requested bus passes through. Finally, there will be Google Map view of the locations using Google Maps API V2.

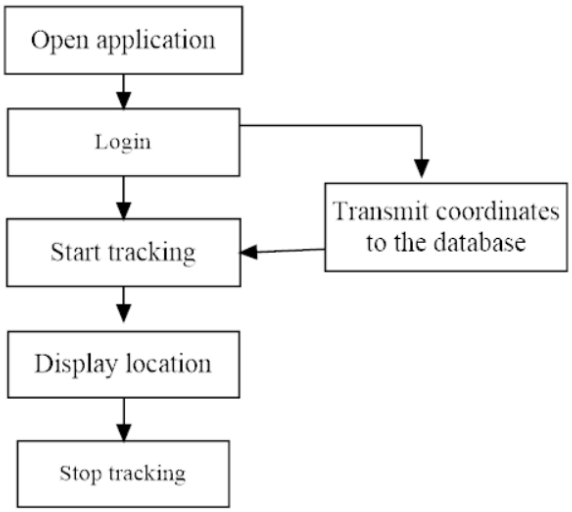

Figure 3: Functionality of Driver and Conductor

When driver and conductor open application of their respective smart phones they are ought to login and thus GPS tracking starts. These tracked longitude and latitude values are sent to database server. The location of bus is updated using average values calculated from these database values.

B. User Module

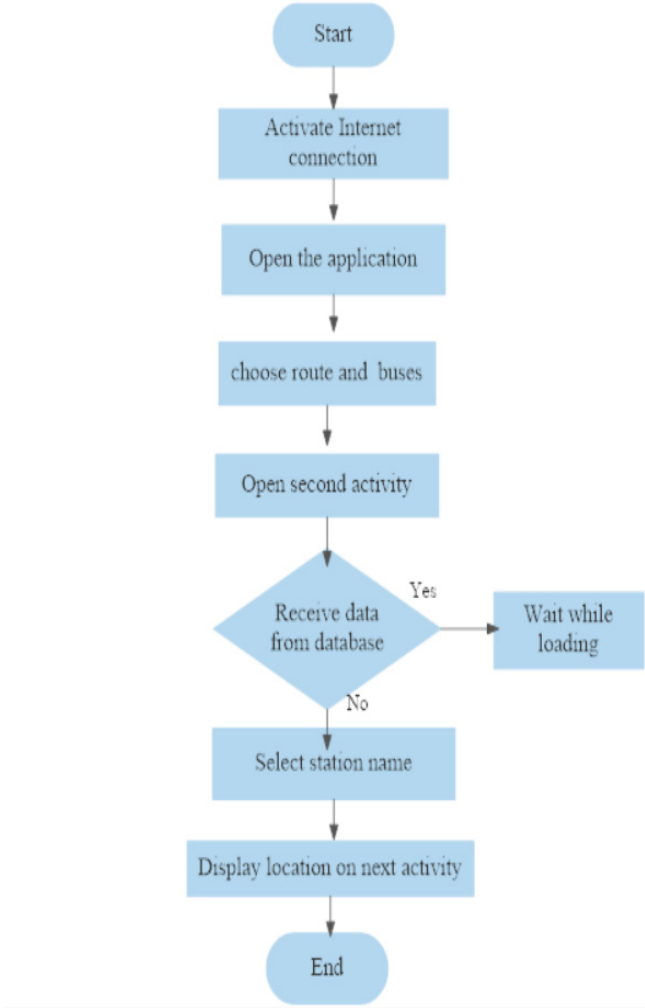

Figure 4: User functionality

Another android app is designed using android studio 2.3.3 API level 27.1.1. This app is developed for all the passengers who travel from buses to know the location information of the desired bus. this app is integrated with MYsqlite database . There is needed to activate the internet connection to use this app. In the 1st activity of the app, the route numbers are displayed. User needs to select the desired route or the bus number for the desired bus. When user clicked the desired bus number, the next activity opens up. In the next activity, we have provided different stations name and the data from the database are received in this activity. By clicking any of the station's name the Google map will open to show the location on next activity by the distance and time information are obtained by using Google map API. By using geocoder class in the android studio, the bus location coordinates are converted to the address and the address is displayed in the app. The working flow of this app is shown in Fig.

