ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

AN EMERGENCY DISASTER SUPPORT SYSTEM EXPLOITING THE SOCIAL FORCE TO REDUCE LOSS RATE IMPLEMENTING ANDROID SMART SYSTEMS

[1] D.Patricia Judith ,[2]K.Bharathi, [3]S.Devakanigai,[4]R.Karunya

[1]Assistant professor,Dept of IT, Kings Engineering College, [2,3,4]U.G. Students, Dept of IT, Kings Engineering College

Abstract-**When disaster strikes the urban community; residentsmay suffer life-threatening, environmental impact, and economicloss. Meanwhile, the cellular and Internet services are prone tofail because the disaster may cause any network infrastructure damage. Ascommunication service is so important fordisaster response, we suggest an emergency social networking solution, called ECSN, to conquer such crisis. ECSN is a community-based emergent social networking service suitable fordealing with the tasks on disaster response. To provide the ECSNservice, we construct a dedicated Disaster Response Portal.There has been no proper alert system implemented to report about the earthquake, so there has been no way to take up immediate rescue processes to save the people. In the proposed model, when the user receives tweets posted by his / her friends it will be analyzed. Android based Social Network site is to be accessed and the Tweets given through android phone should also be considered along with Easy Interface based Buttons also added. In the modification process, An emergency alert is sent as SMS and E-mail to the registered tweet users as well as to the Nearest Rescue Team. Disaster Related keywords are used to identify the Tweets which acts to identify the Location so that Emergency Support can be given to the needy people via SMS & Email.**

Keywords- **disaster response; community; emergency network;social networking; smart phone**

1. INTRODUCTION

Community, as a basic unit in society, plays a semi-official role with some sort of social force particularly suitable fordeploying local disaster management. When disaster comes,residents may suffer life-threatening, environmental impact, oreconomic loss. At this moment, community becomes the battlefront for disaster relief and provides initial assistance for disaster response and rescue. Generally, communities may suffer natural disasters or man-made disasters. Natural disastersinclude fire, flood, snowstorm, hurricane, typhoon, earthquake,and epidemic prone disease. Man-made disasters include public accident, social disorder, or terrorist attack. To ensure the functionality of communication during disaster response, there exists a practical need to build emergency network for crisis response. Smartphone users and smart phone devices can provide advanced computing resource and location-awareness service;we can come out with a mobile social network for local disaster response.The system is positioned for community-based usage, so itturns out with several benefits.

First, the local disaster rescue and response can be integrated with a nation-wide or city disaster management system. Community resource and national resource can be clarified and avoid the resources duplicate engagement problem. Second, disaster response can collaborate with the neighborhood through the mobile community networking service, which is dedicated designed for community residents' usage. Third, the disaster response can be locally planned and manageable to enhance the locality and practicability.

Finally,not only for disaster response, the system can extend into other emergent measures taken by disaster prevention, mitigation,preparedness, and recovery.The rest of this paper is arranged as follows. Section 2describes the background of disaster response. Section 3 presents the concept of Emergent Community Networking Service (ECNS). Section 4 briefly describes the system designand its core components. Section 5 discusses the use case scenarioin an emergent environment and addresses the experiment design, method, results, and

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

discussion. The final section concludes the constraints and benefits, and suggests the future works.

2. THE BACKGROUD OF DISASTER RESPONSE

Taiwan is a natural disaster-prone country along the ring offire, or called typhoon and earthquake belt. Several typhoons hit Taiwan in the summer time each year. During the past decade, it has caused the death of hundreds of people and hurts the country's infrastructure and economy enormously. Flooding, mudflows and landslides are the most typical consequences during or after typhoon invasion because the sudden heavy rainfalls often concentrate in a couple of hours and causemassive surface movement of soil or sediments. Under theinvasion of flooding and landslides, telecommunication infrastructure may lose power, get damaged, and need several days to recover. As a result, disaster rescue and response are often hindered in the beginning.From the past experiences on disaster response, we havelearned more about the importance of keeping communication service running because all of the rescue measures heavily depend on the telecommunication services. Actually, we're more dependent than ever on cellular network. However, the performances of cellular network have been proven unstable and unreliable in an emergency. Taking United States for an example, in August 23,2011, the cell phone services got jammed after a rare east coast earthquake.

