HYPERMARKET ITEM LOCATOR

By

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12345

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
Information Communication Technology

SEPTEMBER 2011

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CERTIFICATION OF APPROVAL

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Information Communication Technology Programme
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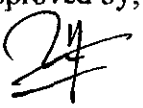
Approved by,



(Mohd. Hilmi bin Hasan)

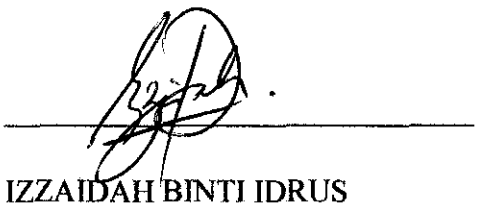
Universiti Teknologi PETRONAS

TRONOH, PERAK

September 2011

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



IZZAIDAH BINTI IDRUS

ABSTRACT

The purpose of this report is to record all the data for both first and second phase of Final Year Project. In the first phase, author is focused more on research work for finding data and information regarding to the project. In the second phase, author will record all the process along the development.

Hypermarket item locater is a mobile application that helps user to find their preferred item in the hypermarket near to their place. The application will suggest the nearest hypermarket from user location. By retrieving the hypermarket data, user can have brief information of their preferred items which includes the location (floor, isle) and price. In order to get user to the nearest hypermarket, a GPS technology will be connected to the application. GPS will locate user to the nearest hypermarket from their location.

Currently, existing item locator can only give information to user on the items. With this modification, hypermarket item locator can also direct user to the nearest hypermarket from their location. Therefore, user especially tourist and traveler could cut their time to shop. The study is meant to research on how the hypermarket item locator could be connected to GPS so that the application could suggest the nearest hypermarket where user can find their items there. Qualitative research method is being used to gather necessary data on suitable approach to integrate GPS with hypermarket item locator. The result of data finding is going to be discussed further at the end of this report together with the system architecture of the application.

The hypermarket item locator prototype then will be developed by using Android Software Development Kit (Eclipse IDE) tool and Java Android as the language. Android SDK is selected for its open development platform, which offers developers the ability to build extremely rich and innovative applications especially on mobile application.

ACKNOWLEDGEMENT

First and foremost, praise be upon Allah s.w.t for his mercy giving me the strength in completing this project within the time period.

My gratitude goes to my supervisor, Mr. Hilmi bin Hasan for precious assistance and guidance throughout the project. Further thanks to all correspondents that involve in doing the questionnaires. Those responses and feedbacks are really valuable for this project. This appreciation also goes to all lecturers, final year students, and technicians for the ideas, assistance and support throughout the completion of this project. I would also like to thank my beloved family for their support.

Finally, thank you to all individuals that have contributed their ideas, knowledge, support and assistance in this project.

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INTRODUCTION

1.1 Background

Hypermarket item locater with GPS is an application that embedded with Global Positioning System (GPS) technologies. This application is used to find the nearest hypermarket from user location and give information on their preferred items in that hypermarket quickly and easily. The purpose of having GPS technology in this system is to locate user to nearest hypermarket that consists of their required item. Item locator with GPS technologies will help the user to minimize their time on searching the item they need and will do improve the existing item locator application.

GPS technologies will be used to transmit the exact position of nearest hypermarket to the item locator application. The item locator then will search the item requested by the user in the hypermarket servers showed by the GPS earlier. The integration of these technologies enable item locator to narrow down it search on item requested by the users. Item locator will be equipped with a GPS receiver to determine its exact position based on the signal transmitted by satellites. According to Min Han, Xue Tian and Shiguo Xu (2011) in their journal *Research on Neural Network Method in GPS Data Transformation*, any point's three-dimensional position on the earth can be obtain by receiving GPS signals [1]. Three –dimensional points are importance in order to calculate the exact position of the satellite. Thus, from this theory, GPS satellite could detect the nearest hypermarket to the user location.

In this paper, more details process will be explained on how the GPS technologies integrated with item locator and what others technologies involved in this system in order to improvised existing item locator application.

