

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 varied 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 surround 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. System Analysis It was done by parting, differing, and choosing the materials to be re-classified according to the particular criteria and then by seeking their relations and interpreting the meanings.

Application Design It was including about how the content to be presented and sent to the final user so that it could be accessed on *android* based smartphone. Coding is writing instructions in particular programming language to make a program on computer. System Implementation A process to place a new information system in existing operating system so that it could be used. System Testing In the process of software development, it was done by seeking and minimizing the bugs in the system, so that it could work well as can be expected. In this research, the testing was done by using a black box and questionnaire.

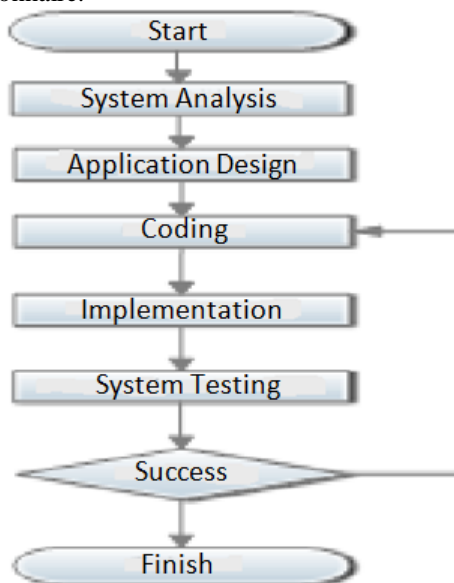


Figure 1. Software Development

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.

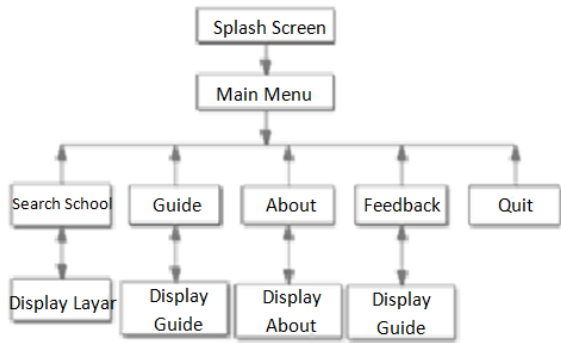


Figure 2. Menu Design

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.

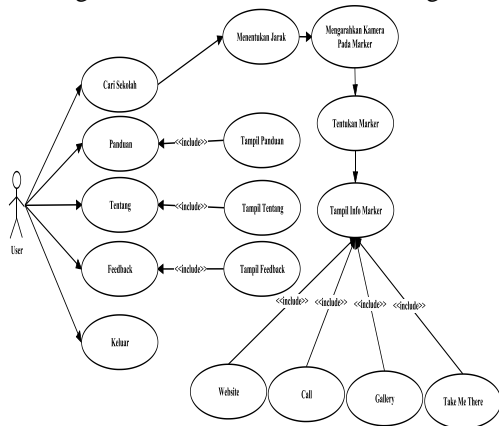


Figure 3. Use Case Diagram

Information:

Table 1. Actor Definition

No	Actor	Description
1	User	Person that use the application

Table 2. Definitions of Use Case

No	Actor	Description
1	Search School	Is a process to search on

No	Actor	Description
		schools
2	Guide	Is a process to see the guide
3	About	Is a process to see about
4	Feedback	Is a feedback process to see feedback
5	Quit	Is a process to quit from the application

3.3.3 Activity Diagram

These are the activity diagrams of the application.

