DESIGN OF PROTOTYPE FOR ONLINE DISASTER MULTIMEDIA DATA TRANSMISSION BASED ON ANDROID

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Abstract

The development of information and communication technology application is growing rapidly. It has motivated the use of mobile devices for various social networking mobile services such as android based multimedia disaster information transmission. Disaster multimedia information is important for quick response and recovery phases of the disaster management. In previous work, an online disaster information system based on location (we called it ASIKonLBS) has been proposed. However, it was only providing the coordinate information of the disaster location by using short message service (SMS) gateway and global positioning system (GPS). In this paper, we propose the design of prototype for online disaster multimedia data transmission based on android. Such that, the ASIKonLBSv2 can provide not only the information of the location, but also the situation of the disaster area including news, picture, and video. The research method refers to a spiral model that begins with conceptual design, prototype development and evaluation. The result shows that the designed prototype can be implemented for online disaster multimedia data transmission (news, photo and video) using Android Developer Tools. Furthermore, the prototype can be installed in the android-based smartphone and map the disaster multimedia data onto the web of ASIKonLBS. Therefore, the proposed prototype is useful for the disaster agencies and practitioners in order to give the first aid for the victim in the disaster area.

Keywords: multimedia data; disaster; online information; android; ASIKonLBS

Introduction

The disaster has hit Indonesia frequently during the past decade. This motivates people to improve the way in giving information about the disaster to push forward aid for the victim. Information about the disaster is needed in disaster management to organize the distribution of aid by the disaster bureau or volunteer. Disaster management can be defined as "The range of activities to maintain control over disaster and emergency and provide a framework to help those at risk, to avoid or recover from the impact of the disaster"[1].

Recently, there are many concepts and applications on disaster management have been proposed. In Ref. 2, Multimedia-Aided Information System is developed on Apple's mobile operating system (iOS) and runs on iPad tablets. The application is limited to report evaluation of the disaster by local Emergency Management. Ref. 3 illustrates the applicability of a smartphone based development method for disaster information reporting and status transmission. Here, the smart phone operating system is pro android.

A framework using smart phone based for disaster management and mitigation applying modern concept of ICT and included GIS at server side is presented in Ref. 1. This paper proposed android based disaster mitigation application and web application to store and visualize the information. Another paper that carried out a system for disaster management using android technology mobile is Ref. 4. Here, a system called MyDisasterDroid application determine the optimum route along different geographical locations that the volunteers and rescuers need to take in order to serve the most number of people and provide maximum coverage area in the shortest route calculation.

Real time information will accelerate rescue especially with information of evacuation route. To provide real time information, an application of online disaster information system is designed. In the development of our previous work in Ref. 5, the prototype of online disaster information system (ASIKonLBS) to present location of the disaster. However, this paper proposes an application of multimedia data transmission related with the textual information, picture, and video describing the disaster. The application is designed and developed using the android develop tool based on the programming and coding in Refs. 6-8. This application enables people viewing the area of disaster and knowing detail news online. The system allows everyone in the disaster area to

send information to the system using his/her smartphone. In this way, people from outside the area will receive updated information of disaster condition.

The rest of this paper describes the preliminary study of multimedia data transmission, ASIKonLBS as the previous work, research method, and the design of application prototype (ASIKonLBSv2). Finally, the summary and future work is concluded at the last part.

Preliminary Study

Multimedia data

The multimedia consists of all applications involving a combined use of different kinds of media, such as text, audio, video, graphics, and animation, as described in Ref. 9. Multimedia data is various in many points, such as time dependency, formats, structure, and size. The functionalities of multimedia system are being categorized by Ref. 9 in three logical sections as content production, compression and storage, and distribution to various end users and platforms.

In this project, the content creation is captured using smartphone. The content can be in text, image, and video. The video or image received is then compressed and encoded to meet the media transmission requirement, while the text can be delivered without character limitation. At the end of the system, a web application is designed in this project as media to distribute the data. Here, the multimedia data system called ASIKonLBSv2 is established to enable disaster data transmission from the people in the disaster area to the end user who has access to the web application.

ASIKonLBS

The application of information system for disaster based on location based service (ASIKonLBS) allows people to send information about location of the disaster as soon as the disaster strikes the area. Fig. 1 illustrates the communication system in the application. As the system receives information about the disaster, it will track the location of the sender by using GPS (Global Positioning System) to support emergency response as this technology is a surviving network infrastructure in providing network connectivity. This location information sending through SMS Gateway is then presented as the map of disaster location. The users can view the information on the web.

