Android Parental Tracking

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Abstarct*: Nowadays child security has become a greater issue. Cases of missing children, kidnapping them between the age 14 to 17 has increased. This paper presents a mobile application based solution to aid parents to track the real time location of the children. Smartphones today provide the facility of location service and most of kids today use mobile phones. The application uses the GPS and SMS services found in Android phones. It allows the parents to get their child's location on Google Maps and also their browsing history. The main responsibility of parent device is to send a request location SMS to child's device to get location of child. While the responsibility of child's device is to reply the GPS position to the parents device upon request.*

Keywords: Child Tracking System, GPS, SMS.

1. Introduction

Recently, the use of Android based smartphones is increased. As these smartphones are providing various unique facilities, day by day more and more people are getting attracted to them. Thus here, including best possible features and resources has become the need of the day. Moreover, GPS there by device which offers an outstanding services of getting respective location. This facility is helpful in developing application which can track locations of missing children. GPS works, gathers analyzes and stores location data from satellite signal, processes the information, saves it for later review or transmits it in real time. In child tracking system parents are able to trace the activities of their respective children. The activities such as real time location (on Google Maps), their browsing history.

The project is designed to be used by parents and aimed to help locating missing or lost children. Also the children surf over the net, so the browsing history of the children can be seen by the parents. It takes advantage of the fact that many of today's children bring smartphones which is convenient for this kind of situation. In this work, GPS is used along with one of the basic service of a smart phone is SMS. 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. A program called Listener will be executed at the backend. Information such as GPS coordinates which are in the form of latitude and longitude. And time are gathered and sent to the parent smart phone that's pre-registered on the application. The communication between the parent side and the child applications is done using Short Message Service (SMS). SMS offers the system unique features. It will allow the system to work without the need of internet connection thus allows the application to be implemented on smart phones that don't support GPRS. The system sends the location of child's smart phone to parent's smart phone when the parent wishes to check on the child. Along with location the browsing history of the child's phone also would be seen on parent side on regular intervals.

2. Related Work

In Al-Suwaidi and Zemerl work, 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 technology. The client phone has to firstly registers and then login into the server. Then, the client periodically sends his latitude and

longitude location updates to the server which stores it in a database. Thus, any client wants to know the location of another client, will also 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 developed using J2ME. It uses MySQL Database along with PHP to guarantees so that the server would not be hanged. This proposed solution makes each client has same control and 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 demerit of this solution is that in order for the system to work there must be internet connectivity in both client and server sides. In the paper "Ubiquitous system" the system is designed in such a way,that it offers maximum accessibility for the users anytime and anywhere by providing two types of end users applications, a web and a mobile application. The architecture of system is client- server based. In server side, it contains a GPRS, web and a 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 GSM modem. When user request from location the web or mobile application after registering and logging into the web server, an SMS request will be sent to the GSM in client device. Then the client device responds using GPRS which will be received by the GPRS server and forwarded back to the SMS server. This project was developed for fleet operators in monitoring driving behavior of employees or parents monitoring their teen drivers[1].

Chandra, Jain and Qadeer used a simple web server approach along with SMS to solve the problem. It was implemented for JAVA enabled mobile devices equipped with GPS receptor. The control is on both side client as well as server. As per the literature survey there are number of solutions for finding missing or lost children. Some of the above discussed systems require internet connectivity on both sides[2].

3. System Architecture

3.1 Existing System:

The internet is the medium that will be used to transfer user data and service request from the mobile to the server and then the requested information back to the user. Figure 1 shows the main 5 elements that construct the system which are the GPS, the client tier, server tier and the database tier[1].

- Client tier (Mobile): The mobile requests its location from the positioning system periodically and sends it through the communication network to the server. The user can request for the location of a family member at any time from the server. Also an alert in the form of a notification can be received whenever the user and a friend are in the same locations.

