

Child tracking system using smart phones without expenditure of money

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Abstract

Recently many cases of missing children are reported. Many cases of women harassment are reported. Parents always worry about the possibility of kidnapping of their children. Nowadays this act has no age limits. This paper proposes an android based solution to aid parents to track their children in real time. In today's world, the recently available mobiles are equipped with location services capabilities allowing us to get the device's geographic position in real time, but there are some mobile companies which do not promote this option or this provision requires data connection to be accessed. The proposed solution takes the advantage of network provider services by mobile phones since most of the children carry mobile phones. The mobile application uses the network provider and the notification services found in android mobile phones. It allows the parent to get their child's location on their mobile as notification. The system consists of two sides, child side and parent side. The child's device main duty is to sense the signals of an alert from the child and send a notification to the parent device. On the other hand, the parent's device main responsibility is to receive the notification from the child's device.

Introduction

In today's world, over 80% of the world population, including children around the age of eight or seven, owns smart phones [1]. This is due to many reasons. One of them is the remarkable features and capabilities that new smart phones offer especially android based smart phones. With that many features the need for resourceful applications rises. In our opinion, network provider offers outstanding capabilities in locating position and this can be used to develop resourceful application that helps in locating missing or lost children.

Studies conducted by Research Triangle Institute [RTI International] showed that in India, abduction of women rose more than one-and-a-half times (165%) over the same period last year (2015). It also revealed that cases of rape increased by 43%. The missing of children is basically classified into two categories. The first category is disappearance, which includes running away from home. The other category is abduction or kidnapping. Statistics reveals that since 2015, a total of 848 women including children. Over three lakh women were kidnapped and killed over the last year (2015). When parents want to go family trip, they always concern about their children's safety. This worrying may affect negatively on the parent to enjoy their family trip. Even worst,

parents can lose sight of their children and fear the possibly of kidnapping or worst for them.

Consequently, this project is designed to be used by parents and aimed to help locating the missing or lost children. It takes advantage of the fact that many of today's children bring smart phones which is convenient for this kind of situation. In this work, the network provider is combined with the basic service of a smart phone which is notification, in one system. This project has two cases. The first case is that the application at the parent side will allow the parents to send a location request to the child side then retrieve the location from the request reply. On the other hand the child application at the child's side gathers the necessary information of the smart phone that will be used to locate the smart phone gathers information about the location and sends a notification to the parent smart phone that's pre-registered on the application. The second case is that when the child is running or at any time when the child is out of some emergency the mobile senses the trembling or vibration of the mobile and gathers information about the child's location and sends a notification to the parent device that's pre-registered on the application. The communication between the child and the parent application is done using notification services. This offers a unique feature that it requires no balance in the mobile and no internet connection to send request and reply among the devices.

The paper is organized as follows. Section I is an introduction to the work. Section II reviews the related works focusing on the various aspects on which the previous projects were done. Section III describes the system development and its requirements, architecture, and how the system works. Section IV is the conclusion and future work.

Related works:

In Al-Suwaidi and Zemerl work [3], 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 help locate family members and friends. The mobile application was implemented using J2ME. As for the server it uses MySQL Database along with PHP to guarantee 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 sides.

In paper by Almomani, Ahmad and Jodeh [4], 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 end user applications, a web application and a 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 database to store user details and data. As for the client, it is a box that contains GPS tracker and a GSM 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 GSM modem 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 designed for fleet operators in monitoring driving behavior of employees or parents monitoring their teen drivers.

Chandra, Jain and Qadeer [5] 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. A client can either send his location to other clients directly by SMS or share it by sending it to the web server’s database via internet. Clients can view the locations on Google maps. The aim of this application is to enables the user to share his location with their friends or even who uses the same solution.

Anderson, Lustig, Brunette, Borriello and Kolko [6] proposed solution for “transportation information system” using only GPS and SMS. On the client side, a device (a box) containing a GSM modem and a GPS unit. On the back end side, a database server stores the details and locations connected to a basic GSM phone for SMS capability. When a user want to request a location of a client, it sends an SMS request to the server’s GSM phone, the server then replay with the latest location acquired from the client to the user issued the request. A unique feature of the solution is that it does not require internet connectivity on both sides for it to work.

