Receiver Apps Development for Emergency Reporting System Based on Android Platform

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Abstract. Emergency reporting application receiver was built to make emergency services office receive and respond emergency reporting reports easier. User interface of receiver application was designed simply so that users can easily use this application. Recipient application is an android-based application with 4 main pages are login, inbox, history and profile of main service office pages. The reports who sent by sender will go to inbox page, the recipient can respond the report using 2 features, text and phone features. The response given by the recipient will be stored in the response history page. By enabling the GPS feature, receiver’s device can directly access the place of sender so recipient can locate the reporter's location easy. This is the main purpose of developing an emergency reporting application, facilitating sender and receiver to get emergency information, so assistance can be provided immediately. Reporting applications can be used by people who connected to internet connections while receiver applications are used by emergency services office such as firefighters, police stations, ambulances, car caches, terrorists and search and rescue (SAR).

key word: emergency reporting, android, receiver, gps

1. Introduction
Some people still use manual methods to get emergency office numbers when they need them. On the other hand, the government has socialized to the public about emergency numbers that can be contacted but some of them did not save the number. So, one of the solution is looking for people they know who work in the emergency office. This causes the reporting of emergency conditions do not work effectively and efficiently. Not effective because people need a longer time to report and not efficient because some of them may not know people who works in emergency offices like immigrants or non-local people.

From the above conditions, we have idea to build an application to facilitate the community in reporting emergency conditions. Similar applications have been developed by several developers but there are still have deficiencies needed to be fixed. This apps is an application can be installed on a mobile device, in view of the people of Indonesia are the most active mobile application users in the world [1]. That is also confirmed by waiwai marketing (2015) that from several platforms on mobile devices, android is the most widely platform used by Indonesian people compared to other Southeast Asian countries, so the mobile application is very appropriate to be applied [2]. Next, figure 1 shows the percentage of mobile OS users in Indonesia in 2017. It illustrated the number of Android, iOS, and other OS smartphone users mostly chosen by the people of Indonesia, which is 72.9% of all smartphone users.
choose to use Android platform. Furthermore, 19.4% of OS iOS users and 7.7% of them use other OS smartphones [3].

![Shares of Mobile Web by Mobile OS](image)

*Figure 1. Percentage of mobile OS users in Indonesia 2017*

Emergency reporting application on the sender side has been developed in 2017 [4]. This paper is a continuation of the previous system and focused on the receiver side, where the receiver is an emergency service office. The application is designed easily and simply, so that this application can be used by the general society. Service offices are located in 25 sub-districts, so that each service office was provided a special account to receive and respond emergency reports that sent by the reporter. The previous sender’s application and receiver’s application are integrated into a system. Application development includes building user interfaces on the receiver side, adding notification features on the sender side, and building databases to record receiver contact data and receiver activity history.

2. Related Works
Several previous studies have discussed about development of applications related to the reporting of emergency conditions and the methods used in determining the location of emergency service offices. From the results of research conducted, the library references relevant to this study include Bhuvana Sekar dan Jiang B.Liu (2014) in his research entitled "Location Based Mobile Apps Development on Android Platform" developed a mobile application called TriTHEapp where one of its services is Emergency Call. The application also provides a service office telephone number for emergency conditions if the user wants to call the service office. In this application also adds another feature that is the button to do the recording by activating the camera application, then the recording is sent via email to the emergency services office [5].

S. Higuera de Furtos dan M. Castro (2014) in his research entitled "Using Smartphones as a Very Low-cost Tool for Road Inventories" has developed an application to record or perform an inventory of the desired path. This application is built using two software that is android and java. Android is used to record video, GPS information and data from accelerometer and pressure sensors. While the java application is used to visualize the recording with the position of the smartphone through the map and all the values obtained from the sensor and the vehicle path. The output of this research, one of which is knowing all the roads, whether it can be passed the car up the streets [6].

M. Basyir, et al (2018) in his research entitled “Determination of Nearest Emergency Service Office using Haversine Formula Based on Android Platform” has developed an application that serves to help the community in reporting the emergency condition. It consists of application development on the sender side and the creation of admin database to monitor user activity. The selected emergency services office is the nearest emergency service office from the complainant. It application requires a GPS (Global Positioning System) feature recording, reporting and SMS (Short Message Services) positioning for message delivery of reports [4].

This research was focused on building applications on the side of the receiver which is the development of applications that have been built previously. The system consists of a receiver
application that is built on the Android mobile device platform, a database update that has been built using PHP software and the admin website display to access the database.

Figure 2. Emergency reporting service architecture.

3. Receiver Apps on Emergency Reporting System

Emergency Reporting Service System was developed on the receiver side integrated with Emergency Reporting service on the sender/reporter side. In Figure 2, it can be seen that the receiver is connected to the GPS (Global Positioning System) satellite in order to see the location of the sender. The receiver is also connected both ways with the database server to get information and store information. Receiver requires information stored in the database server in the form of the sender location coordinates, contact number, database server. The database server also functions to store receiver data, namely location, contact number, login data, and receiver activity history. In Figure 2, you can also see a two-way relationship between the sender and the receiver connected by the cell tower and the internet. When sender finishes sending emergency reports, the receiver can send sender notifications that the report sent will be processed.
Figure 3. Flowchart of using recipient application in emergency reporting system.

