Designing Android Based Augmented Reality Location-Based Service Application

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Abstract- Android is an operating system for Linux based smartphone. Android provides an open platform for the developers to create their own application. The most developed and used application now is location-based application. This application gives personalization service for mobile device user and is customized to their location. Location-based service also gives an opportunity for the developers to develop and increase the value of service. One of the technologies that could be combined with location-based application is augmented reality. Augmented reality combines the virtual world with the real one. By the assistance of augmented reality, our surrounding environment could interact in digital form. Information of objects and environment surround us could be added to the augmented reality system and presented. Based on the background, the writers tried to implement those technologies on now rapidly developing android application as a final project to achieve bachelor degree in Department of Informatics Engineering, Faculty of Information Technology and Visual Communication, Al Kamal Science and Technology Institute. This application could be functioned to locate school by using location-based service technology with the assistance of navigational applications such as Waze and Google Maps, in form of live direction process through the smartphone.

Keywords: Augmented Reality, Location-based Service

I. INTRODUCTION

Its educational quality is highly varieted from having luxurious building to the simple ones. Along with schools built by the government, there are many schools built by privates. Not everyone in society could be in pace with rapidly developing education. Sometimes they find it difficult to access on information, such as information about senior high schools and their location in Tangerang city. By the fact of rapidly developing information and communication technology, the writers had done a research to solve those problems by creating an application that uses the augmented reality technology and location-based service. The application could give the information and locations of senior high schools in Tangerang on android platform based mobile devices.

Mobile devices with android platform are now rapidly developing. Almost everyone has this device. Android is an operating system for Linux based smartphone. Android provides an open platform for the developers to create their own application. The most developed and used application now is location-based application. This application gives personalization service for mobile device user and is customized to their location. Location-based service also gives an opportunity for the developers to develop and increase the value of service.

One of the technologies that could be combined with location-based application is augmented reality. Augmented reality combines the virtual world with the real one. By the assistance of augmented reality, our surrounding environment could interact in digital form. Information of objects and environment around us could be added to the augmented reality system and presented. With an application that combines augmented reality technology and location-based service, hopefully the society could be helped in accessing information about senior high schools in Tangerang city.

The research problems are:
1. How to use augmented reality technology on android?
2. How to acquire the latitudes and longitudes of senior high schools in Tangerang city?

The research aims are:
1. To create an application for senior high schools in Tangerang city.
2. To use the latitudes and longitudes of senior high schools in Tangerang city accurately as the markers in application.

To be able to illustrate clearly and to simplify the existing problems, the writers had restricted the problems as follows:
1. Data in the application was restricted to senior high schools in Tangerang city.
2. Data in the application such as locations and information were restricted to be presented in google maps.
3. The application was developed with android basis.

II. RESEARCH METHOD
To acquire a systematic procedure and accurate data standard in this final project assignment, the writers used some methods that could help until the data could be gathered as follows. Literature Study To be able to solve the problems and enrich the materials related to research methods as well as explanation, the writers had studied the materials such as books at the library and the other supporting materials. Observation After the data required in the literature study had been acquired, the data then gathered and analyzed until it leads to a right conclusion.

III. ANALYSIS AND EXPLANATION
3.1 System to be Developed
In this writing, the writers are going to make an application with augmented reality or added reality using location-based service that functioned to show the location of state or private senior high school in Tangerang. This application was built by using internet-based platform layar augmented reality. [2]

To save the data of locations, information, and distances to schools, the writers made a database on web hosting. This application would show dots or points of interest that shows the position of schools in Tangerang. The user could adjust the point of interest’s search range in kilometer scale from user’s position.[5] Every point of interest could be selected to see the information of address and how many kilometers is the distance between school and user.

3.2 Requirement Analysis
Requirement analysis is a stage or process to identify about what is needed in designing an application, to determine the specification of needs to build the application that was already planned. In this case, the writers tried to do a requirement analysis grouped to three part: hardware analysis, software analysis, and user analysis. [3]

3.2.1 Hardware Analysis
Hardware analysis is an activity to analyze what hardware needed to build the application, and in this case is the development of Augmented Reality Location-based Service Application for senior high schools in Tangerang city. The writers were using laptop device A45V with the specification as follows: Processor Core i3 - 2370M 2.4 GHz, RAM 2 GB, VGA NVIDIA 2GB Geforce 610M, Harddisk 500GB

3.2.2 Software Analysis
Specifications of software used in the development of this application are as follows: Eclipse, Xampp, Layar, Notepad++, Photoscape

3.3 System Design
System design is an activity of determining stages that would be done in developing an application [1]. This is important in application development to make sure a structured development process, in this case is the process of developing Augmented Reality Location-based Service Application for senior high schools in Tangerang city.