1. Activity Diagram of Search Schools

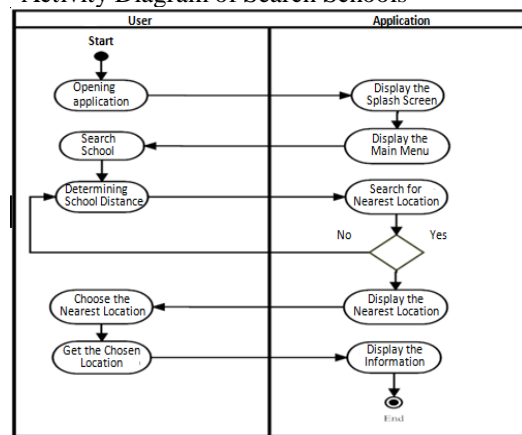


Figure 4. Activity Diagram of Search Schools

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

2. Activity Diagram of Guide

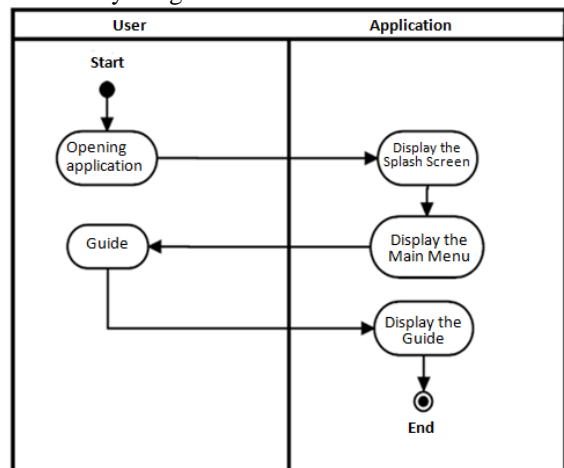


Figure 5. Activity Diagram of Guide

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

3. Activity Diagram of About

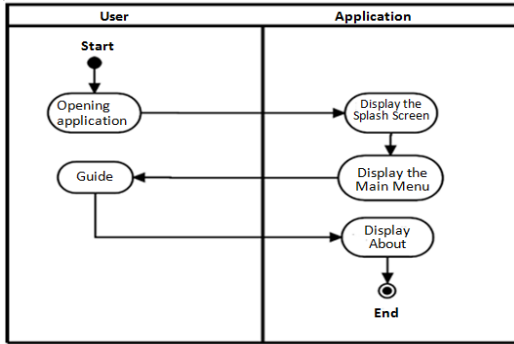


Figure 6. Activity Diagram of About

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

4. Activity Diagram of Feedback

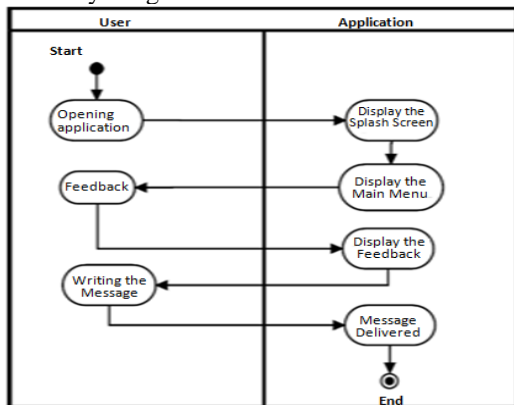


Figure 7. Activity Diagram of Feedback

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

5. Activity Diagram of Quit

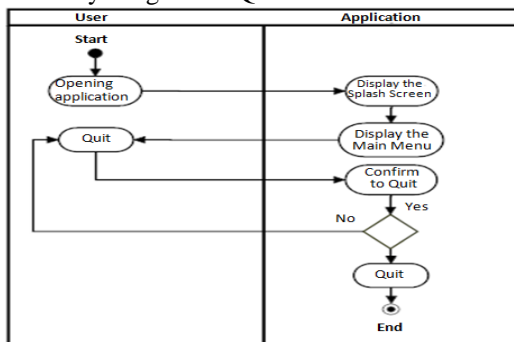


Figure 8. Activity Diagram of Quit

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

3.3.4 Sequence Diagram

These are the sequence diagrams of the application.

