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Multi Platform Application for Parent and School using GPS tracking

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Abstract: In today's era everyone is using mobile phones for communication. At the same time Mobile Providers are also providing the variety of services to users. In attempt to expand on this, we propose a GPS based school bus tracking system for an organization and parents to help to find addresses of their children and locate their positions on mobile devices. The organizations are investing money in monitoring and tracking school buses aiming at improving services and ensuring the safety. The proposed technology allows organizations and parents to track real-time information about the school bus during travel. Today for transportation most schools use Bus as a medium. But due to various problems like not reaching on time, bus failure, no proper schedule etc. By this scenario author has created an application which provides the exact location of all organizational vehicles. The system contains single smart phone that is equipped with GPS. During vehicle motion its location update can be continuously reported to a server. This location information will be plotted using Google maps on monitoring device.

Keywords: Bus Tracking System, Global Positioning System (GPS), Mobile Application, Geo-location sensor.

I. INTRODUCTION

This project is designed to be used by parents and aimed to help locating children. It takes advantage of the fact that many of today's children bring Smartphone's which is convenient for this kind of situation. An application at the parent side will allow parents to send a location request to a child side then retrieve the location from the request reply and shows it on a map. On the other hand, the application at the child's side gathers the necessary information of the smart phone that will be used to locate the smart phone. Information such as GPS coordinates and time are gathered and sent to the parent smart phone that's preregistered on the application. The communication between the parent and the child applications is done using Cloud storage. It will allow the system to work with the internet connection thus allows the application to be implemented on smart phones that support GPRS, 2G or 3G internet connectivity. The system sends the location of child's side smart phone to parent's smart phone when the parent wishes to check on the child.

II. RELATED WORK

In Al-Suwaidi and Zemerl work [1], the problem was solved by proposing an application "Locating Friends and Family Using Mobile Phones with Global Positioning System (GPS)". The architecture of the system is based on client-server approach. The client phone registers and login into the server. Then, the client periodically sends his coordinate location updates to the server which stores it in a database. Thus, any client wishes to learn the location of another client will have to register and login to the server to request the location. This application was developed to helps locate family member and friends. The mobile application was implemented using J2ME. As for the server, it uses MySQL Database along with PHP to guarantees that the server would not be overloaded. This proposed solution makes each client has same control and command privileges as the other which is not convenient for use in child tracking application where only the parent should have the control and command privileges. A limitation of this solution is that in order for the system to work there must be internet connectivity in both client and server side.

In the paper by Almomami, Alkhalil, Ahmad and Jodeh [2], a "Ubiquitous GPS Vehicle Tracking and Management System" is proposed. This system architecture designed in a way so that it offers maximum accessibility for the user anytime and anywhere by providing two types of applications, a web application and mobile application. The architecture of the system is based on client-server. In the server side, it contains a GPRS, a web and an SMS server along with the database to store user details and data. As for the client, it is a box that contains a GPS tracker and a GPS modem. When users request location from the web or mobile application after registering and logging into the web server, an SMS request will be sent to the GPS modem in client device. Then the client device responds using [7] GPRS which will be received by GPRS server and forwarded back to the SMS server. Finally the SMS server forwards the response to the web server. This project was designed by the fleet operators in monitoring driving behavior of employees or parents monitoring their teen drivers. In Vehicle Tracking System for tracking the vehicle any tracking device is required. Now a days, three navigation systems are available and people use those for tracking any object. The GNSS consist of three main satellite navigation systems. They are GPS (Global Positioning System), GLONASS and Galileo. The comparative study of these three navigation systems is mentioned in following table:

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Parameters	GPS	GLONASS	Galileo
Satellites per complete constellation	32(Block III)	24	27+3 spares
Orbital Planes	6	3	3
Plane Inclination	55 deg	64.8 deg	56 deg
Radius of Orbit	26650 km	14100 km	23222 km
Period required for complete cycle	12 hrs	11 hrs 15 min	11 hrs 15 min
Civil Data Rate of Satellite	50 bps, up to 100 sps	50 bps	50 bps, up to 100 sps
Accuracy	5-20 m	50-70 m	Claimed 1 m
Operation Bands of Satellite	L1,L2,L5	L1,L2,L3,L5	E1,E5,E6

Table 1: Comparison of GNSS

III. SYSTEM ARCHITECTURE

The GPS based vehicle tracking system uses the GPS technology, and Smart Phone. As per shown in Fig. 1 this system has three main modules transmitting unit, monitoring unit and server. Transmitting side performs tracking functionality. It tracks the vehicle through GPS and transmits its current location to the server. The main function of monitoring side is to provide login interface to user and to show the Google map with vehicle locations.

