A Review Paper on GIS Web-System to Support Emergency Situations in Urban Areas and Provide Services

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Abstract— The agility measure and time response during the emergency situation is that hour when the incident has existed. Prune the risk of losing lives & property from appropriate response at emergency place. Therefore this paper-thin determine and inspect the concurrent android petition, GIS and web-base system that is focusing with prior information of inspected dataset. Purpose of the system is intended in case of emergency in organizations and society. Emergency incorporates accidental, health care, fire platoons, external emergency (storm, floods, and earthquake). The person in an emergency or anybody at the emergency place will send his current location from smart phone gadget; geo-location coordinates dispatch on each supplication onto the server. The proposed petition will respond to proper request from client.

Keywords— Emergency , Geographic Information System (GIS),geo-locations

I. INTRODUCTION

Human support is always of colossal support for a developing country like India. India even though saturated with 1,281,050,867as of May 20 2015 (with reference: World meters' RTS algorithm) [16] which is equivalent to 17.5% of the total world population, not many are overlooking the guarded life of an individual. In emergency situation Transportation of a patient to hospital seems simple but in actual it is pretty hard during peak hours. An appropriate operation for the handling of emergency incidents is the routing of responding vehicles to incident sites and then to closest and appropriate hospital. Similarly, in case of fire emergency at urban area contacting to fire services placed very hard onto numbers they has provided ,numbers looks always busy at emergency stages . GIS technology can support emergency responders to provide efficient response in quick succession time through solving the steering problems.

Presently in our country, different emergency communication and response Systems are in place for police, fire brigade, ambulance, disaster management, civil defense etc. These systems are accessed through different numbers such as 100(Police), 101(Fire), 102(Ambulance) & 108 (Emergency Disaster Management)[17].For example Somewhere at city personal from command center and person who called for emergency ,this system help with response without any delay in service. System will act as interface between agencies and the one who notify an incident. Through the Response got from source geo-Location the response team gets the shortest path to reach to the place of incident to avoid delay. Queries will be solved based on the severity, urgency, need.

The Emergency and high volumes of cases tends to increase unpredictable cases in worldwide. The purpose towards coordinated incident management system is to give coordination and structure in management of incidents. It improves regulation and efficiency in management response. A purpose was to develop a integrated web system whereby different departments, agencies could work together for common goal in well-organized manner. The Time Taken and the accuracy of information are the problem normally faced by Police, Fire Fighter and Ambulance in emergency case department [9].

Collecting emergency information is very crucial step towards good emergency management. An Emergency management system should be reliable for immediate action and access easily from anywhere and should have well sophisticated staffed, so that affected person can get immediate help.

The paper presents mobile application to report about any emergency situation from mobile phone, which turns helping authorities of the web- applicant to get current geo-location from the mobile phone and place services that are required about at incident place. Getting Parallels and meridians values from the geo-location requires two types of location providers, the GPS Location provider and Network Location provider, any of the providers is required to get current geo-location of the user's device. GPS Provider will get geo-location at indoor area and, the Network geo-Location provider will not get geo location when the network connectivity is poor. After getting geo-

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location will send onto the server, server will alarm with emergency incident geo-location i.e. parallels and meridians values of the earth with emergency service required, so that the geo-coordinates accessed from the server and overlaid on a map. Nearest services are found on a map from incident happened such as hospitals, fire brigade, police stations and others.

II.   LITERATURE REVIEW

The Emergency management involves into four phases: mitigation, recovery, response and preparedness. Emergency never coordinate with prior information, the detailed information has to be filled to saves lives at incident places. Proposed Emergency management is for Urban Area of Aurangabad city which is located with Geo-coordinates 19.88°N 75.32°E [18]. Our Web-system is for Urban Areas at Aurangabad city as a case Study. Emergency Management Literature categories with two phases i.e. existing systems reviews & current Different technologies for emergency management.

A.   Existing Systems

For Emergency or Non-Emergency cases, Aurangabad Municipal Corporation (AMC) provided Online Complaint Web-System, where user can register their complaint with detailed information such as type of complaint, it's Sub-type, ward wise Complaint registered, Landmark, Geo-Location & Description followed by Details of Complaint Registered Person then After registering complaints Token will generated for Registered Complaints then onto respective department these requested complaints forwarded. User can confirm Status of the complaints online via Token Number of Requested complaint [19].

For Fire Emergency, medical, police services in Indian state free telephone numbers are provided such as System 1-0-8 / 1-0-0. Emergency service System 100 provided for calling police. Emergency incidents reported from 1-0-8 require basic information so that call taker dispatches appropriate services to the incident person [10].

B.   Current software's for Emergency managements

(a) Disaster management by integration of web services with geospatial data mining

Implemented system creates SMS alert system for the government authorities so that they reach accident spot and extract knowledge rules for analysis. System has two emergency phases like ambulance facility and police. System accessed on any GPRS enabled device. System accessible for government authorities and common user. Current Geo-location for help on accidental spots and will work as an SMS alert system to the government authorities. System will be helpful for the Roadways planning and transportation to the respective authorities [11].