- Server: The server receives users' location and alerts two friends if they are in the same location or update the user about the location of family members.
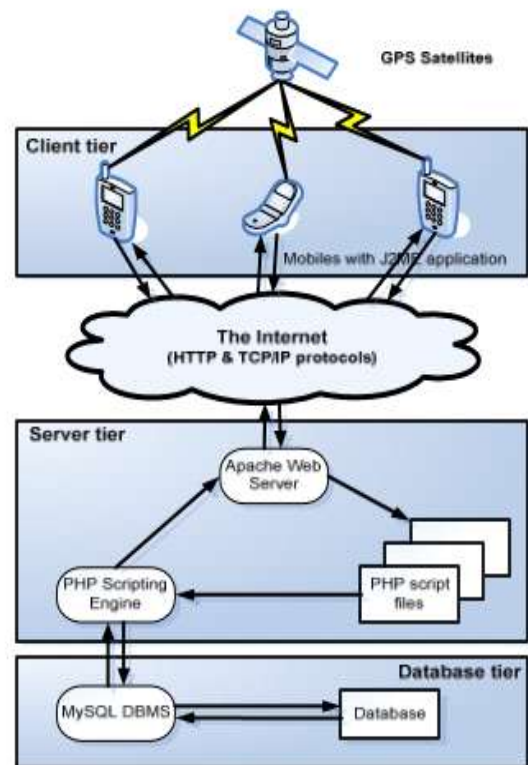

Figure 1. System Architecture

- Database: The database contains all users subscribed in the service with their location, a separate list for each user that contains friends and family members that can be located, and there is a table that contains locations with their coordinates. MySQL is the database used for maintaining the record of the child's activities along with PHP.

D. Global Positioning System:Every time the mobile phone updates the user location in the server, it requests the current location of the user from the GPS. The GPS determines the co-ordinates and sends them to the mobile phone[1].

Here the control is provided on both sides. All the members in the group can add or remove the members. The members can also hide their location.

3.2 Proposed System:

This system is designed for parents and children. It can also be used in offices by the employer for the employees. Both have a smartphone that supports GPS and SMS facilities. SMS is a basic service provided on any smartphones but GPS can be found only new smartphones. The application is mostly to be used by parents to track their child's location. In a later phase for implementation purposes, the system will be eclipse supporting android. The main reason why the Android Operating System was chosen for the implementation of this work is to target more users. Statistics shows that the market share for the Android OS 48.8. This makes it the highest market shares over other smartphones operating systems currently in the market. There are 91.4 million smartphones in USA alone.

Architecture: We propose a solution to the two main features that is offered in advanced smart phones platforms nowadays.

Those features are location providing services, mainly GPS and SMS based services. The solution proposed will be implemented to support Android platforms in future. The system to be implemented is based on a simple and basic idea that is the use of SMS for communicating between the parties involved, parent and child. It is designed in a simple way so that it will involve few elements and less user interaction. This will result in a system that is simple and easy to implement and use,thus making it more user-friendly.

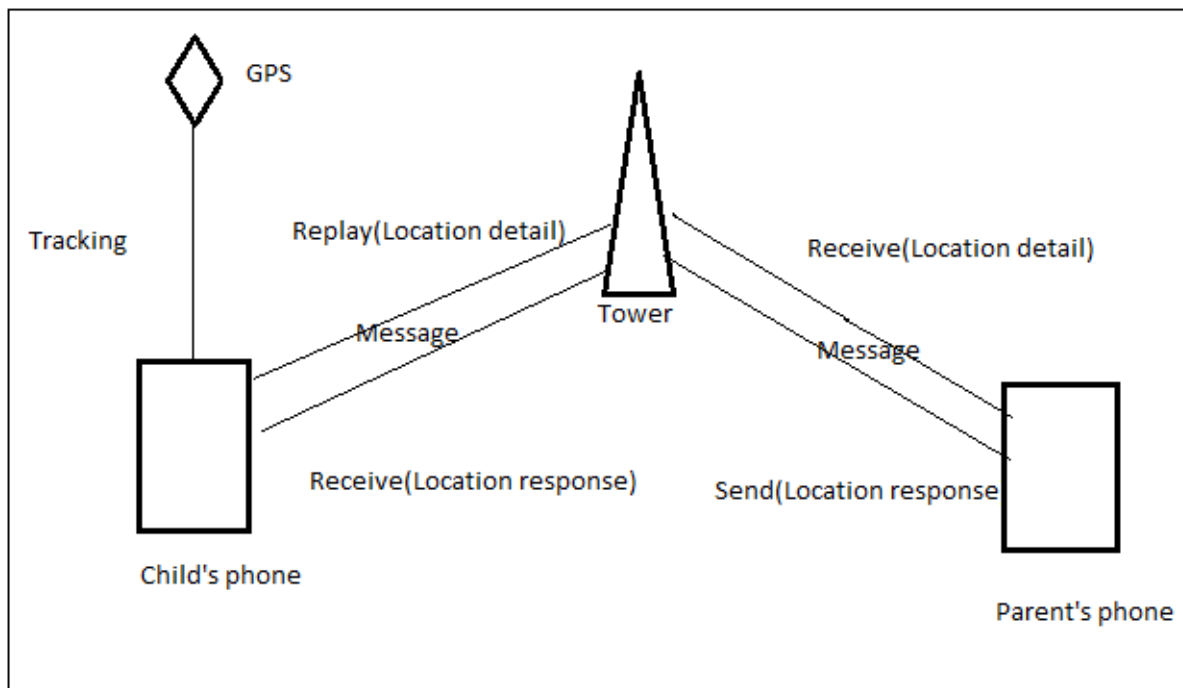The system architecture to be implemented is illustrated in fig.

