GPS-Based Shelter Tracking Application During Natural Calamities

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Abstract—A GPS-Based tracking system is proposed for arranging shelters to the victims that are afflicted by natural calamities. The location manager and algorithms are assessed by using Android Studio software. The results demonstrate the approximate location of shelters to the victims and present the at most potential of the application.

Keywords—GPS, Shelters, Tracking, Android

I. INTRODUCTION

Being the commercial capital of India, Mumbai (also known as Bombay) is an island city which is covered by sea from 3 main directions and have several low-lying areas which makes Mumbai more vulnerable to calamities like floods, Tsunami, Hurricanes, cyclones, landslides, etc. During the season of Monsoon, water-logging is a very common issue in most of the locations in Mumbai. As the sea-level is increasing by 3.2 millimeters per year [], Mumbai will keep on facing this scourge even in other seasons. In our expedition of Android application development, we development a methodology which will support this social cause in the embodiment of this application.

II. BACKGROUND

A. GPS Technology:

Global Positioning System (GPS) was established by the United States Department of Defense (DOD) as a military operation. Since then the system is active and has become very useful for civilians in many systems and applications. This service was published for general public in 1996 for navigational purpose which was free of cost and also supported unlimited number of applicants and this service was accessible from anywhere in the world. Starting in 2004, the mobile phone industry began successful tests to incorporate GPS receivers into mobile phone devices Various satellites are launched by NASA, ISRO and other space organizations for accurate and 24*7 assistance for accurate for any consumer with a GPS receiver. Most of the current smartphones are equipped with a fully functional GPS technology.

B. Android Software:

The proposed application is designed and developed for smartphones running on Android (Marshmallow) or higher, Linux Kernel version 3.18.10 or higher and the API level of 16-18or higher. The development is done using Android Studio software which has the Android Software Development kit (SDK) which includes various libraries and emulators. SQLite database support is combined with the Android platform. The Android Development Tools (ADT) provides an Android emulator that allows for the simulation of GPS and Wi-Fi. The Android emulator is depicted in the Fig.1 displaying the Android desktop.



Figure 1. The Android desktop. III. LITERATURE SURVEY

The real-time tracking system is programmed by using GPS and GSM (Global System for Mobile) with give the location of the object which is carrying the tracker and sends the location via SMS. This system will eventually fail as when there will be no network on the GSM communication. [1].

A GPS-based wireless system is proposed by Vietnam Government to save the small boats of fishermen during calamities. This has a major drawback of signal disturbances created by the thunderstorms making the location less accurate. [2]

A GPS-based tracking system is made for keeping a track on the vehicle which is parked and it gives you an alert SMS when the vehicle is moved. It also gives an alert when the car exceeds the speed limit. This system has again the same drawback as of [1]; moreover the system is not real-time making it very less efficient. [3]

A soldier tracking wireless system is designed to find the soldiers which are not able to communicate with the control room. This system uses the body temperature of the soldier to track them. The system will face human errors as if the sensors are misplaced; the rescuer might end up inside the war zone. [4]

A Child tracking model is implement by using Bluetooth GPS application in which the location of the child will be shared if the child exceeds the speed of 2.8 km/hr. This system possess a major drawback regarding area of connectivity. As we know, the range of Bluetooth is 10m; due to which if the child goes far from the system there will be a loss of connection leading to the failure of the system. [5]

IV. PROPOSED SYSTEM

The application Programming Interface (API) will have the access to the GPS receiver, Audio/Video recording, calls/SMS transfer of the user's smartphone. The modern smartphones consist of WGR7640 GNSS RF receiver which is a fully functional GPS receiver developed by Qualcomm.[7] This receiver will receive the exact co-ordinates of the user via satellite communication and will send them to the servers where the co-ordinates of the nearest safe shelters are stored. The programmed system on the server will correlate the user's co-ordinates and the co-ordinates of the nearest shelter. The outcome of this correlation will be sent to the user's smartphone again via satellite. Basically, there will be a 3-way communication between the smartphone, satellite and the servers. As soon as the co-ordinates of the shelter is received; the user will be redirected to the application's Map API or through the Google Maps API. [6]

A. Google Map in Android

Android provides several objects to operate the maps in Location Based System (LBS) system such asMap View which displays the map. To implement this a Map Activity class is there. To interpret this map it provides the overlays class. Even it caters canvas by which we can easily create and display multiple layers over the map. Moreover, sufficient functions in the library are there to zoom the map, summarize the map by means of Map Controller.