Server woks as a central connector for transmitting unit and monitoring unit. As both transmitting side and monitoring side communicate with each other through Server only. As shown in Fig. 1 mobile application communicates with server and access the remote database. Where at transmitting side Tracker application obtained its current location through GPS technology and updates it to server. Parent side application can then access the location of school bus of their child.

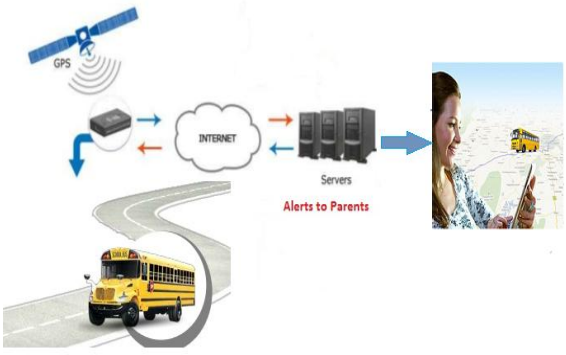

Fig.1 System Architecture

A. Project Components:
It consists of two units:

1) Transmitting Unit:

Transmitting Side contains Android mobile which has inbuilt GPS, functionality. Therefore the mobile will be used as transmitting unit.

GPS: GPS stands for Global Positioning System. The Global Positioning System (GPS) is a satellite radio navigation system developed by the Department of Defense (DoD) owned by the United States Government (USG) and operated by the United States Air Force (USAF) [3].GPS has provided positioning, navigation, and timing services to military and civilian users on a continuous worldwide basis since first launch in 1978. An unlimited number of users with a civil or military GPS receiver can determine accurate time and location, in any weather, day or night, anywhere in the world [3].

The system makes use of a medium earth orbit satellite constellation transmitting microwave signals allowing a GPS receiver to determine its position, velocity and time. Different types of positioning can be carried out using GPS receivers depending on the algorithms, type of measurements and corrections used in the navigation solution.

GPS is a main module in this Vehicle tracking system. As vehicle is tracked using GPS technology. Author has used it to get the exact location of respective vehicles. But to get exact location of any vehicle it need to be in a focus of four satellites.

2) Monitoring unit:

Monitoring unit is an Android Application through which user will get to know the actual position of proposed vehicles. This android provides the user interface through which user communicate with system. It provides login to the system. After login to the system user is will get Google map with exact location of vehicles.

B. Work Flow

The workflow of School Bus Tracking System is as per the given Fig.2. Users can use this system by performing actions mentioned in flowchart.

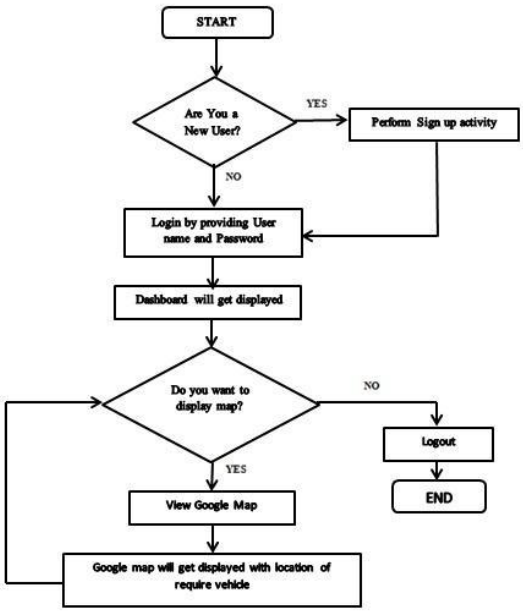

Fig. 2 Work Flow

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Tracking Device:

1) The tracking device will continuously request to the GPS satellite for its location information.
2) At the same time GPS satellite will provide the location information to tracking device installed in vehicle.
3) The tracking device will send the location information back to the server through GPRS and continuously update the database.

Monitoring Device:

1) Monitoring device will continuously access the database from server. 2) From that database the location information will be plotted on Google maps.