Figure 2. Proposed System

consists of two sides. First is the parent side which acts as a server for the system though it is not actually a server .It is basically an Android phone owned by the parent of the child to be tracked. The parent's side that is server uses SMS for communicating with the child and maps to view the location of the child on a map. The phone should have telephony and internet services.

Second is the child side which acts as a client side for the system. The child side is also another Android smart phone but owned by the child to be located. The child side uses SMS for communicating with the parent side and location providing services that is GPS or Network, to get the respective locations of the child in form of coordinates. The child should also have the telephony services but no need of internet connectivity.

On the parent side, the application by minimum runs the user interface, mostly for map tracking, as well as a service (Listener) that runs in the background of the smart phone application. On the child side that is client, the application is generally a service or Listener that runs in the background of the smart phone. A user, parent which acts as server, will use the interface to send a location request SMS to child. The Listener at the parent side performs one main function and that is to listen for the child's reply for the location request. However, the Listener at child side (client) performs two main functions. One of these functions is periodically listens and gets location coordinates updates from GPS satellite or Network provider whichever more accurate.

Figure 3. Child's location at Parent Side

For The Listener to work, it listens for a specific string of characters that is predetermined between the server and client side i.e. parent and child side. If an SMS report received beginning with that predetermined string then the application will handle event. In this work, the string "$getUpdate$" will be used by the SMS sent by parent side for location request. Where else, the string "$update$Coord" will be used by SMS sent by the child side for updating the location.

The other main function is listening and waiting for a location request from the parent side. A Listener is a service runs in the

background and keeps listening to all SMS incoming but only will only reply to location requests or update coming from the other side of the system. So, when a parent sends a location request via SMS to the child side, the Listener at the client side(child) will automatically reply to a location request SMS with the latest location update received from the location service. Afterwards, the parent's Listener will receive the location details from the child via SMS and processes it for viewing on a convenient map on the UI.

Figure 4. Child Side

Note that the "Coordinate" in the string refers to the location coordinates decimals in the actual system. Fig. 2 shows the parent's side application. The yellow transparent area is the restricted area where the child is allowed to travel within. If the child passes the limit of the area, the parent will be notified. Fig. 3 shows the interface of the child's side application.

4. Review

This project is developed to aid locating missing or lost children between age 14 to 19. The solution proposed in this paper takes advantage of the rich features offered in Androids smart phones. The architecture of system is mainly built on two basic features i.e Global Positioning System(GPS) and SMS services . Some of these works depends on internet connectivity or a server that has to be up running. The proposed system depends only on two main services, telephony and location services, thus eliminating the need for internet connection or a dedicated server. Finally, like any software application or model, there is still a gateway where one can add new features and get more enhanced design. Features can be added to enhance the system such as Geo-fencing, emergency alerts and many more. The proposed system will be implemented, continued, reviewed and improved in a later work.

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