As people try to find their families or report they were fine during a crisis, cellular network comes to paralysis at that time. Thus, instead of calling, many Residents get in touch with families and friends by using social networking service like Line, Twitter and Facebook.Moreover, under a violent disaster attack, the network infrastructure can be suspended or damaged not only for cellular network but also for wired/wireless network. Under such acircumstance, without a cellular or wire/wireless network,rescuers use handheld transceiver to communicate with eachother. However, in the urban area, such plight could be avoided.Nowadays most of communities have built up their community network by using local Wi-Fi. When the Internet ServiceProvider (ISP) cannot provide the service due to the networkinfrastructure damage from the disaster, the community network may still have its local network functionality, but merely act like an isolated network island. Namely, despite the failure of cellular and Internet services, we can utilize this network island to build emergent community service for disaster response. The disaster response portal is connected to community wireless access point (AP) and the community network is an isolated island.As using Smartphone applications (APPs) for social networking has become so popular now, our solution has set up an emergent mobile social networking service for community disaster response. We call this social network service as"Emergent Community Social Networking" (here after referred to as "ECSN").

It is reasonable, for both rescuers and disaster victims, that the most likely device for communication is by using the Smartphone as most of people have the Smartphone at hand.Even though we build an emergent local network for disaster response, some extreme conditions still should be considered. There are too many people using too many network-consuming applications in Smart phones where the local wireless network does not have capacity to afford, especially in a disaster crisis. Text messaging instead is a better way for communication especially when network congestion happens. The main reason is that text messaging uses less network resources than a voice or wireless broadband data session. Second, even when the network is congested, the text messaging system will continue to keep trying to send the message. These features make it more efficient to communicate when the network bandwidth is limited.Therefore, we hope our disaster response system for communication is based on text messaging and implanted as simple as possible. Sobanski proposed a Disaster Management Communication System (DMCS) based on a webplatform.They compare and contrast the differences that can be found in an Internet application, client server application, and mobile application. They suggest that mobile phone client with web applications can be the best architecture for disaster system. We agree this view point, and adopt this concept as a principle to design our solution.

3. SMARTPHONE AND EMERGENT COMMUNITY SOCIAL NETWORKING SERVICE

Based on the popularity of Wi-Fi access with smart phones,social networking has shifted their foot prints into mobile handset devices. Aoki et al. use Smartphone with Social NetworkingService (SNS) to

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

solve "regional disaster information sharing problem" in disaster prevention and verify that Smartphone is the most suitable device for SNS on disaster prevention. The main Difference between desktop- based and Smartphone-based social networking is the mobility, the capability of connecting network in the outdoor space at anytime and anywhere.Another difference is about the ability of context awareness,the capability of continuous and seamless sensing of the environment to obtain spatiotemporal context from the physicalworld. In other words, Mobile Social Networking Service(MSNS) makes it possible to provide user experience on egocentric services. However, the frequent change of user context is a challenge, it needs intelligent and historical reasoning mechanism to deal with context information. The computing ability on Smartphone provides such possibility.

Also, Smartphone's have the capability to form Mobile AdHoc Network (MANET) through Wi-Fi Direct or Bluetooth.When a disaster strikes, the electricity and telecommunication networks may be damaged so that reliable communications and Internet access are no longer available. One of the important requirements in such situations is to support people to communicate in an infrastructure-less, or survivable way.The ability of working on infrastructure-less environment makes MANET as a candidate to be a mobile network infrastructure. MANET also has the characteristics including dynamic topology, infrastructure independent, multi-hop, and ease of deployment suitable for emergent services .Flanaganet al evaluate the feasibility of implementing and utilizing awireless ad hoc network configuration to communicate between Android Smartphone's. Daqiang et al.Propose aMobile Ad-hoc Social Networks (MASNs), which set up local social communication via mobile devices without utilizing the underlying infrastructures. The emergent network architecture uses MANET when the communityAP fails.

The main distinctive feature of our disaster response system is about the goal of community-based usage. We expect that the local assistances from the neighborhood can promote the disaster response system to work more smoothly. During adisaster, the community office can be the main rescuer on the disaster site and plays the role of a rescue center, which can quickly respond and minimize the consequences of accident.In the FEMA's National Disaster Recovery Framework, it focuses on community response and recovery needs, which is theability for a community to quickly re-establish its own localcommunication.Based on the above mentioned concept of utilizing Smart phones and social networking services, this research constructs an ECSN service system for disaster response. In our definition, ECSN service is a type of MSNS/MASNs where individuals with similar interests converse and connect with one another through their mobile phones and/or tablet. The same idea of using MSNS for disaster management also appears in some researches. For instance, B. Iannucci et al.Proposed a Survivable Social Network (SSN) that delivers resilient and robust communications means which may fit disaster conditions. Geo-social networking is another emergent trend for MSNS development, in which location-based services and capabilities such as geo-coding and geo-tagging are used to help additional social interaction and enrich the usability of social network.

