RESEARCH ARTICLE OPEN ACCESS

Efficient Emergency Services Using Mobile And Web Technologies

Suvitha Wilson[1], Vanshaj Gupta[2]
1(Computer Science, Vellore Institute of Technology, Vellore)
2 (Computer Science, Vellore Institute of Technology, Vellore)

Abstract:

In this paper, we present an innovative and fairly effective ways to manage emergency service departments. The paper aims at unifying various departments so that the service department personnel can cooperatively work together to provide various emergency services. The mechanism outlined is backed by web and IoT technologies to provide a technological edge to these departments. The paper aims at developing an efficient and coming of age platform to use and request emergency services with primary focus on Ambulance Services. Along with the booking mechanism, a piece of hardware has also been developed that assists the user to identify the shortest route possible with minimum traffic while he/she is requesting an ambulance.

Keywords — **Emergency; web technology; Internet of Things; Ambulance; hardware**

I. INTRODUCTION

Communication during disaster time is very crucial for both rescue team and victim. Emergency never comes with prior intimation. The System is intended to function in case of emergencies in society. The emergencies include Fire, Medical Emergencies, accident and External Emergencies (Earthquake, Floods, Strom or any other situation involving injury). In this paper we present Emergency Management System, which enables smart phone based ad-hoc communications at disaster times over Wi-Fi. The person in an emergency or anybody at the emergency site will call the EMS at avail service. Location Coordinates are sending on each request. The system works on the principles of client-Server system, wherein the server responds to the requests of the Clients. We have implemented the EMS Client Application, Rescue Application and Server. The Client and Rescue Application was Implemented as an Android Application. The Sever is implemented as a Web Based Java Application. We tested the System using several real Android Phones with GPS on phone, clients communicating over Wi-Fi.

Whenever there is some disaster or any other major emergency situation, the traditional modes and means of communication such as telephones are either disrupted or sometimes the situation does not permit their use. In such situation services like the one that has been presented in this paper come handy and prove to be life-saving.

Many such emergency services management systems are available at present but they all have some short comings and this paper aims at overcoming those short comings.

II. NEED FOR SUCH SERVICES

A. Pre-existing statistics

As per Indian government, department of highway and street transport report during the logbook year 2010, there were around 5 lac street accident occurred in India, which resulted in about 5.2 lac injuries and more than 1.3 lac deaths. About every 4 minutes one street accident happens there. Sadly, more than half of such accidents belong to the age group 25-65 years

B. Role of smart phones in emergency situations

The role of smart phone technology in emergency management has greatly improved in tracking

emergency zones, and also users can be tracked through enabled GPS. Through Internet connection, users have the ability to send and receive updates related to any disaster situation. Modern smart phones have computational platform with embedded sensors such as location detecting through maps, sensing strength of geomagnetic field. During reporting of disaster information, high power consumption is a major design challenge in the smart phones

III. MODERN TRENDS IN EMERGENCY MANAGEMENT

A Wireless Sensor Networks is basically used. The WSN focuses on short range communication protocols where as the center of attraction of wireless communication is long range message passing. Different mobile or smart phone applications involve invoking different sensors such as the magnetometer, accelerometer, gyroscope, GPS etc. All these crucial sensors are embedded in the mobile phone and can be used by any mobile application.

All these advancements in the mobile phone technology have proven to be the foundation for emergency systems as these can effectively used in managing emergency response because of their sensing and data exchange capabilities.

These advance technologies can be used to automatically invoke, detect emergency situation and send a request to the required response team so that a timely reaction can be carried out.

IV. PROBLEM STATEMENT

The paper focuses at solving two very critical problems faced by the various emergency service departments in our country. The first one is that different emergency service departments are unable to coordinate with each other due to the unavoidable time and technological constraints. For instance, if a traffic policeman has a prior knowledge about an arriving ambulance then he can act accordingly and provide a clear passage to the incoming ambulance which is of immense importance, but this is not feasible with the currently available technology and communication services. The second is the absence of a centralised regulatory system for various different emergency departments. This paper aims at creating a system that will allow the emergency service personnel to coordinate and work together toward mitigating any imminent danger.