1. Sequence Diagram of *Search Schools*

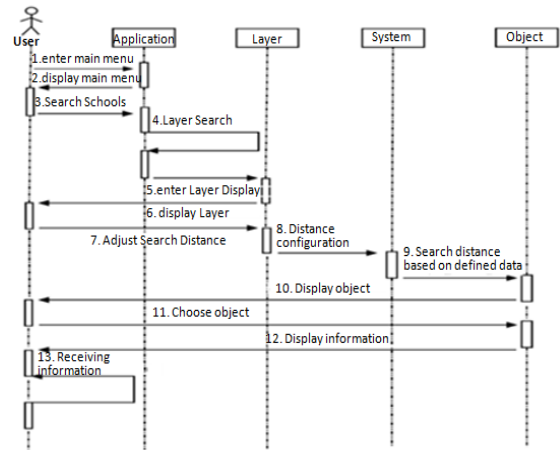


Figure 9. Sequence Diagram of Search School

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

2. Sequence Diagram of *Guide*

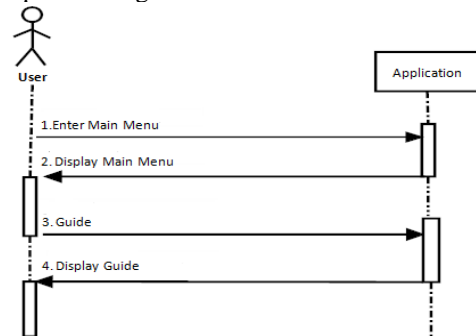


Figure 10. Sequence Diagram of Guide

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.

3. Sequence Diagram of *About*

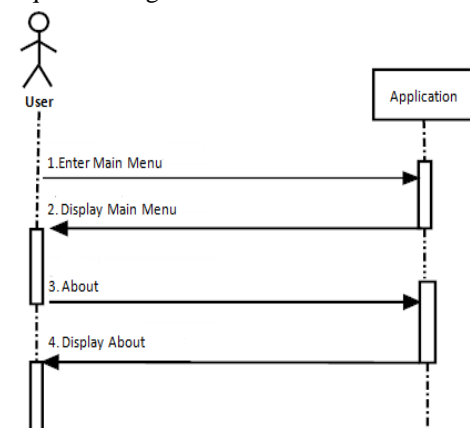


Figure 11. Sequence Diagram of About

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*

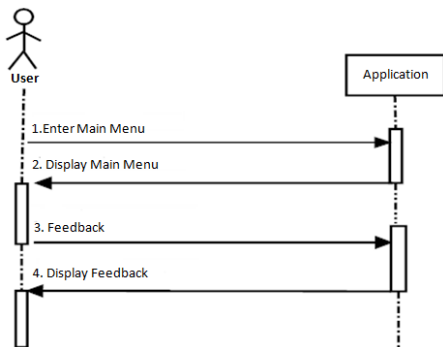


Figure 12. Sequence Diagram of Feedback

Sequence Diagram above is the process that will be happen when the user choose *Feedback* from the main menu and then the application will display *Feedback* menu.

5. Sequence Diagram of *Quit*

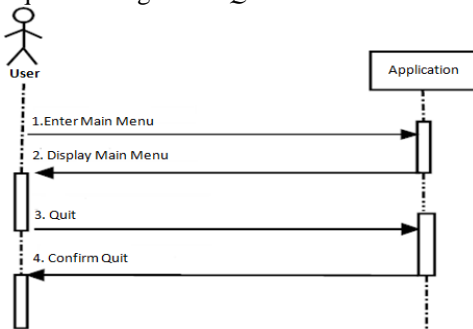


Figure 13. Sequence Diagram of Quit

Sequence Diagram above is the process that will be happen when the user choose *Quit* from the main menu and then the application will display *Quit* menu.

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

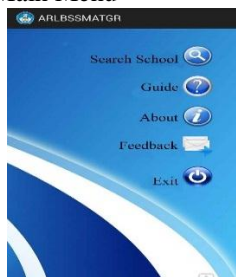


Figure 14. Main Menu

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

2. Display of *Search School*



Figure 15. Search School

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

3. Display of *Guide*



Figure 16. Search School

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

4. Display of *About*

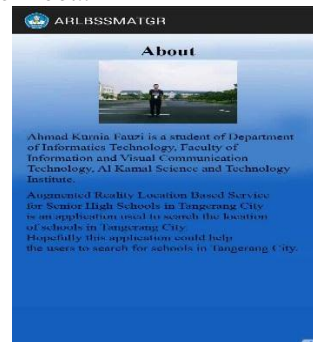


Figure 17. About

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

5. Display of *Feedback*

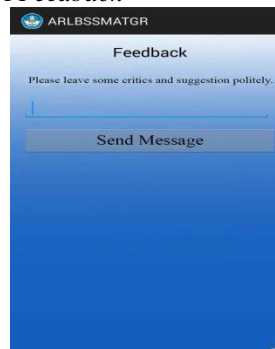


Figure 18. Feedback

Figure 18 shows the display of *Feedback* 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

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