In disaster scenarios, geo-social networking can allow rescuers or victims to coordinate around activities collaboratively since geo-location information could assist people to detect and track potential dangers for disaster response and rescue. Similarly, our ECSN is also a type of mobile geo-social networking but having real community inhabitants living out there. Unlike web-based social networking with virtual communities, Mobile CommunityNetworking occurs in real communities and depends on the locality of inhabitants. In other words, when virtual mobile social network combines with real community entities, the drawbacks of virtualization in social network will no longer exist. This is the main reason why we explain the concept-"Emergent Community Networking" in this section.

4. SYSTEM DESIGN

First, we define the development scope of our system design. These are:1) The system is positioned for community-based usage and disaster response.2) Based on the concept of "Mobile CommunityNetworking, the construction of ECSN is dedicated for smart phone platform and makes the extension of advance intelligent service possible.3) For enhancing the system's survivability, the system design is as simple and efficient as possible, mainly including a mobile client agent and a group of server-side tailored emergency-services. No matter whether the client is a web browser, an agent program, or a mobile App, community residents can connect into

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET) V
Issue 19, April 2016

the system.When network is in normal conditions, the system works like aweb portal and provides ECSN services. The portal service is designed for the needs of community-based disaster management, listed as Table I. For instance', the "Emergent map" service is a disaster mitigation service related guiding map. Victim can search nearby public place to seek suitable refuges or relief supplies.To realize the concept of "Survivable Social Network", we construct a two-mode switching networking system, a twitter like text-messaging service for "disaster response mode" and a community portal for "normal mode". Namely, when networking infrastructure malfunctions due to the disaster damage, ECSN can switch the service into "disaster response mode" for the need of light-weight resource servicing. Forexample, the "Emergency text twitter" is a light- weight and twitter-like text chatting service. Followers can post a simple message to communicate with each other and view the historical interaction messages.

Each message binds with the followers' GPS geo-code. The manager can monitor the followers' real location if disaster rescue measure is needed. The layered model shows that "Simple response networking" service is the base module to provide the operation of "Emergency text twitter" interface, which corresponds to the "Disaster networking" service in Table I,this is our core function to realize the ECSN.Behind the "Simple response networking" service is the resource integration layer which includes a tiny embedded database light-weight enough for emergent information management. The embedded database is easier to configure, backup, and transfer because the database connection is like a bypass. Before the system switch into disaster response mode, we can export the identity data from stage database and transfer into embedded database. The data transfer can be done even by using a USB drive. The portal services can be divided into three dimensions, including disaster prevention, response, and recovery. The three dimensions constitute our solution on disaster management. The detail description about these services listed as bellow:

Community office: provides the command center operation and coordination among the urban/nation disaster management organizations. It can combine with free web site hosting service

.Neighborhood line: The contact book for community residents'-Line function including phone, messaging,online discussing.

Community alert:The alarm posting for local community-based or official disaster management event.

• Reporter: the interface to report the preparedness or disaster rescue event. User can use Emergent map as an entry point to report their message.

• Knowledge: the online disaster rescue guidelines or documents for residents searching.

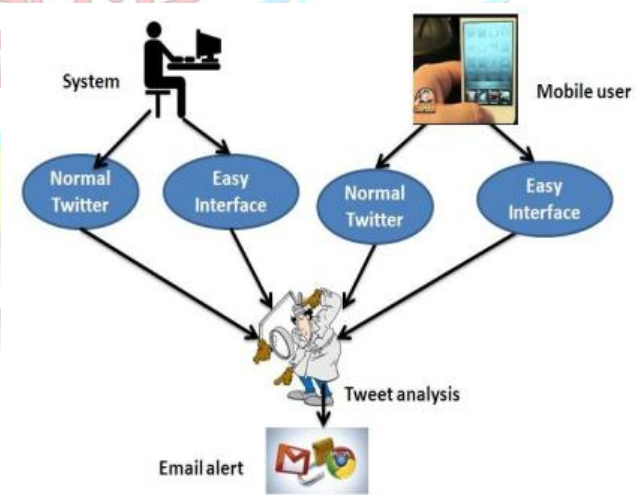
• Refugee passport: the important refugee guidelines for the community residents
.

• Emergent map: Geo-social networking map. The main interface for disaster response and report.

• Disaster networking: The emergency texts twitter when the network bandwidth is extremely rare.

• Relief note: the relief recording. Residents can use it to record the damaged part of their homeland and neighborhood such as taking picture, record voice interview, or positioning the damage location.

