

Location Tracking with Safe Paths and Safe Zones in Android

Mr. Manish Bane

Department of Information Technology
K. J. Somaiya College of Engineering
Vidyavihar, Mumbai, Maharashtra.
e-mail: manish.chava@gmail.com

Prof. Sujata Pathak

Department of Information Technology
K. J. Somaiya College of Engineering
Vidyavihar, Mumbai, Maharashtra.
e-mail: sujatapathak@somaiya.edu

Abstract— In this paper, we will present the process of tracking location with respect to set safe paths and safe zones in an android smartphone for an android smartphone. For the safety of women and children, using android phones, we have introduced the concept of safe paths and safe zones. The safe paths could be set for respective person, using the android smartphone, and the person's location would be tracked against these safe paths. So, whenever the person is deviated from the safe path with a certain threshold, specified by the user, a notification or an alert is generated on the android smartphone indicating the deviation from specified safe path. Similarly, safe zones could be set so that whenever person enters or exits the safe zone an alert is generated on android smartphone.

Keywords- Safe Paths, Safe Zones, GPS, Android, Location Tracking, Real Time Location Tracking

I. INTRODUCTION

The world out there is full of threats and risks, to which, we and our loved ones are very much vulnerable. While reading the newspaper, we often come across news of kidnappings, abductions, rapes etc. Speaking of statistics related to kidnappings, India stands among top 5 countries in the world [1][2]. According to the data from NCRB India (National Crime Records Bureau), a child goes missing every eight minutes, in the country. Among these missing children, only 60% get traced, remaining 40% are left untraced [3].

These statistics can be reduced down with tremendous numbers if people start using the tracking technology to lookout for their children. There are some tracking applications available on android platform. But those are simple tracking applications which require manual intervention for generating alerts. We wanted to design an application which will require minimum manual intervention and that once the setup is done the application will automatically do its work intelligently. So, we came up with the idea of location tracking with Safe Paths and Safe Zones.

A. Safe Paths – The Concept

Safe Paths are the paths on map selected by the user for another user, let us call that user as loved one, from a set of available paths between the source and the destination entered by the user. These paths are called safe paths because either these paths are safe from user's perspective or these are paths on which user's loved one travels regularly or more often.

B. Safe Zones

The concept of adding safe zones mechanism was to alert the application user about the distance covered by the device. Application will allow user to add safe zones for added members. Once the safe zones are added, the application will

generate alert whenever the added member enters or exits the safe zone. This mechanism will give user an idea (i.e. if user is not continuously tracking the device) about the location of user.

II. METHODOLOGY

A. Client-Server Model

The project comprised of two modules:

1. Android application - Client
2. Web Service – Server

1. Android Application:

The application was built to send location data to the server as well as receive other user's location data from the server. The application provided user interface for managing "Safe Paths" and "Safe Zones" for added members.

2. Web Service:

Web service acted as a mediator between the applications on different android smartphones. The data received from android smartphone was stored in database by the web service. The stored data was then passed to the application on authentic requests.

B. Libraries and APIs used in application

1. Google Maps API:

Basic requirement for any location based application.

2. Google Places API:

Used to get places through Autocomplete Textboxes.

3. Google OAuth API:

Used to authenticate emails of registered users.

4. Google Play Services Library

Another basic requirement for using Google services.

C. Registration and Signing in

After installing the application on android smartphone, user needs to register in order to use the services. The application provides the list of added account names into the android smartphone. User needs to select account for registration, which will be his/her login ID while signing in. Once registration is successful, user can sign in using the login ID and password used for registration. Figures 1 and 2 represents the process of signing up and logging in respectively.



Fig. 1 Register



Fig. 2 Login

D. Adding members for tracking

To track a member, user needs to add that member using member's login ID. Once added, the request is sent to the member and once the requested is accepted user can track the location of added member by adding safe paths and safe zones. Figures 3 and 4 represents the process of adding member and accepting request respectively.



Fig. 3 Add Member



Fig. 4 Requests

E. Adding Safe Paths

The application provides an interface to user wherein the user can select source and destination. Between the source and destination, user will be provided with various available routes on the map, from which user is required to select the paths which he/she thinks are safe for that particular member. These routes are saved as Safe Paths for added member. Once the safe paths are added, the location of added member will be checked against the safe paths. If the member deviates from the path more than the distance threshold specified by user, an alert is generated in user's android smartphone. Figure 5 shows user interface for selecting source and destination, Figure 6 shows user interface for selecting and adding safe paths for member.



