GEOFENCING FOR DISASTER MANAGEMENT SYSTEM

Anish Deshpande
Student, Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India

Abhishek Shingte
Student, Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India

Ashutosh Dwivedi
Student, Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India

Swapnil Sonawane
Assistant Professor, Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India.

***Abstract*— We are designing an android application which is useful for saving many human lives. Help me app is working on an android operating system. Number of people squander their precious life in natural calamities such as accidents, floods etc. However, the implementation of new solutions using these technologies requires concepts based on information and resources sharing and inter-services communication. Sharing the information between services allows acquiring more knowledge about the current events on the Disaster area that helps participants making appropriate decisions. This paper also discusses about what features could be added in the app in future to make it more effective in information management in a post-disaster scenario. We create Geo-fences that will help to alert about the restricted area which is made by the user manually in the app. Database likewise complete data of the user and the co-ordinates of the Geo-fences is store on server. Later we will access those data from server to our mobile by using this application.**

Keywords— geofencing; location based services; swift; android application.

I. INTRODUCTION

Disaster management is the formation of arrangement through which society decreases vulnerability to risk and cope with disasters. It does not preclude or eradication the defiance, instead it concentrates on making plans to reduce the impact of disasters. Omission to produce a plan could lead to damage to assets, human mortality, and lost revenue. We can't predict the future of nature. Natural disaster like earthquake, flood is increased day by day which lead to loss of life as well as property. Internationally, there have been some practice in implementation of some program for the effective information management post-disaster. The Sahana free and open source disaster management system [6] conceived after the 2004 Sri Lanka Tsunami is a web based collaborative disaster management solution which was used in Philippines during Asian Quake in Pakistan (2005), Southern Leyte Mudslide Disaster in Philippines (2006) and the Jogjakarta Earthquake in Indonesia (2006) (Fajardo and Oppus 2010)with great effectiveness in rescue. For example, among techniques and approaches used are service-oriented architecture (SOA) principles . In a typical scenario a merchant is notified when a valued customer is within some distance of a retail outlet, upon which the customer is delivered a coupon or some notice of a special promotion. This is an example of what we term location based notification, which we define as the act of sending a text or multimedia message to wireless subscribers when they are determined to be in a particular geographical area. The most popular scenario involving location-based notification seems to be delivering coupons, but we believe that it actually has a wide range of applications. For example, it can be used to:

- Notify a consumer as they enter a shopping center that an office supply store's back-to-school sale is over in two hours.
- Send tourists brief multimedia descriptions of the monuments in the Washington, D.C. mall as they enter each monument's surrounding area.
- Communicate to fair-goers the current events inside the venue they are approaching.

- Notify drivers who enter a certain section of highway that construction two miles ahead is causing a backup and they should take a detour.
- Alert drivers that because of severe fog conditions ahead they should reduce speed immediately.
- Send a message to all subscribers in a certain area that their water supply will be cut off in half an hour to replace a section of pipe.
- Warn a game player that they are entering a "target zone" and are in danger of being abducted by aliens. Inform lottery players that they are close to the "pot of gold at the end of the rainbow" and that they should look for someone dressed as a leprechaun.

Thus we see a range of uses, from public safety and public service, to commercial promotion and tourism, to pure entertainment. In this work, an interoperable and cooperative platform, based on Geofencing techniques. Geo-fencing is executed on the mobile devices. It includes the continuous positioning of the mobile device as well as the continuous matching of the mobile's position with a set of geo-fences. The mobile device is considered to be a client that is mainly responsible to locate itself whereas the continuous comparison of the mobile's position with a large set of dedicated zones, called geo-fences[1]. Geo-notification plays very important role in geo-fencing. Generally the geo-fencing refers to the idea in which the user defines the boundaries virtually over a geographical area, and once the transition is detected over a boundary the notification is send to performed the desired action .

II. PROBLEM STATEMENT

The main problem statement for this is, based on geofence coordinates, how I can get geographically location-aware push notifications/messages to end users,[5] without lag and in as real time as possible, without having the application opened? That is, enabling location-awareness in the background, that can trigger relevant geopush messages, while optimizing battery usage and being as sensitive as possible to the privacy of end users. The main optimization is that of the battery but I can't optimize the life time so much that I lose the functionality of the program. In most cases when I am discussing geofences that means that I can't optimize life time so much that I loose too much accuracy of my position. This problem creates a new question how much accuracy am I willing to lose? The answer of the last question has to be depend on how much battery consumption I earn from that loss of accuracy.

III. PROPOSED SYSTEM

GEO-FENCING: Geo-fencing combines awareness of the user's current location with awareness of the user's proximity to locations that may be of interest. To mark a exact location, it should specify its latitude and longitude. To adjust the proximity for the location, it should add a radius. The latitude, longitude, and radius define a geo-fence, creating a circular area, or fence, around the location of interest. Geo-fencing is executed on the mobile devices. It includes the continuous positioning and/or tracking of the mobile device as well as the continuous matching of the mobile device's position with a set of virtual boundary i.e. geo-fences. Geo-fence can be circular or polygonal geo-fence. The mobile device is considered to be a client that is mainly responsible to locate itself and the continuously comparison of the mobile's position with a large set of geo-fences.