Monitoring unit, tracking unit and server are the main pillars of GPS based school bus tracking system. Monitoring side consist of Login page, Signup page and Google Map with the location of required vehicles. As user can easily use this application by sign up and he will get all login rights. At monitoring side Google Map is obtained by using Google APIs. Author has created online Apache server, php MyAdmin database server to stores the information receiving from tracking and monitoring units. The database operations are performed through the Word Press framework. Tracking device will continuously communicate with GPS satellites and it will provide the current location of vehicle. The tracking device will receive its current location in the form of longitude and latitude and it will send the update to server. On the Google map the tracked location of vehicle will get plotted.

IV. 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.

V. RESULT

At monitoring side, initially user needs to perform Login activity. Login page shown in Fig. 3 provides Login interface to the user. When user will enter user name and password then system will do validation to check whether the entered username and password is correct or not. If the entered username or password is wrong then system gives an error message. And if it is correct then user gets directed to next page with successful login.

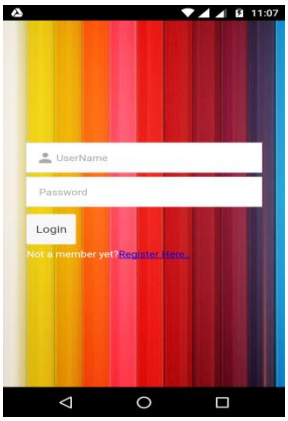

Fig.3.Login page

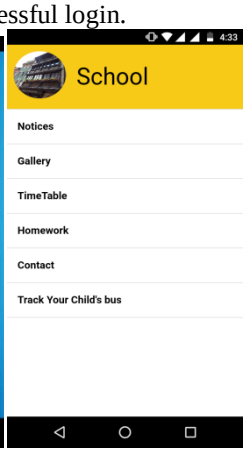

Fig 4.School Dashboard

For plotting the location of vehicle its Longitude and Latitude must be known. For tracking vehicle author uses Google map APIs. The database location information will be plotted on Google maps.

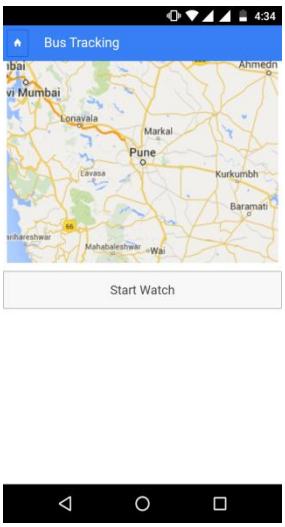

Fig 5.Bus Tracking

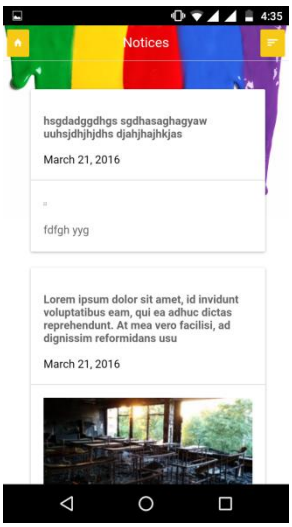

Fig 6.Notices

Fig 7.Gallery

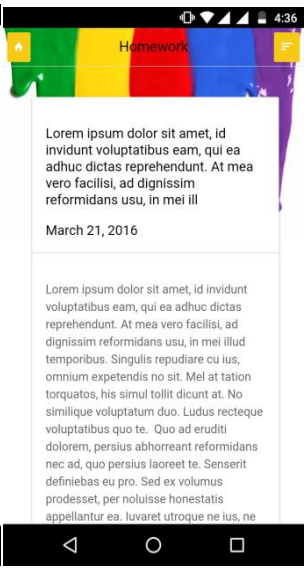

Fig 8.Homework

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VI. CONCLUSION

In conclusion, this project was developed to aid locating the children position. The solution proposed in this paper takes advantage of the rich features offered in smartphones. The architecture of system built on two main component, GPS satellite, and cloud based services.

Developing this project would not have been possible without studying related and existing works. The work relies on internet connectivity or a server that has to be up running. The proposed system relies on location services. Finally, like any software product or design, there is still room for enhancement. Features can be added to enhance the system such as Geo-fencing, emergency alerts and many others. The proposed system will be implemented, continued, reviewed and improved in a later work.

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