(b) MyDisasterDroid Android Application

For Philippines country, there will be system that help in the effective provision of rescue to disaster- affected areas. This MyDisasterDroid Android application determines optimum routes along with geographical locations that the rescures need to take to serve the most of peoples and provide for maximum coverage areas in short period of time. Genetic algorithm where applied for most optimum route [12].

(c) Mobile Emergency Response Application Using Geo-location for Command Centers

It uses Geo-location for command centers. It is an integrated web and mobile based application for getting to emergency request for police, fire truck and ambulance for the urban areas. Application detect current users geo-location and send onto web- application, type of service selected with detail information like age, mobile number and geo-location of user so that dispatch units will reach incident place easily [13].

III.   WEB-BASED GIS SYSTEM

Proposed web-system architecture have two parts i.e. Mobile & web-entreaty server .Mobile entreaty uses Android Technology for user friendly GUI and web-Application we have uses scripting language PHP and MYSQL for the interaction with geo-location database. These technologies can offer superior results. Also Technology like AJAX(Asynchronous JavaScript) For displaying dynamic maps on to the web-entreaty result of current geo-location of users .We uses integration of scripting languages with AJAX in their original forms and provide a efficient way to data repository for handling system easily [14].

The Architecture system includes three emergency personals like Fire platoon, police and Hospital prerequisite supported mobile environment. Organic calamities earthquake, accident, flood, fire doesn't have instant of occur, at any instant it can happen, so that role of emergency reaction teams is to ready with any situations to save the lives of human beings at urban areas.

A.   User Interface Design

In this phase, the client Enter into the application. The user automatically retrieves the current geo-location after selecting onto the Get-Location Control from application. The Get-Location control have Parallels and Meridians points from earth surface, these points selected using Network or GPS Location Furnishers. Recommended any of the above providers is enough to get current geo-location of user device. In android gadget to access the current geo-location, user have to set permissions onto the AndroidManifest.xml file [21] which presents require information about the android system.

```
<manifest ..>
<Uses-permission
android:name=android.permission.ACCESS_FINE_LOCATION"/>
<uses-permission
android:name="android.permission.ACCESS_COARSE_LOCATION"/>
<users-permission android:name="android.permission.INTERNET" />
</manifest>
```

Fig.1 Manifest xml file to set permissions

Where:

ACCESS_FINE_LOCATION: It gets permission for both Network and GPS Providers

ACCESS_COARSE_LOCATION: Android application uses network location provider

INTERNET: permission is required to use network provider [20][22].

B.   Configuration of map and Registration

Natural calamities of incident geo-location mark with red pin, which is geo-location of complaint person at incident place .Map uses with geo-coding of geo-location. After geo-coding it is capable to show routing information from service provider team to disaster placed [14].

C.   Selection of Services

The person at incident place has to select type of services person require, the person can be any user who have mobile application installed onto the device. Application provide different service teams according to disaster occurred such as in case of accident , geo-location selected automatically with ambulance service from nearest located hospital. After receive geo-location, selecting type of services geo-data send on to web-application server. By using Web services geo-data send onto web-application for further assessment into the emergency situations.
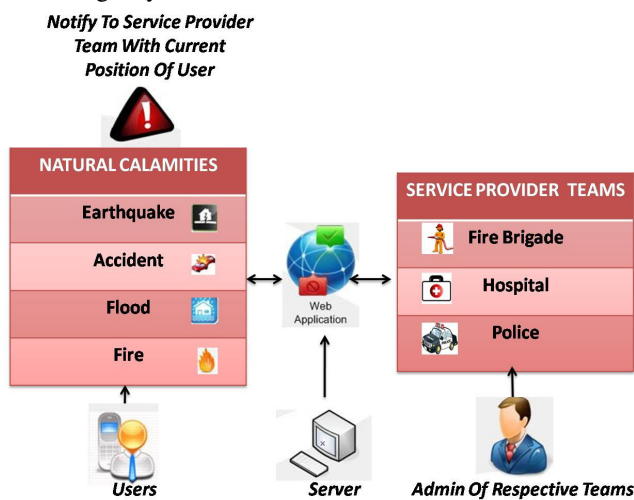

Fig.2 System Architecture

D.   Web Application Server

The WFS (Web Feature Service) and WMS (Web Map Service) is used to discover line and point data in the map [14]. The collected parallels and meridians geo-coordinates of fire platoons, hospitals & police stations pointed in to the map. Collected geo-coordinates of emergency platoons selected for the Aurangabad city. In proposed system, after receiving disaster geo-location co-ordinates automatically get selected type of services user has selected , so that accordingly web-system administer forward to the respective department so that emergency teams gets notify about the query.

Geo-located request is store at MYSQL web-server database, once the person at emergency position click to request , the system electronically forward the user's geographical points using mobile 's GPS. The web system will retrieve the forwarded request from mobile application and plot into the Google Map's real-time [13].

Web-system verify emergency dispatch units, whether emergency services provided onto the geo-location , identify services provided onto the geo-locations then change status of report to responded.

