

Child Safety & Tracking Management System

By using GPS, Geo-fencing, Android application & Jewelry design: An Analysis

Sridevi S

Assistant Professor, Dept of Computer Science, KNSIT,
Bangalore-560064, INDIA, sridevi_svs@yahoo.co.in

Abstract: Life would have been like a walk in a park without technology. But that is not the case as with each day the technology is only getting improved. And with the growing technology the concern towards an individual's safety is also growing. Child safety is one such matter of concern in today's world. In this paper we discuss majorly on child safety, here we make use of GPS and wireless networking techniques. Mobile phones have been a major influence on human life but the effect of it varies for an adult and child. So here with the help of digital jewelry we have a modified model of phone which although is not a complete smart phone but consist of the all the applications that are required. Apart from this we have made use of GPS, Geo-fencing, SMS techniques to track the child's location and to inform about it via telephony communication.

Keywords: Global positioning system (GPS); Geo-fencing; Short message service (SMS); ChildTracking; Embedded system.

I. INTRODUCTION

With each passing day the technology is only developing. In everyday life the solution to every problem is technology. And so the solution to the child's safety and tracking can also be a technological application.

This paper is focused upon child safety using two models that is a child model and the other parent model. The child model is an example for digital jewelry and the parent model can be any android devices say smart phones. Here it is discussed how Embedded intelligency by manufactures can be combined with the GPS and used to track the child's location. The digital data is stored in microchips which are placed on small transistors.

For this application the basic techniques required are - GPS, Geo-fencing, and SMS.

Fig (1) represents the android application that uses GPS to track the location by using Google maps. It provides the information as to where the child is located also it informs the parent device how far the child is from their current location. SMS services used when the connectivity is not good helps the child to send the location or quick message with the help of telephony

Shivani Thakur

Student, Department of Computer Science & Engineering,
KNSIT, Bangalore, India, thakurshiv7348@gmail.com

media. The child's location is displayed on the screens of the parent device and along with it they also receive the calculate distance information on their device. In case of emergency on just one click or by shaking the mobile they can send their current location via SMS to the parent device. In addition the Geo-fencing helps the parents to set a boundary limit. If the location of the child is tracked outside this boundary then quick alert information is sent to the parent. This application uses Google maps API to show location on map.

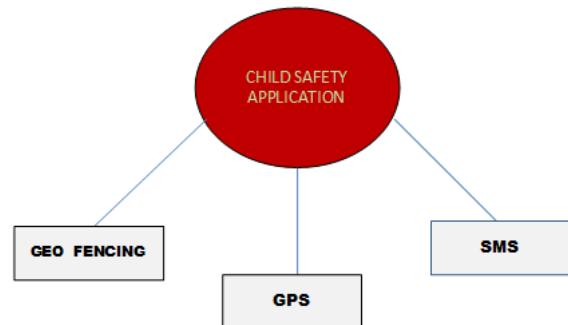


Fig 1. Contents of Application

II. RELATED WORKS

Here the architecture is based on client server approach. The application was basically implemented in JAVA enable mobile devices which support GPS. But here with the help of jewelry designing we have modified the device application. Firstly the application works on two methods one for the parent and the other one for children, both are the applications are installed that is one on the parent device and the other on the child device.

After installation of the details as per one's requirements we can add up to 5 member details on a single parent device. With the help of the information the parent can monitor the child's location and keep a track on his/her movements. Along with the location notifications the device also sends the alert message if in case the child crosses the Geo-fence boundary. The child can send the message using the device that is the current location or SMS, which will be saved in the database on the server and can be viewed by the parent on their device.

III. SYSTEM DEVELOPMENT

In developing the device on parent side, we required GPS enable smart phones which can be used to track the child's location. On the other hand the child device is a model of jewelry design with embedded system and similar inbuilt features. For developing android based applications, we required SDK tools and Eclipse which support android operating system.

Various stages of proposed system development are discussed below:

A. Application development

Android is software stack of mobile devices that includes operating system, middleware and key application. On the other hand embedded intelligency forms the backbone of digital jewelry.

In digital jewelry display, the representation is through bits or symbols. For instances LCD's can also be used for display, as often as found in watches.

Further advancements can help in incorporating speakers, a sensor of some kind or other informational aesthetic. The display layer will be the face of the device and in addition to it we have external buttons attached for sending signals or SMS and data port for accessing the data.

The android SDK supports several integrated development environments (IDE) but we selected Eclipse because it is the best IDE integrated with the SDK no matter which OS you are using

The essential sets of tools required are listed below:

- a) Eclipse IDE
- b) SUN's Java development kit(JDK)
- c) The android developer tool (ADT), Eclipse plug-in.

In our proposed system we have used android development IDE as shown in fig (2) and model of jewelry design as shown in fig (3).

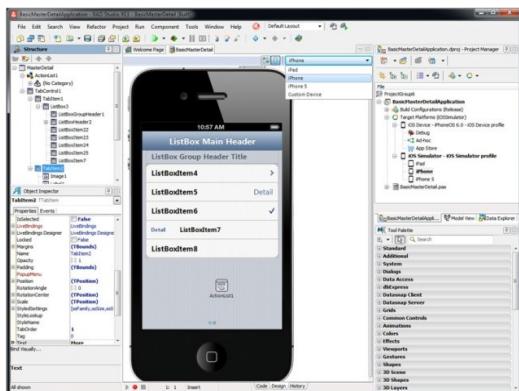


Fig 2. Eclipse Android Development IDE

We use a MySQL database along with PHP. For developing any applications in android we require java

supported eclipse android IDE and user can select the selection of different versions as per their requirements.

All the smart phones have Java platform and the digital jewelry consist of embedded system which also is implemented with java platform.