This particular paper endeavours to solve two specific problems. Firstly, the app allows the user to book an Ambulance as per his/her location identified by the GPS.
Secondly, deciding the route from which to book the Ambulance is equally important. The IoT hardware piece provided in this paper solves this problem by allowing to identify the shortest route.

A. Booking an Ambulance

Disaster never calls or informs before happening. Almost all the disasters and emergency situations require urgent calling of the ambulance. The presence of medically trained personnel at the spot of emergency can make all the difference. During an accident or any other similar emergency situation, it is very much possible that the communication link drops or may be cellular voice calling network might not be available. An app would never fail during this time, and is surely more accurate in passing on the relevant details as compared to passing or sharing the details orally, which can very much be misheard or misinterpreted

B. IoT harware

Booking the ambulance is just one feature. It is equally important that the ambulance reaches the emergency location on time. To make this happen the IoT device allows the user to identify the shortest path with minimum traffic so that that particular ambulance can be booked.

V. METHODOLOGY

The following section outlines the basic methodology followed in the development phase of this paper. The paper has been developed using the waterfall process model and has a two part aim. The first part deals with developing a platform to book ambulances based on your GPS location and the second part deals with the IoT hardware piece that allows the users to identify the shortest and in turn, the most optimal route to be followed by the ambulance so that minimum traffic is encountered.

The methodology is as follows:

1. First of all, classify the various types of weaknesses in the current emergency service departments.
2. Then research various parameters responsible for these weaknesses.
3. Make a tabular format of various reasons responsible for the inefficiencies encountered in the current emergency departments.
4. Design a methodical approach to remove or mitigate these reasons in order to improve upon the existing service providers.
5. Incorporating these efficient mechanisms in the form of an app or website.
6. We will come up with a shared platform for various departments to communicate with each other and work together accordingly.
7. We will use an android platform to design and implement the app.
8. Ultimately, we will also design an IoT powered medical kit that could help identify optimum routes.

VI. ARCHITECTURE/FRAMEWORK

We will work with three types of real life problems related to emergency service departments which are as follows:

- **No coordination:** The currently existing system does not provide any scope for the various different types of emergency service personnel to communicate with each other and work accordingly so the problem can be solved easily and with greater efficiency
- **No centralised system:** There is no regulatory authority that can supervise the working of all the emergency department and also maintain the database of locations and victims etc.
- **IoT implementation:** Internet of Things is a very powerful technology that can serve very essential purposes in the medical field but the current emergency departments are not implementing it efficiently.

VII. SAMPLE DESIGN AND IMPLEMENTATION

1. Registration form for new user

Name, email, password are taken as input for registering new user.

If he is already registered then he can directly login. All the input information will be stored in a login table in the database.

All test cases for authentication were tested.

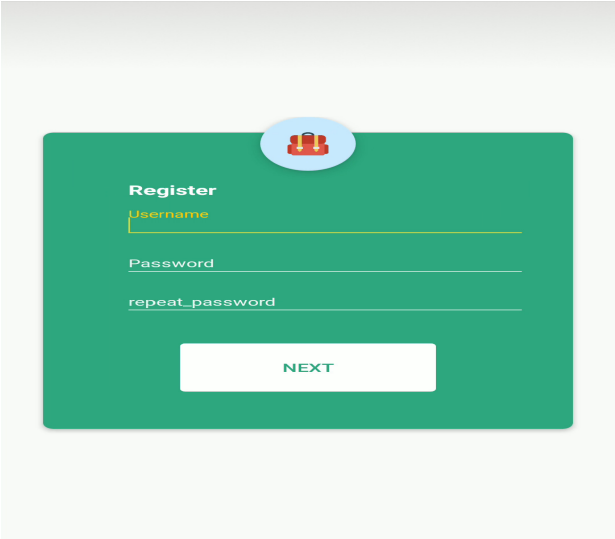

Fig. 1 Signup page

2. Registering new user

After entering the data, control will be directed to server. Server will store the data to the login table.

3. Login table in database

In database, Login table is created. It consists of field like Sr No., full name, email id, password, and time stamp.
Once register button is clicked, control will be transferred to the server.
There will be one more table for storing location of person, i.e. latitude and longitude for showing their location on map. Once register button is clicked, control will be transferred to the server. There will be one more table for storing location of person, i.e. latitude and longitude for showing their location on map.