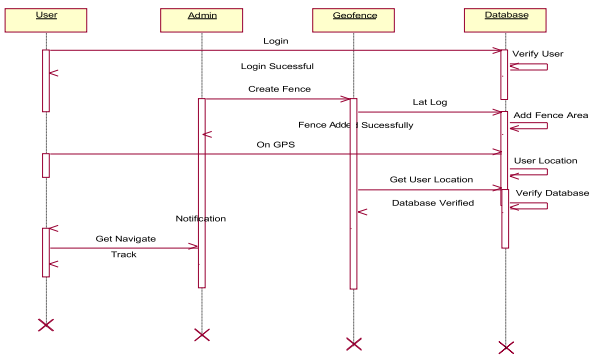
Types of Geo-notification-

(1) Static geo-notification: This is based on the geographical position of a mobile user with respect to a fixed area. For Example, notification is send to particular mobile user when he entered into geo-fence, for example student enter into school campus.[2]

(2) Dynamic geo-notification: This is based on the geographical position of a mobile user with respect to a changing data stream. For example, the "open parking space" notification that is sent to mobile users who happen to be driving nearby.

(3) Peer-to-Peer geo-notification: This is based on the geographical position of a mobile user with respect to other users. For example, go through notification of nearby friends on a social mobile app like Facebook, or Foursquare. Our system delivers risk information timely to specific users who are in the area where a disaster has occurred or may occur with high probability. We assume that each user has a smart phone with position detection and Internet connection capabilities. Because the users usually handle their smart phones, they can also acquire information smoothly when a disaster occurs. Moreover, it is possible to detect the user's current location and receive information on the disaster from the Internet.[4]

Fig 1: Sequence Diagram of the system



III. SYSTEM OVERVIEW

The following project creates a Geofence around the area where the disaster takes place. Geofencing technology is allowing mobile apps to do incredible things, and geofencing is the next step in this useful and ground breaking innovation. Our system delivers risk information timely to specific users who are in the area where a disaster has occurred or may occur with high probability. We assume that each user has a smart phone with position detection and Internet connection capabilities. Because the users usually handle their smart phones, they can also acquire information smoothly when a disaster occurs. Moreover, it is possible to detect the user's current location and receive information on the disaster from Internet.

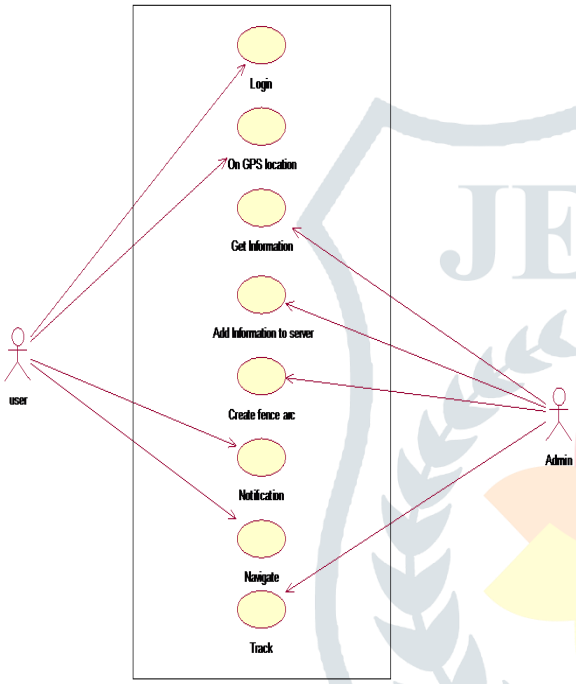


Fig 2: Use Case Diagram of the System

IV. IMPLEMENTATION OF PROPOSED SYSTEM

This project integrates the geo-fencing technique and mobile android applications so as to provide the right information to the smartphone user at the right place and at the right time. Geo-fencing technique is used to fence the particular area i.e the areas where accidents happen on a regular basis due to various reasons (like traffic ,merging of roads) and the crime prone areas (like chain snatching) where specific crime occur multiple times. The boundaries will be fenced using software like Arcgis, Qgis[5] and Google earth after that the boundaries or the fenced area file will be loaded in the application which will track the user location and notify the user as he/she enters the fenced boundary.