Fig. 5 Selecting Source & Destination

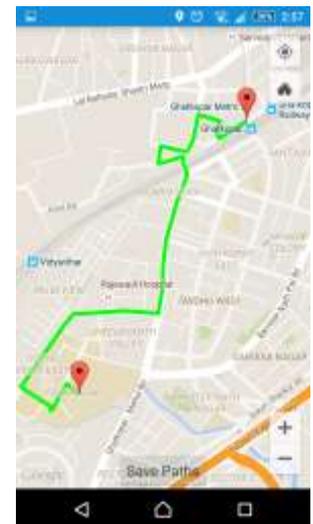


Fig. 6 Adding Safe Paths for Member

Tracking with Safe Paths – Algorithm

1. Safe paths, for the added member, are retrieved from the server.
2. Current location of the added member is retrieved from the server.
3. Each path's co-ordinates are compared with the co-ordinates of current location. Arithmetic is carried out to find the distance between the two co-ordinates. Once the distance between current location and all co-ordinates on safe paths is found, the minimum distance is noted and compared with the threshold, which by default is 300 meters. So, if the minimum noted distance is greater than 300 meters an alert will be generated informing the deviation of the user from the safe path.

F. Adding Safe Zones

The application provides a map to the user, on which, user can either pin point the location of safe zone or enter the name of place to be added as safe zone. These safe zones are then saved on the server and the user will be informed whenever the member enters or exits the safe zone. Figures 7 demonstrates adding safe zones for a member.

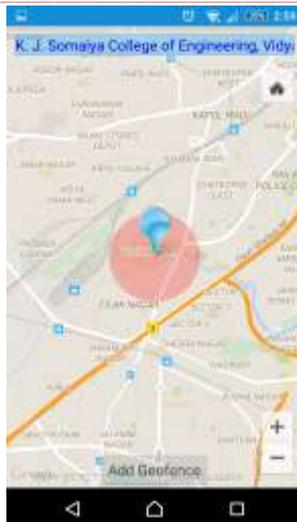


Fig. 7 Add Safe Zone

G. Alerts for Deviation from Safe Paths

Whenever the member is deviated from added safe path an alert is generated in the notification area of Android device. When clicked on the alert, user is presented with the added safe paths and current location of the member who deviated from the safe path. Figures 8 shows deviation from safe path whereas Figure 9 shows the alert due to deviation.



Fig. 8 Deviation from Safe Paths.

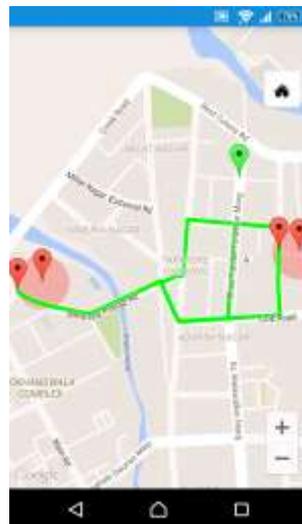


Fig. 9 Deviation from Safe Paths.

H. Safe Zones Entry and Exit Alerts

Whenever the member enters or exits added safe zone an alert is generated in the notification area of Android device. When clicked on the alert, user is presented with added safe zones and current location of the member who entered or exited the safe zone. Figure 10 demonstrate the working of

Safe Zone entry alert whereas, Figure 11 demonstrate the working of Safe Zone exit alert.

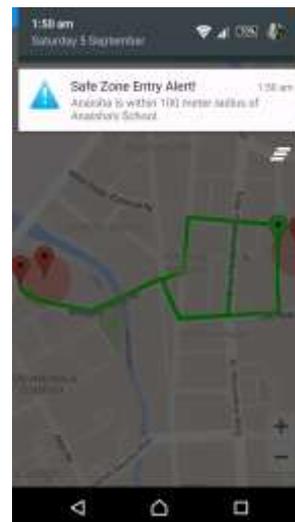


Fig. 10 Safe Zone Entry Alert

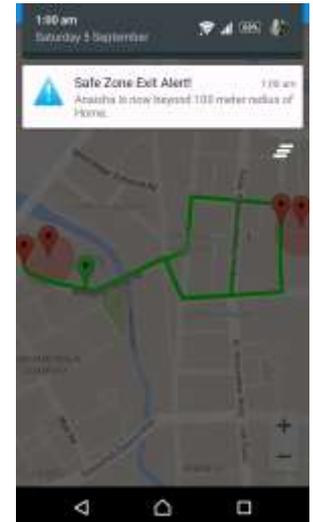


Fig. 11 Safe Zone Exit Alert

CONCLUSION

With keeping in mind, the safety and security of women and children, we came up with the concept of Safe Paths and Safe Zones and successfully implemented it on Android platform. Alerting user's loved ones of any possible dangers with respect to the location of the user, without any intervention from the user, was the main motive of the concept.

REFERENCES

- [1] Steven Perlberg. (2013). The 20 Countries Where People Get Kidnapped The Most. Retrieved from <http://www.businessinsider.in/The-20-Countries-Where-People-Get-Kidnapped-The-Most/articleshow/27253192.cms> (accessed September 01, 2015).
- [2] Ludovica Iaccino. (2014). Top Five Countries with the Highest Rates of Kidnapping. Retrieved from <http://www.ibtimes.co.uk/top-five-countries-highest-rates-kidnapping-1441648> (accessed September 01, 2015).
- [3] Shreya Shah. (2012). India's Missing Children. By the Numbers. Retrieved from <http://blogs.wsi.com/indiarealtime/2012/10/16/indias-missing-children-by-the-numbers/> (accessed September 01, 2015).