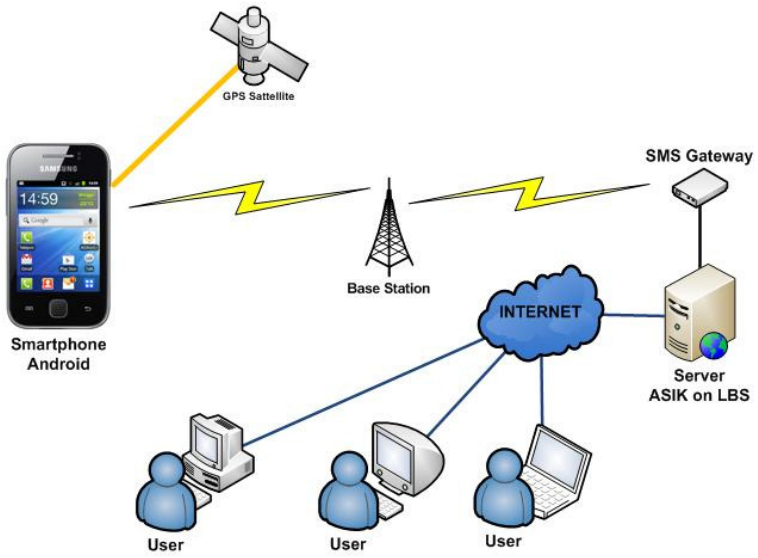

Figure. 1. Information transmission of ASIKonLBS (Ref. 5)

Research Method

In designing the system application, spiral method is applied in four steps which are concept development, application design, building and testing, and evaluation. The first step is developing the online disaster information application concept that allows agency, society, and the victim at the location sending information to the system using proposed user interface to the developed web-based system. The work is initiated by modeling the input of multimedia data that will be sent using the proposed application on smartphone. The second stage is enabling the information transmission. Here a user interface is designed based on LBS technology for several multimedia data platforms of smartphone which is called ASIKonLBSv2. After designing the ASIKonLBSv2, the prototype of the application is built based on Android Developer Tool. Then the Android based application is evaluated.

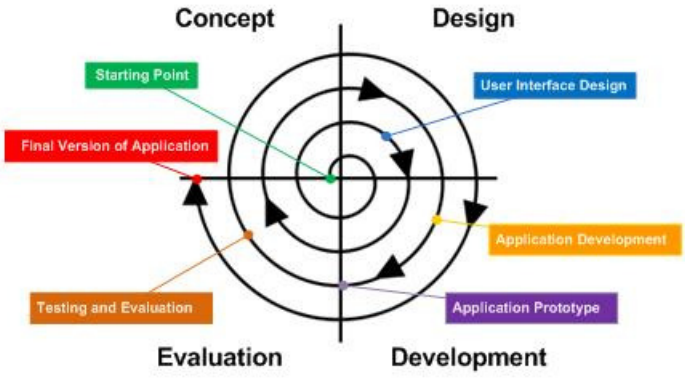

Figure. 2. Research method

Design of Disaster Multimedia Data Transmission

Application Concept

In multimedia application, the LBS technology is applied by appending the media transmission with data packet on the smartphone. The concept is described in Fig. 3. In our previous work, the application is limited to the disaster location information using GPS feature on the smartphone and the communication between smartphone and server relied only on SMS. In the application development (ASIKonLBSv2), the communication of smartphone to the server is expanded to GPRS/EDGE/CDMA for data communication. By utilizing the feature of the smartphone that can connect to internet, the application is developed to communicate to server using data packet. In addition to disaster location coordinate information, the application also allows news, photos, and video streaming sent from disaster location, while adjusting the size of the photos and videos to meet transmission requirement.

ASIKonLBSv2 will be available to be downloaded from Google Play or ASIKonLBS website. The society at the disaster area that is directly hit by the disaster can report disaster either in textual, photos or video form by sending the information to ASIKonLBS application. The feature of ASIKonLBSv2 includes member status check (using data packet), disaster type and coordinate location (using SMS and data packet), and disaster news in textual, photos, videos form (using data packet). In order to keep the validity of received data, only person that has been registered as the member can send information to the application. Everyone can view the information on the ASIKonLBSv2 website as the information is verified by the system.