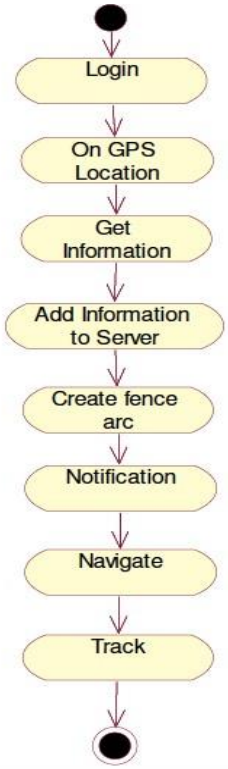


Fig 3: Activity Diagram of the system

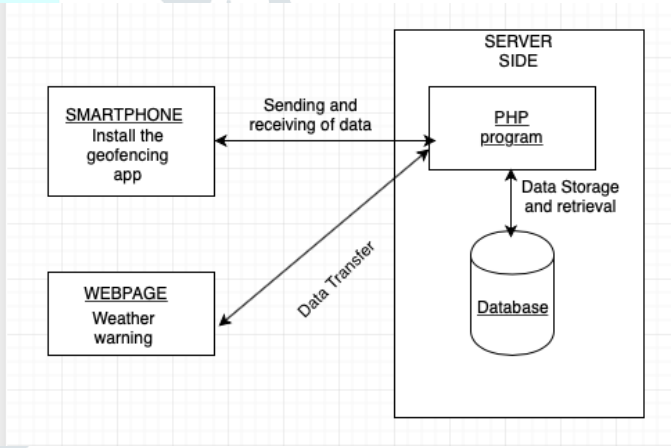


Fig 4: Client-Server Architecture

V. RESULT

Expected result for this project is a smartphone application that would give proper alerts to the user who is entering the disaster affected area. It will give the nearest relief camp location to the user so that the user can safely move towards the safe area or outside the disaster affected area marked by the government authorities.

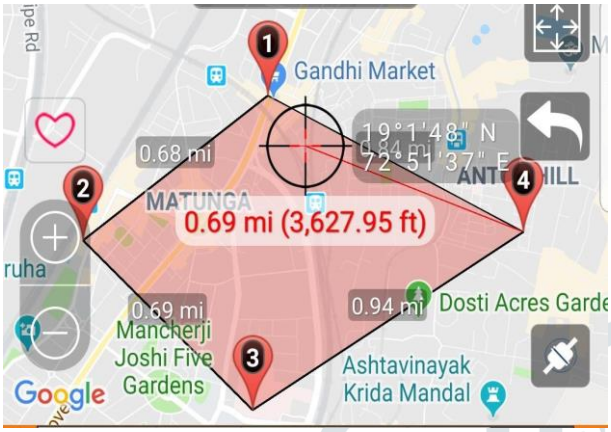


Fig 5: Plotting the points in map

Fig 6: Longitudes & Latitudes

VI. CONCLUSION

In this paper we have developed a first prototype general-purpose notification service. The prototype serves as a testbed for performance evaluations, and as a vehicle for exploring the systems-level issues involved in our distributed proximity detection system. Initial performance studies, in which we are now engaged, are focused on determining the performance characteristics of our architecture relative to the GSM LCS architecture. We confirmed that our system notifies disaster information when a user enters the fence with Internet on by the experiment. The location was at 20-30m outside the fence. When exiting the fence with Internet off, we found that the information is delivered at the place more than 100m outside the fence. Internet is necessary for precise detection of location by using geofencing. Our goal is not to create a new protocol in emergency response, we have just maximize the use of smart phones to act as medium and to help people save their lives in case of disaster. Command centers will also benefit in a way that the location of the user are easily detected and plotted on a map. Our proposed system supposed to lessen the response time it takes to respond to emergency events. It also provides reliable information that might help in identifying accidents

ACKNOWLEDGMENT

We are thankful to all those who helped us throughout the course of writing this paper. Their valuable and insightful inputs and constructive criticisms have been of utmost importance.

REFERENCES

[1] Vasos Hadjioannou, Constandinos X. Mavromoustakis, George Mastorakis, Evangelos K. Markakis, Dimitra Valavani, Evangelos Pallis, “Context Awareness Location-based Android Application for Tracking Purposes in Assisted Living” Public Sector Information and Communication Technologies (IJMPICT) Vol. 6, No. 2, June 2015

[2] Nataliya Hristova and G.M.P. O’Hare,”Ad-me: Wireless Advertising Adapted to the User Location, Device and Emotions”,Department of Computer Science, University College Dublin, Belfield, Dublin 4, Ireland, 2004

[3] "Using geofencing for a disaster information system - IEEE Conference Publication", Ieeexplore.ieee.org, 2019. [Online]. Available: https://ieeexplore.ieee.org/document/7550849. [Accessed: 25- Feb- 2019].

[4] "Near real time vehicle tracking using GIS - IEEE Conference Publication", Ieeexplore.ieee.org, 2019. [Online]. Available: https://ieeexplore.ieee.org/document/7095912. [Accessed: 25- Feb- 2019].

[5] https://www.researchgate.net/publication/274317021_Geofencing_20_Taking_Location-based_Notifications_to_the_Next_Level. [Accessed: 25- Feb- 2019].

[6] https://www.ijser.org/paper/Role-of-Open-Source-Software-and-ICT-in-Disaster-Management.html. [Accessed: 25- Feb- 2019].