As it can be established from the literature review conducted, there are many existing solutions for locating missing or lost children. Some of the above discussed solutions required 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 child or parent sides. Additionally, the relationship between the child and parent devices should be controlled by parent side. A child should

not be able to delete or modify his details without parent’s permission. Hence accordingly, a solution to solve child locating problem which led to propose a design for any smart phone that supports Location based Services including GPS. The main feature proposed in this application is to get the child location without the child’s interaction in the process and with simple and cost effective methods. This is done through the use of GPS and SMS only.

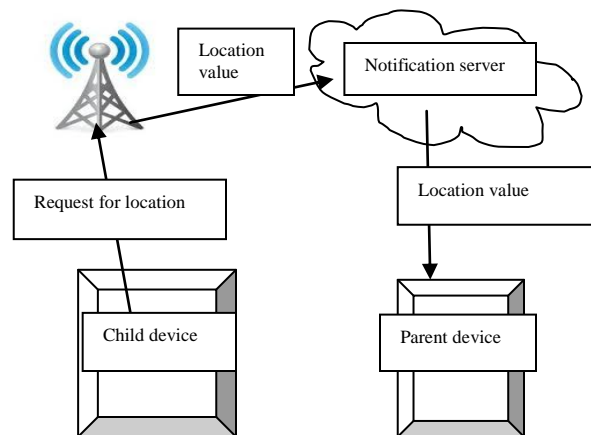
Application development:

A. Requirements

This work is designed for parents and children. Both must have a smart phone. This application is mostly to be used by parents to track down the child’s location. In a later phase for implementation purposes, the system will be developed using Android SDK tools [7] and Android Studios. The main reason why the android os was chosen for implementation of this work is to target more users. Statistics shows that the market share for the android os is 48.8%. This makes it the highest over other smart phone operating systems currently in the market.

B. Application architecture

We propose a solution to solve the problem based mainly on the network location provider, wifi access point and the push notification technologies. The solution proposed will be implemented to support android platforms in a later work. The system proposed is based on a simple ideology that is the use of push notification technology 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. In this way, it will result in a simple and easy implementation and use, making it more user-friendly.



The first case is that the parent device, device in the sense, the parent’s smart phone sends a location request to locate the child’s smart phone. This basically requires the cellular network provider or the wifi access point, which traces the current location of the child’s smart phone at the moment. The child’s smart phone detects the current location of the child’s mobile and sends the location coordinates to the notification server. The notification server uses the push notification technology and sends the coordinates as a notification message to the parent



mobile. Thus the parent being informed about the child's location takes necessary actions.

The second case is that the application is designed in the manner where the system traces the kind of trembling signals or the vibration that the child is running. As soon as the system senses such a situation, it immediately uses the network provider and the wifi access point to determine the exact location of the child's smart phone and sends the information to the notification server. The notification server sends the information in the form of notification using the push notification methodology. The parent's smart phone immediately gets the notification with the information about the child's location along with an alert. By this, the parent is well informed about the child that the child is in danger and does the necessary actions further.

The design of this proposed solution offers many advantages over many exiting solutions. First, the application operates automatically upon the request of the parent, without the need for user interaction at the child side. This is considered as a big advantage for the system because usually a child cannot handle a complex mobile application and too many user interactions. Another advantage is that the information about the location is transferred even if there is no balance on the child's side. This system requires only the network provider services and the notification services. This is suitable for situations where the user might not have internet access. The third advantage this solution offers is that it can perfectly function indoors as well. The application will always get coordinates from both the network provider and the wifi access points compare them and use the most accurate. Lastly, the system uses a master slave relation between parent and child sides where the parent controls all the functions of the system and the child has very little control over the system.

Conclusion and future works:

In conclusion, this project was developed to aid locating missing or lost children. The solution proposed in this paper takes advantage of the rich features offered in Androids smart phones. Developing this project would not have been possible without studying related and existing works. Some of these works relies on the wifi access points or a network location provider and the notification server that has to be up running. The proposed system relies only on two main services, cellular network location provider and notification server, thus eliminating the need for internet connection or a dedicated server. Finally, like any software product or design, there is still room for enhancement. Features can be added to enhance the system such as emergency alerts and many others. The proposed system will be implemented, continued, reviewed and improved in a later work.

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