Fig 3. Digital jewelry model

B. Application architecture

The solution to the problem of locating a missing child is done by the GPS and GMS technologies. There are two main services used for this application one the GPS and the other is the SMS. GPS is used for the location services and SMS is used for telephony services.

All the features are with respect to the working of the android system. SMS is used for communicating in case of poor internet connectivity. This application is developed to make it user friendly on both the parent and child's side by using java eclipse android IDE. The architecture can be as shown in the fig (4) which is based on client server model. Parent side is the first side which acts as server and the child side acts as client. Basically the parent side has a android devise more specifically a smart phone and on the other hand the child device has the digital jewelry with the same features.

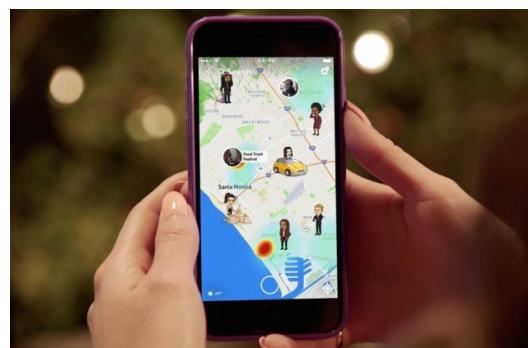


Fig 4. Tracking of location and distance of child

Parent side uses GPS and SMS to track the child's location and communicate with the child. Whereas the child can use SMS to reply or notify the parent device in case of emergency. With the help of Google maps the parent can view the location of the child and also view at what distance it the child away from them. At the child's

side the digital jewelry which consist of embedded system consist of similar applications and hence even the child device has a GPS and SMS facilities. The child's side uses telephony services to communicate with the parent side.

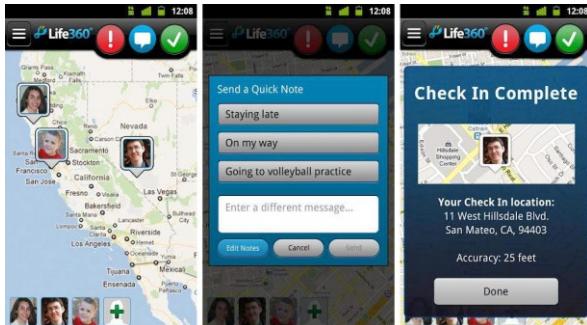


Fig 5. Child device Quick replies service

The child's phone have some quick replies by default and which can be sent via a single click on the child's device as shown in fig(5) . By this feature the child can send information just in case if there is poor internet connectivity and the location cannot be tracked.

In addition to GPS, we have another important feature that is Geo-fencing technique. In this technique the parent can set a fence or a boundary limit for the child's location. if the child's location is tracked out of the boundary location then immediately the information is transmitted to the parent device as shown in the fig (6) . The parent can mark multiple geo fences at a particular time which will keep in track of the child's location and notify if the child moves out of the boundaries.



Fig 6. Geo-fencing

IV. LIMITATIONS

We believe that this can be the best solution to child safety, but as we all know ever thing has pro's and con's and so do this application has some limitations.

- 1) Both the child and parent should know how to operate the devices.
- 2) This system depends on the GPS functionality therefore its complete working is based on cellular network. The location cannot be tracked if there is no cellular network, but the last location of the user is always stored in the database.

- 3) The switched off mobile or device can also be considered as a drawback feature.
- 4) This system can only track the location and cannot sense any other factors such as if the child gets hurt, or if the child is crying etc.

V. RESULT

With the day to day inventions and developments technology is taking an up curve. According to a study India is the fastest cellular based growing country. With the use of technology we can not only protect our children but also help to reduce the crime rates. This application has been tested in various places and the result varies in each place due to difference in cellular connectivity. And hence the better functioning of these applications was found in urban areas when compared to the rural areas. Henceforth the functioning depends on the cellular connectivity in the area.

VI. CONCLUSION

In conclusion we can say that this device is one of the basic and most effective ways to track the location of a child. Using this device the crime can be avoided. The device is portable and can be carried by a child everywhere he/she go. The solution represented in this paper takes the advantages of jewelry designing, Google maps, Geo-fencing, GPS, and SMS etc. As per previous works there was implementation of SMS application but in addition to that we have added jewelry designing which makes the device more child-friendly and easy to use, we also implemented GPS which helps in live location tracking, Geo-fencing which will alert as soon as the child goes out of the boundary limits and SMS quick alerts which will provide replies in case of poor network connectivity. This feature enhances the device and provides child safety to larger extent.

REFERENCES

- [1] NicoFremann, Dennis Wilmsmann, "Digital Jewelry – The technical part" unpublished
- [2] B.Guruprasath, "Digital Jewelry made possible using wireless communication "unpublished
- [3] How Digital Jewelry will work on Howstuffworks. [Online] Available: http://www.howstuffworks.com/How_digital_jewelry_will_work.html
- [4] Digital jewelry on seminar projects [online] Available: <http://www.seminarprojects.com\generaldiscussion\digitaljewelry>
- [5] Frank Vahid, Tony D. Gavages, Embedded System Design: A Unified Hardware/Software Introduction, John Wiley & Sons, 2002.
- [6] The Eclipse Foundation, available at: <http://www.eclipse.org>.
- [7] Android Developers, available at: <http://developers.android.com/sdk/index.html>
- [8] Geo-Fencing ,available at: <http://www.fieldtechnologiesonline.com>
- [9] Ghaith Bader AL-Suwaidi, Mohamed Jamal Zemerly, "Locating friends and family using mobile phones with global positioning systems (GPS)", "IEEE/ACS International Conference on Computer System and Applications,2009.