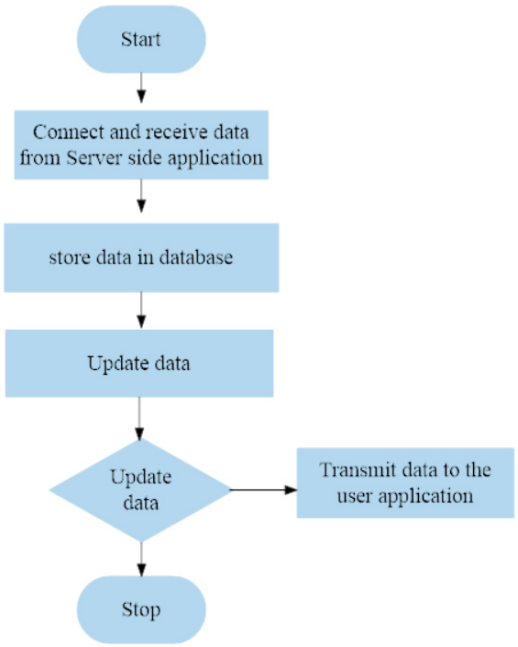

Figure 5: Database Functionality

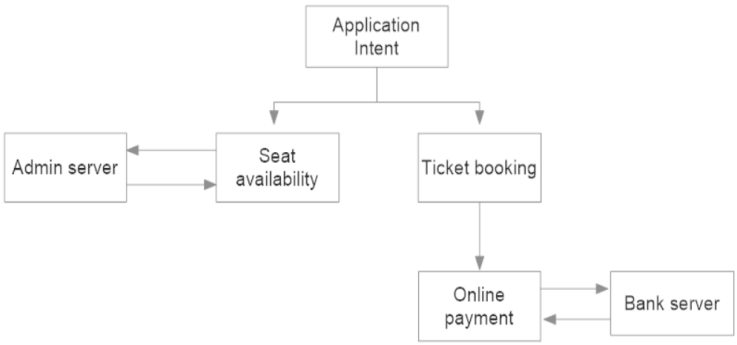

Figure 6: Extended Functionalities

The application has some extended functionalities. These include seat availability updation as well as monitoring. Ticket booking gives an easy way for online reservations with online payment facility. Payment ways provided by application include direct connection with bank servers.

4. IMPLEMENTATION

Real time location tracking in the application is shown below. The main functionality of google map is given in fig. It highlights current location of device. It gives full user interface of google map system with detail display of every possible route such as highway, small roads , railway tracks, airways, etc.

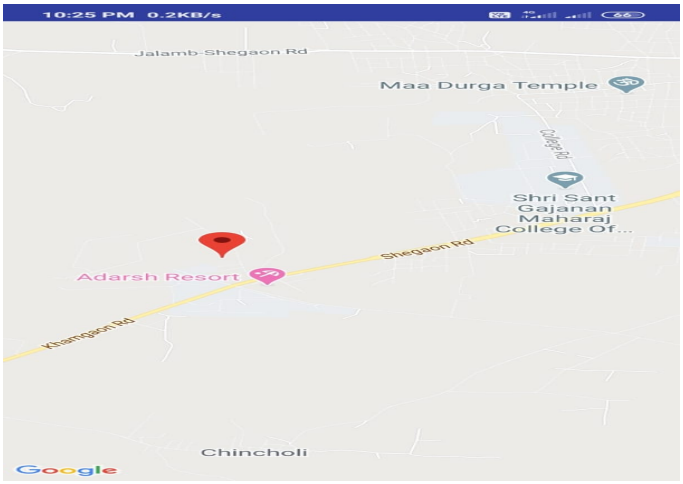

Figure 7: Screenshot for live location

5. CONCLUSION

In this project, we introduced an android application for tracking live location of a local bus. This application mainly makes use of GPS, Google Map, web server and database server. With this application, passengers can get location information of the bus in a very low cost way. However, the system has limitations in some respects. Here, we are using internet provided location information where there is accuracy in getting information from GPS. Network provided location is not more accurate than GPS. We are trying to develop application for both situations first by using internet (that we have already implemented) and the second one without any internet connectivity i.e. using network. We are looking forward to develop an automatic notification system when the bus arrives at chosen location. There is no system to handle load over server. In future we hope to extend this work and implement these features to make this system more beneficial.

6. REFERENCES

[1] P. Verma, J.S. Bhatia, "Design and Development of GPS-GSM Tracking System with Google Map Based Monitoring", International Journal of Computer Science, Engineering and Applications, vol. 3, no. 3, June 2013.

[2] A. Al-Mazloum, E. Omer, M.F.A. Abdullah, "GPS and SMS-Based Child Tracking System Using Smart Phone", International Journal of Electrical, Computer, Electronics and Communication Engineering, vol. 7, no. 2, May 2013.

[3] I.M. Almomani, N.Y. Alkhalil, E.M. Ahmad, R.M. Jodeh, "Ubiquitous GPS Vehicle Tracking and Management System", IEEE Jordan Conference on Applied Electrical Engineering and Computing Techniques, pp. 1-8, 2011.

[4] C.V. Sonia, Dr. A.R. Aswatha, "An Android Application to Locate and Track Mobile Phone", International Journal of Engineering Trends and Technology, vol. 4, no. 5, May 2013.

[5] Tan, KuanYew, and KokSheik Wong. "Low-cost campus bus tracker using WiFi access points." Consumer Electronics-Taiwan (ICCE-TW), 2016 IEEE International Conference on. IEEE, 2016.

[6] Lee, SeokJu, Girma Tewolde, and Jaerock Kwon. "Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology and smartphone application." Internet of Things (WFIoT), 2014 IEEE World Forum on IEEE, 2014.

[7] Rahman, Md Marufi, et al. "Real time Google map and Arduino based vehicle tracking system." Electrical, Computer & Telecommunication Engineering (ICECTE), International Conference on. IEEE, 2016.

[8] Patil, Ulhas, et al. "Tracking and Recovery of the vehicle using GPS and GSM." (2017).

[9] Alshamsi, Humaid, Veton Këpuska, and Hazza Alshamsi. "Real Time Vehicle Tracking Using Arduino Mega." International Journal of Science and Technology 5.12 (2016).

[10] Li, Dongjiang, Cheng Cheng, and Bo Zhang. "Vehicle Remote Monitoring System based on Android." Software Engineering and Service Science (ICSESS), 2016 7th IEEE International Conference on. IEEE, 2016.

[11] Nusrath Jahan , Kamal Hossen and Muhammad Kamrul Hossain Patwary "Implementation of a Vehicle Tracking System using Smartphone and SMS service" Proceedings of the 2017 4th International Conference on Advances in Electrical Engineering (ICAEE) 28-30 September, Dhaka, Bangladesh.