3.3.1 Menu Design
Figure 2 illustrates the design of application menu.
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Information:
1. When user opens the application it will display Splash Screen before the main menu displayed.
2. When Main Menu displayed, there will be five menu
3. Search School functioned to search the information about schools
4. Guide functioned to display application use guide such as conditions to run the application and how to run the application.
5. About functioned to display brief profile of writers and the description of application.
6. Feedback functioned as interactive media between user and developer of application to deliver any critics and suggestions.
7. Quit functioned to close the application.

3.3.2 Use Case Diagram
Figure 3 illustrates the use case diagram.

![Use Case Diagram](image)

3.3.3 Activity Diagram
These are the activity diagrams of the application.
1. Activity Diagram of Search Schools

![Activity Diagram of Search Schools](image)

Activity diagram above is the activity that will happen when the user chooses Search School menu.

2. Activity Diagram of Guide

![Activity Diagram of Guide](image)

Activity diagram above is the activity that will happen when the user chooses Guide menu.

3. Activity Diagram of About

![Activity Diagram of About](image)
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3.3.4 Sequence Diagram
These are the sequence diagrams of the application.
1. Sequence Diagram of Search Schools

4. Activity Diagram of Feedback

5. Activity Diagram of Quit

Figure 6. Activity Diagram of About
Activity diagram above is the activity that will happen when the user chooses About menu.

Figure 7. Activity Diagram of Feedback
Activity diagram above is the activity that will happen when the user chooses Feedback menu.

Figure 8. Activity Diagram of Quit
Activity diagram above is the activity that will happen when the user chooses Quit menu.

Figure 9. Sequence Diagram of Search School
Sequence Diagram above is the process that will be happen when the user choose Search School menu from the main menu and then the layar application will be integrated with the main application and begin to determine the radial distance in searching schools.

Figure 10. Sequence Diagram of Guide
Sequence Diagram above is the process that will be happen when the user choose Guide from the main menu and then the application will display Guide menu.

Figure 11. Sequence Diagram of About
Sequence Diagram above is the process that will be happen when the user choose About from the main menu and then the application will display About menu.

4. Sequence Diagram of Feedback
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4. Implementation and System Testing

4.1 Application Implementation

Application implementation is the implementation of application on android based smartphone, and in this case the writers were trying to implement the application that had been made on Samsung Galaxy Grand Duos smartphone, and also try to explain how the program work by illustrating every displays accessed.

1. Display of Main Menu

![Main Menu](image1)

Figure 14. Main Menu

Figure 14 shows the main display of menu after Splash Screen displayed.

2. Display of Search School

3. Display of Guide

![Search School](image2)

Figure 15. Search School

Figure 15 shows the display of Search School menu when the user chooses it from the main menu.

4. Display of About

![Search School](image3)

Figure 16. Search School

Figure 16 shows the display of Guide menu when the user chooses it from the main menu.

5. Display of Feedback

![Search School](image4)

Figure 17. About

Figure 17 shows the display of About menu when the user chooses it from the main menu.

4.2 Application Testing
Application testing is an important part of application development. The tests were done to ensure the quality of product, and also to detect the weakness of software. In the process of testing, the writers tried to do the functional and accuracy test on the application.

4.2.1 Functional Testing

Functional testing was the test of 13 processes in the application. After the tests, it was revealed that all of those 13 processes worked well.

4.2.2 Accuracy Testing

Accuracy testing was the test of 50 school data in the application. This test was done to know whether or not those 50 data are accurate, and after the tests it was revealed that all of those data are accurate.

4.2.3 Questionnaire

After the tests of application succeed, the last stage was to test the acceptance of user. To do that, the writers had conducted tests to 15 respondents by accidental sampling technique (Margono, 2007). In this technique, the respondents are common society. This was done to know if the application and its features is suitable for the user’s need.

5. Conclusion

Based on the explanation that has been described, it can be concluded that the writers were succeeded to make an augmented reality location-based service application for senior high schools in Tangerang city using an android platform. The test results on some types of smartphone showed that this application could work well in any smartphone.

To use this application, the user needs internet connection and GPS. The challenge of using this application is this application needs a stable connection of internet and strong signal because it will affect on the time needed to prepare the contents of augmented reality.

Based on the questionnaire filled by 15 respondents and also application testings, this application got quite a good response from most respondents. From the calculation of questionnaire response, 68.09% respondents very agree, 27.62% agree, 1.43% disagree, and 2.86 very disagree with the use of this application. From that result, the total of very agree and agree reach 95.71% response of respondents.

References