5. ARCHITECTURE DIAGRAM



ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

6. EXPERIMENT AND EVALUATION

To evaluate the benefits of the proposed system implementation, a simulated community environment has been established for imitating the experiment circumstance. The subject community covers two rectangle street blocks surrounded by five streets and contains six departments and one public building in there.The main goal of experiment is to evaluate system

Performance under the most perilous circumstances ,the Cellular network, Internet service and Community AP may all fail. The users' Smart phones are composed of MANET environment. Meanwhile, the Disaster response portal also works on peer to peer network mode. The network condition is extremely unstable and inefficient, and the bandwidth must be consumed as little as possible.

The client-side devices consist of six Android Smartphones, all having installed the mobile application agent. All of the Smartphones will be placed at various locations throughout a community to mimic the community resident in a disaster site. During the experiment we plan to use six Smartphone's to simulate 30 community disaster residents with the need of disaster rescues, so every day we only simulate five residents and continue for six days to finish the experiment. The area of community is positioned for two block of streets, which is common in Taiwan's urban neighborhoods. Hence, 30 residents are initially reasonable for the simulation of a small community in crisis. However, the system performance should be tested in large scale because a disaster crisis can be any situation. For each day, the Smart phone needs to be repeatedly relocated and reconfigured to simulate different residents. We observe system performance from stressing testing to verify the scalability of system performance. The data produced in scenario-based will be analyzed quantitatively. Through analyzing the raw data in a statistic form, we can try to explainthe result and discuss the related problems.The scenario of disaster is about flooding incidenthappening mostly during typhoon invasion in Taiwan's urban community. The crisis event is about the whole community is flooded over 30 centimeters at 6 AM and assume the whole area is at the same water level. Later, the Cellular network, Internet service, and community AP may all fall at 8 AM. The experiment will verify the usability of ECSN service.

The experimental outcome shows that we can set up six Smartphone in MANET with within thirty-five minutes.Based on the response metrics of the disaster rescue proposed by Brown et al. We statistically analyze the percentage of accident report after being identified by the Mobile Community Networking Service. Also, during the experiment, we found the MANET is extremely unstable. Every time when we want to use the disaster report service, the network connection must be reconnected.Because the practice of MANET is out of our research scope, we do not discuss here. We convince that in the near future Smartphone will have a stable hardware andsoftware support in a MANET environment.The result comes from scenario-based simulation. In reality,the incidents of disaster and the behaviors of community residents are both various and unpredictable. Disaster response systems need to be evaluated on the unknown accidents. We hope in the future the whole system can be validated in real disaster crisis.

7. CONCLUSION

Traditional community networks linked by people's social relationship can help individual connect to their neighborhood. It is a strong social connection between an individual and community valuable in many dimensions, which includes sharing and learning living experience, offering mutual support and collaboration, and providing a command center for neighborhood development. In our opinion, if we can rely on the traditional community networks and base on top of them to create "Community Social Networking" service, the new community value can be rebuilt and extended. This is the main vision of this work. The problem domain for this research is about the emergency disaster crisis. The crisis seems very likely to be happening in our daily life. Based on the ECSN service we can develop the Community-based Disaster Response System with survivability and scalability.

The system architecture contains client agent and server-side portal working together to providedisaster response solution. Through this Community-based Disaster Response System, the missions of disaster management can be fulfilled. Experimental result shows that the system can work on the problem domain.In addition, some related future works needed to be followed: 1). Further analysis the performance of the disaster response service. 2). Searching for the value-added application domain of Mobile Community Networking Service. 3). Take

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology
V Vol. 3, Special Issue 19, April 2016

experiments with practical disaster crisis to validate in the real world.

REFERENCES

[I] Cell service jammed after East Coast earthquake,http://www.cnet. comlnews/cell-service-jammed-after-east-coastearthquakel

[2] Christo Ananth, Mona, Kamali, Kausalya, Muthulakshmi, P.Arthy, "Efficient Cost Correction of Faulty Overlay nodes", International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE), Volume 1,Issue 1, August 2015,pp:26-28

[3] E. Aoki, T. Kikuchi, K. Korida, N. Yoshiyama, Y. Shibata, M.TakahashI, et aI., "Study on the Social Networking System of DisasterPrevention Using Smart Phones," 2011 International Conference onComplex, Intelligent and Software Intensive Systems (CISIS), 20 II, pp.691-696.

[4] Y. Zhiwen, L. Yunji, X. Bukan, Y. Yue, and G. Bin, "Towards a SmartCampus with Mobile Social Networking," 2011 InternationalConference on and 4th International Conference on Cyber, Physical andSocial Computing Internet of Things (iThings/CPSCom), 2011, pp. 162-169.

[5] J. Rana, 1. Kristiansson, 1. Hallberg, and K. Synnes, "An Architecturefor Mobile Social Networking Applications," First International Conference on Computational Intelligence Communication Systems andNetworks, 2009. CICSYN '09., 2009, pp. 241-246.