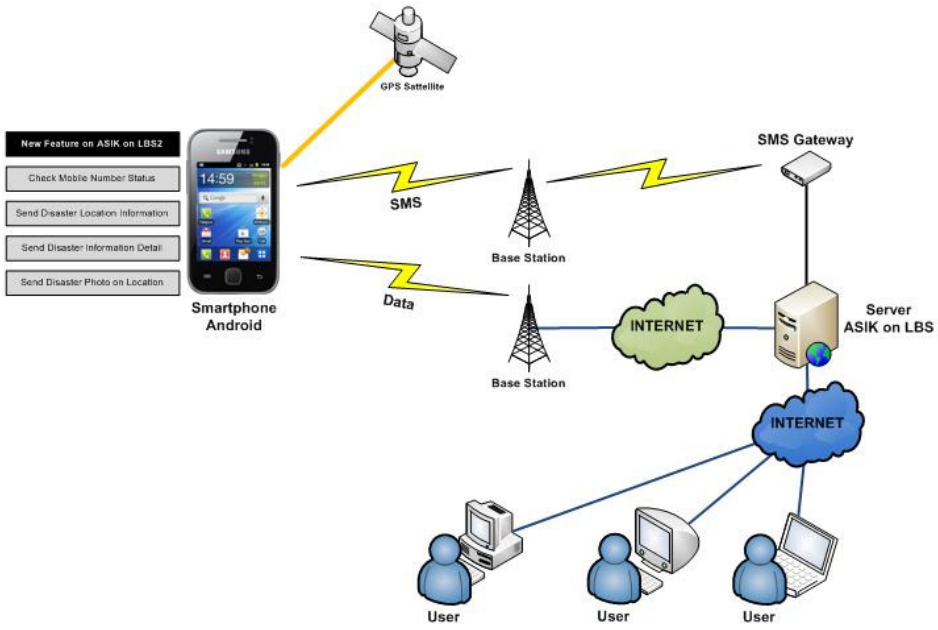

Figure. 3. Concept of online disaster information system for multimedia application

Application Prototype

In designing the user interface of this online disaster information system, two sides are built, smartphone application and the website, by focusing on utilization and usage of application by user to retrieve and deliver disaster information. ASIKonLBSv2 is an application of online disaster information system as a solution in transmitting disaster information sent by the member, while the website is the media to disseminate the disaster information to public.

The application of ASIKonLBSv2 is designed base on Android with some added features to enhance the ability of disseminating the disaster information. The features include the main page of ASIKonLBSv2, member status check, detail of disaster information transmission, photos of disaster transmission, and video streaming of disaster transmission. Each of the features will help the society at the disaster location and the disaster mitigation stakeholder in delivering and obtaining the disaster condition information.

The features on ASIKonLBSv2 and its components are shown in Fig. 4 and described as follows:

- Welcome page: This feature is the page to access the application. The information that shown related to the newest update of the application and the disaster mitigation information (latest disaster) is also provided here.
- Menu page: This page allows user to access the menu button of the application. Here users can check their member status whether they are being registered or not, send information about the location, detail news, photos, or video of the disaster directly from the location.
- Check Mobile Number Status button: In validating the member status, the system utilizes web service to check the cell phone number to database server. If the number is registered to the server, then the system will allow information transmission from the number since it is authenticated as the member. For future development, the feature on this page can be added to improve the application.
- Send Location Information page: This feature will send the coordinate and the type of the disaster to the server.
- Send Disaster Information Detail page: This feature allows user to send text message regarding detail news about disaster condition. In this application the text message is transmitted via data packet, thus it allows user to send information in detail without worrying about the character limitation.
- Send Disaster Photo page: This feature enables the member to send photos from the disaster location directly to server. Photo on location informs the real updated condition visually which is very useful in identifying the disaster. The photos sent by the member will be displayed on ASIKonLBS website that can be viewed by anyone.

- Send Live Streaming Video page: This feature allows member to send disaster information in video streaming directly from location.
- Exit button: This feature will close and exit the application.

(a) Display of main page of ASIKonLBSv2 on emulator

(b) Display of menu page of ASIKonLBSv2 on emulator

(c) Display of detail information transmission page of ASIKonLBS on emulator

(d) Display of disaster photos transmission page of ASIKonLBS on emulator

(e) Display of disaster video transmission page of ASIKonLBS2 on emulator

Figure 4. ASIKonLBSv2 Features

Conclusion

In this paper, the design of the prototype for online disaster information using multimedia data transmission based on Android proposes is proposed. The conceptual design and the prototype of application using android development tools has been described and demonstrated. The application prototype has the facilities (features) to send the multimedia data of the situation of a disaster area such as news, photo and video. The disaster multimedia data are important to obtain a real situation of the disaster area. It is also useful for quick response, planning and recovery phases of disaster management. The proposed prototype will be installed in the real system based on Android. The transmitted multimedia data will be mapped to the web of ASIKonLBS that has

been implemented in our previous work, so that the people who are located outside of the disaster area and has responsibility, such as local disaster agencies and government, can immediately assist the victim. For future work, the proposed application will be implemented and tested on the smartphone before it is disseminated to the society.

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