B. Location Manager

Location Manager class of ADT is used to manage all other components required to establish a LBS system.

C. Location Provider

Location provider displays the technology to categorize the physical location i.e. to handle GIS. Location Provider component of Android application is a present to aid the assurance of available provider and selection of suitable one.





Fig.2 flow diagram of the proposed application.

D. Location Visualization:

Once a location is known, then one may wish to mark it on a map to visualize the location. Marking the location on a map when the coordinates of the location are known is quite straightforward. Google maps, for example, provide simple interfaces to mark locations. A GPS device normally provides locations in the NMEA (National Marine Electronics Association) format. Fig.3 illustrates an example of NMEA file.



Fig.2

V. CONCLUSION AND FUTURE WORK

The Android platform proved to be capable of administering the functions performed by the application. Our application has showed how the GPS data and Google Maps API are combined together to help the victims affected by such natural calamities. Only in-built GPS of a smartphone and our programmed servers were used. Many more innovative applications are possible as far as Android's vast sensor capabilities are concerned.

Future development is planned to integrate and connect the victims and the on-field rescuers to ameliorate the rescue operation. This will work as a catalyst in the process of helping the victims and getting them into the safe zone.

VI. IMPLEMENTATION OF THE WORK



About JSON: JSON is known as JavaScript Object Notation is a simple data-interchange format. It is easy for users to read and implement. Based on a subset of the JavaScript Programming Language, Standard ECMA-262 3rd Edition -December 1999. We do not require JavaScript thus an independent language and can be used in AJAX. This makes implementation easier for this project.

Since Location of the shelter is required, we also need Google Map API.

What is a GOOGLE Map API? [5]

Google APIs is a set of application programming UI created by Google allowing communication with Services of Google and the integration to other services.

VII. OUTPUT OF THE APPLICATION

This image shows all the listed shelters on the application which can be used by the victims. This shelter are in and around those affected areas where the victim is stuck.

Here by helping proper navigation towards the destination or shelter selected by the user. This would make him/her walk through the routes that will be provided in the application which is the next step ahead.



REFERENCE

- Hind Abdalsalam Abdallah Dafallah "Design and implementation of an accurate real time GPS tracking system" ISBN: 978-1-4799-3166-8 ©2014 IEEE https://ieeexplore.ieee.org/document/6991376/
- [2] T. D. Ta and T. D. Tran, D. D. Do, H. V. Nguyen, Y. V. Vu, and N. X. Tran "GPS-based Wireless Ad hoc Network for Marine Monitoring, Search and Rescue (MSnR)" IBSN: 978-0-7695-

www.ijltemas.in

4336-9/11 © 2011 IEEE https://ieeexplore.ieee.org/document/5730373/

- [3] M. A. Al Rashed, Ousmane Abdoulaye Oumar, Damanjit Singh "A real time GSM/GPS based tracking system based on GSM mobile phone" ISBN: 978-1-4799-2975-7/13 ©2013 IEEE https://ieeexplore.ieee.org/document/6767186/
- [4] P. Chakravarth ,S. Natarajan., M. Anto Bennet. "GSM BASED SOLDIER TRACKING SYSTEM AND MONITORING USING WIRELESS COMMUNICATION" http://s2is.org/Issues/v10/si/papers/paper18.pdf
- [5] Norsuzila Ya'acob, Siti Sarah Saaiddutdin, Azita Laily Yusof and Nani Fadzlina Naim "BLUETOOTH GPS APPLICATION

BASED ON LATITUDE AND LONGITUDE FOR CHILD TRACKING MODEL" http://www.arpnjournals.org/jeas/research_papers/rp_2017/jeas_s_ 6034.pdf

- [6] Official Google Map API website, URL http://code.google.com/apis/maps/faq.html/
- [7] WGR7640 GNSS RF RECEIVER IC DEVICE SPECIFICATIONHTTPS://DEVELOPER.QUALCOMM.COM/DOWNLOAD/ SD410/WGR7640-GNSS-RF-RECEIVER-IC-DEVICE-SPECIFICATION.PDF