Figure 3 illustrate the use of the application on the receiver. The initial page of the application is a login page, on this page the user enters some information, namely sub-district data, service offices and password. The login page data has been previously saved in the database server, the next page can be opened when the data entered by the user matches the one stored in the database. After the data on the login page has been verified correctly, the user enters the main page of the application. On this main page the user sees the reports sent by sender. Furthermore, the user can choose the report message to be responded to, by selecting one message, the response selection page will open, namely the option to view the sender's report location, response by using the phone feature, and the last option to respond by sending a text notification.

3.1. Receiver Interface Design

The use of receiver application in the Emergency Reporting system is addressed to officers of emergency service in each sub-district. Therefore, the design of the receiver interface is made simply so that the user can be easily understood. The main part of the application is inbox sub-menu that contains all reports received by the receiver and activity history sub-menu that contains the reply response provided by the receiver. Other sub-menus are the login page, the profile of the service office and the reply option as the response provided by the receiver. The login page consists of 3 data fields, namely the name of the sub-district, emergency service office, and password. Data input for sub-district names and emergency service offices use ComboBox option menu, while password data is entered manually by typing into the fields provided. Other sub-menu pages are also designed simply so that users can understand and use this application easy.

From the design of application development on the receiver side using Android Studio Software with the Java programming language and XML for display design. The application used the Google Maps API and GPS feature to view sender locations for emergency reports and also features voice calls to contact reporters when needed.

![Figure 4. Receiver interface design on android platform](image)

3.2. Database Development

Figure 5 illustrate the database design that was built using PHP software. The database was developed to store the sender and receiver information so that it is expected to ease the android platform application working system. In addition, the existence of a database can also facilitate admin to change data (if needed) both from sender and receiver. In the receiver application, the database is used as a place to store password data for each emergency service office, time for receiving emergency reports, time for sending replies by the receiver and receiver profile information.

Figure 6 illustrate the web display containing sender sending data. Besides being seen using Android application, emergency reports that sent by sender can also be viewed using a web application that can
be opened via internet browser. The website provides information of delivery reporting time, sender name, sender location coordinates, the service office that is contacted by sender, the location of the service office that is contacted by the sender and access to view folders through the google map application.

![Figure 5. Data in a database PHP software](image)

![Figure 6. View of delivery data reporting website](image)

4. Apps Accuracy Testing
Accuracy testing is to determine the success level of the system in determining the nearest service office contacted by the sender. The determination of the nearest emergency service office has been calculated using Haversine Formula [4,7,8].

In table 1 there are some information provided, namely sender coordinates in the form of latitude and longitude values, the sender coordinates indicate the location of the sender of the emergency report. The sender location is an area that covers from the research area. Second, the type of emergency service that is chosen by senders from the 5 emergency services provided by the application. Third, the location of the nearest emergency service office detected by the system based on the results of calculations. The location of the emergency service office is divided into 25 locations based on the subdistrict division. Fourth, the location of the emergency service recipient report office is the user/receiver that receives the emergency report sent by the sender. Next is the calculation of the accuracy of the system or called the accuracy value. Accuracy values will be calculated using the parameter similarity between the results.
obtained from the table column of the Office Location of the Emergency Services Nearest to the Location of the Emergency Receiver Service Report Office.

**Table 1.** Result of the nearest emergency services office accuracy testing

| Sender coordinate | Emergency service was selected by sender | The nearest Emergency Services Office to sender Location | Location of emergency report receiver |
|-------------------|-----------------------------------------|--------------------------------------------------------|---------------------------------------|
| Latitude Longitude|                                        |                                                        |                                       |
| 5.2252 97.0270    | Ambulance                               | Dewantara                                              | Dewantara                             |
| 5.0444 97.3396    | Ambulance                               | Lhoksukon                                              | Lhoksukon                             |
| 5.0378 97.2833    | Ambulance                               | Matang Kuli                                            | Matang Kuli                           |
| 5.1218 97.1580    | Police                                  | Blang Mangat                                           | Blang Mangat                          |
| 5.1762 97.1469    | Police                                  | Banda Sakti                                            | Banda Sakti                           |
| 5.0750 97.2568    | Police                                  | Tanah Luas                                             | Tanah Luas                            |

Determination of accuracy values used 6 test data which can be seen in the table 1. Test data is the sender location taken in 6 different sub-districts. The type of service chosen by the sender is an ambulance and a police station. The test results can be seen from the number of location similarities shown in the table column of The nearest Emergency Services Office to sender Location and Location of emergency report receiver showing the same location. For 6 test data, the whole shows the same data, meaning, between the calculation of the nearest distance and the location determination of the application system shows the same results, so that the accuracy of the system reaches 100%.

**5. Conclusion**

We have successfully developed applications for emergency reporting systems to make it easier for emergency service offices to receive and respond to emergency reports sent by the public through the sender application. The application is made simple and easy so that it can be used by recipients in emergency service offices spread across the general public. From the results of the system testing it was found that the accuracy of the system in sending emergency reports correctly at the closest location of the sender was 100%.

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