4. Login form for the registered users

Once user has registered, he can login to app, authentication will be performed by server. Login table is used for verifying correct records. We are online server. On OnClick event of login button control will be transferred to the server. Connectivity is carried out using JSON. For server connectivity, we need Server IP address .Since we are using localhost as server, IP is static. Two parameters email id and password will be sent to server, further authentication will be performed.

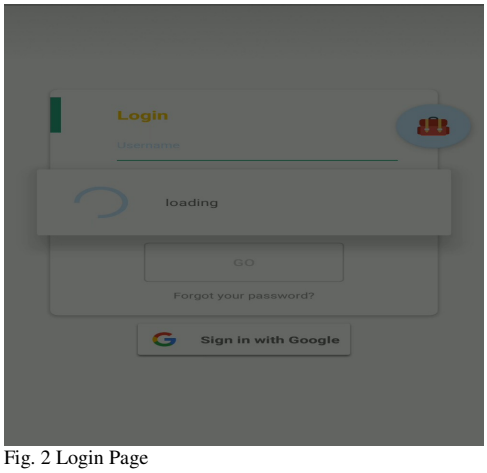

Fig. 2 Login Page

5. Chat window for trapped person

Once user logs in successfully, he can broadcast message to the rescue team and ask for help.
In addition to chat, location of trapped person will be added in chat editor. Rescue team can view the location of the person and provide assistance.

Fig. 3 Location detector page

VIII. CONCLUSION

Whenever there is some disaster or any other major emergency situation, the traditional modes and means of communication such as telephones are either disrupted or sometimes the situation does not permit their use.

Emergency can strike anyone, anywhere, all we can do is prepare for it and this paper presents an

efficient mechanism that allows us to not only prepare for an emergency but also to come out of it smiling.

This paper makes booking ambulances easier and also allows us to track their location to know the estimated time by which the ambulance will reach us.

REFERENCES

[1] Osnat (Ossi) Mokryn Dror Karmi Akiva Elkayam Tomer Teller\Help Me: Opportunistic Smart Rescue Application and System"," 2012 The 11th Annual Mediterranean Ad Hoc Networking Workshop (Med-Hoc-Net).

[2] D. Horowitz and S. Kamvar, "The anatomy of a large-scale social search engine," in Proceedings of the 19th international conference on World wide web. ACM, 2010, pp. 431–440.

[3] J. Fajardo and C. Oppus, "A mobile disaster management system using the android technology," WSEAS TRANSACTIONS on COMMUNICATIONS, vol. 9, no. 6, pp. 343–353, 2010.

[4] A. Pietilainen, E. Oliver, J. LeBrun, G. Varghese, and C. Diot, "MobiClique:middleware for mobile social networking," in Proceedings ofthe 2nd ACM workshop on Online social networks. ACM, 2009, pp.49–54.

[5] B. Van de Walle, G. Van Den Eede, and W. Muhren, "Humanitarian information management and systems," Mobile Response, pp. 12–21,2009.

[6] T. Catarci, M. de Leoni, A. Marrella, M. Mecella, B. Salvatore, G. Vetere,S. Dustdar, L. Juszczyk, A. Manzoor, and H. Truong, "Pervasivesoftware environments for supporting disaster responses," IEEE InternetComputing, pp. 26–37, 2008.

[7] N. Tolia, M. Satyanarayanan, and A. Wolbach, "Improving mobiledatabase access over wide-area networks without degrading consistency," in Proceedings of the 5th international conference on Mobile systems, applications and services. ACM, 2007, pp. 71–84.

[8] J. Su, J. Scott, P. Hui, J. Crowcroft, E. De Lara, C. Diot, A. Goel, M. Lim, and E. Upton, "Haggle: Seamless networking for mobile applications," in Proceedings of the 9th international conference on Ubiquitous computing. Springer-Verlag, 2007, pp. 391–408.

[9] P. Currion, C. Silva, and B. Van de Walle \" Communications of the
ACM, vol. 50, no. 3, pp.61-65, 2007.

[10] J. Scott, P. Hui, J. Crowcroft, and C. Diot, "Haggle: A networking architecture designed around mobile users," IFIP WONS, vol. 2006, 2006.