IV.   COMPARATIVE ANALYSIS OF DIFFERENT EMERGENCY MANAGEMENT TECHNIQUES

The need of understanding emergency management from a comparative view is unpaid to several reasons. Natural calamities and man-made emergencies, such as floods, building collapses, earthquake or nuclear services issue a big challenge to public emergency services. Emergency impacts onto all nations indirectly or directly hence various techniques used with their methods are to be compared.

The table below discusses works to be ready by various authors on Emergency Management System Analysis. What are the various types of methods or authors, which techniques used onto the system, main event phases, accuracy of system, emergency types used onto the system and we analyses all different methods with limitations of the system discussed below:

Table 1. Different Emergency Management Techniques comparative Analysis

Author & Year of Publication	Techniques used	Event Phase	Accuracy on the basis of scope	Types Of Emergency	Limitations
N Jing et al.(2014) [1]	context-aware disaster response system Uses Collaborative Filtering Approach	Future emergency(disaster) management and relief	Medium	Tsunami, Earthquake.	Sky guard does not support the privacy issue when investigating and storing the preference and feedback of mobile clients.
L Zhigang et al.(2010) [2]	GIS Technology with spatial data organization for urban areas.	Disaster Response, emergency documentation provision and Aid in Decision Making(AMD)	Medium	cyclone, Floods, wildfire etc	It is a complex for setting up and research in urban emergency, management.
S Sadik et al.(2006) [3]	Scalable fault tolerant Agent Grooming Environment SAGE	Disaster response, Mobile agents, distributed information retrieval and searching techniques.	High	Earthquakes	It doesn't define the mechanism for collaborative behaviour among group of mobile agents.
SSK Baharin et al.(2009) [4]	GIS Technology, spatial DBMS	Emergency Response	Not Described	All types of disasters.	System does not provide information about dimensional model at Real Time Data Warehouse(RTDW)
R Abdalla et al.(2007) [5]	GIS Interoperability with emphasis on critical infrastructure sectors. GIS and Web-base GIS Technology uses.	Strength and weaknesses of GIS interoperability in case of disaster and also demonstrate as a case study for Ontario municipalities (i.e. Toronto, Waterloo, Kitchener and Dufferin country).	High	Focus on flood emergency using interoperability technique also in case of earthquake	System has only two models which are earthquake shakemap and hydraulic simulation for input to GIS Database. Other models gives complete information on cascading effects grows failures and systems dynamics included into GIS databases for advanced capabilities.
Z Alazawi et al.(2011) [6]	Vehicular ad hoc network (VANET) ,Mobile and cloud computing Technology	Emergency Respons11e ,Intelligent Transport System(ITS).	Average	Earthquakes, Tsunami	Vehicles can communicate via only V2V in case of traditional disaster and to the network infrastructure via V2I, only when connectivity link available.
A Meissner et al.(2012) [7]	Disaster response mechanism	Response and recovery phase.	Medium	Earthquakes, floods, plane crashes, high-rise building collapses etc	It doesn't provide require solutions for encryption and data integrity.

R Jeberson Retna Raj et al.(2012) [8]	GIS Web services, Asynchronous JavaScript (AJAX), Extended Mark up Language(XML)	Provide services to emergency affiliated areas, finding possible routes to reach location.	Medium	Police, fire and medical.	In case server down requested service onto command centre can't understand request so further different techniques have to applied to overcome situations .

V.   ROLE OF GIS IN EMERGENCY MANAGMENT

A Geographic Information System or GIS is a computer based system which allows to map, model, query, and analyze large quantity of data within a single database according to their location [23].

GIS is mainly identifies the objects. Because of use of telephonic emergency complaint report authority doesn't identify correct address of the area. Emergencies cases it further worse the condition if user gives wrong address so as to get the help and command team may not knows the every place so it takes a time to reach to the incident place when question comes for the case of death and live at emergency case. With the help of GIS observer when identifies the location of the person and tracked automatically using GPS or network device.

GIS can arrange computer-aided dispatch systems which is one of the primary components. Foundation for emergency management activities are focused on three objectives which are property, protecting life & the environment .To get these objectives with the assist of GIS, we need proper [15].

- Planning: Emergency programs starts with identifying proper geo-location problems. By using a GIS, We pinpoint hazards and begin to evaluate the potential emergencies.

- Mitigation: Eliminates the probability of disaster.

- Response: Emergency assistance for victims.

- Preparedness: For saving lives, minimizes disaster damage and also measures disaster operation response.

- Recovery: Property and the environment, fast threat to life.

CONCLUSIONS

In this paper-thin, we initiate the work of web technology and mobile based terminology to add another foundation for emergency response. Goal of our system is to not just create new regulations in emergency response, we try to increase the use of smart phones to help peoples and save their lives in case of disaster.

The considered method used the current trends i.e. Location based services (LBS) in mobile gadgets and web technologies for efficient dispatching of emergencies units.

The Government jurisdiction require time to identify the geo-location and reporting is thus lengthened. The proposed work based on the current trend like GIS, this will help for identification of poor person and afflicted area & keep the optimized route to immediate services.

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