1.3 Objectives

The objectives of this project are:

1. To research on how to integrate the GPS technologies with the hypermarket item locator application.
2. To develop an application that consist of several features which are:
   (i) Use GPS technologies to search the nearest hypermarket to user location.
   (ii) Item locator application will give the information of required item to the user from the hypermarket that showed by the GPS earlier. This mean the application will focus only to the item from hypermarket that search by the GPS earlier.
   (iii) The information includes the location of the item (floor, shop name, aisle) and the price of the item.
3. To retrieve item details from the server/database of the hypermarket.

1.4 Scope of Study

Scope of study explains general outline of system that is going to be developed. This is importance as to keep system development within the accepted range of the study. This also reminds the developer that the problem solving should be centered within provided scope. Below are the outlines of the system:

- The distance covered by the GPS is within radius of 50KM.
- The application will only be tested using Android emulator instead of the real mobile phone at the end of developing process.
- GPS will redirect user to the nearest hypermarket, including map to the location.
- Dummy databases will replace the hypermarket databases

CHAPTER 2

LITERATURE REVIEW

2.1 Background Studies – GPS technology

The Global Positioning System (GPS) is one of the growing technologies that widely used in the world. It is a positioning technique for direction finding based on earth system of orbiting-satellite. According to Peter H. Dana (1997) in his journal entitle *Global Positioning System (GPS) Time Dissemination for Real-Time Applications;* GPS could be defined as an earth-orbiting-satellite based navigation system. GPS is an operational system, providing users worldwide with twenty-four hour a day precise position in three dimensions and precise time traceable to global time standards. [2] This technique allows accuracy of point coordinates at any point in the earth. GPS operates under United States Air Force with the direction of Department of Defense (DoD). It was special design and control by the United States military.

On the first introduction of GPS to the world, its operation focuses on the land, marine and aviation navigation system. This happen in during 1980's where GPS still under construction and planning. Even so, both military and civilian agencies depend a lot on GPS technologies at that time. Then it expended to widest functionality where could be used by the technologist as well as by the engineer which include surveying, space navigation, automatic vehicle monitoring, emergency services dispatching, mapping, and geographic information system. As it has widest functionality and provide precise real time, a large community today come to depend on GPS as a primary sources to global time and navigation operations. [3]

The Global Positioning System (GPS) consists of 24 operating satellites and several spares. Spare is needed if one of the operation satellites becomes dysfunctional. Taking the specific orbits of this many satellites into consideration, a viewer can see at least four satellites at any time from any location on the earth. The GPS satellites

transmit signals to a GPS receiver. These receivers passively receive satellite signals; they do not transmit and require an unobstructed view of the sky, so they can only be used effectively outdoors.

All GPS satellite transmits data as representation of its location and the current time. They have synchronized operations as to transmit repeating signals at the same time. The signals that will be received by the GPS receiver will be slightly difference in time as some satellites are far than others. Besides, the time taken by the signals to reach the receiver considers as the distance of GPS satellites from the earth. [4]

2.2 Main Issues – Hypermarket Item locator with GPS technology

Hypermarket item locator is not a new technology in this world. It has been develop by others group as to ease the people in their daily life. This project emphasize on a new hypermarket item locator which helps user to find their required items provided by the nearest hypermarket to their location. By requesting any items or product, hypermarket item locator will then search the exact location of the item including which floor, shop and aisle of the item. This to ensure that user could go directly to that location and save their time on searching the items. Besides, this application will also give pricing and availability information of the items to the users.

GPS technology on the other hand will help this hypermarket item locator to narrow down the searching task by providing the nearest hypermarket to the users' location. When user entering the items that they want to find, GPS will start to search the nearest hypermarket to the users location. Once GPS received the feedback of the location, it will tell hypermarket item locator to find location of item at only in particular hypermarket that been search by GPS earlier. With this, hypermarket item locator does not need to find at entire hypermarket in Malaysia. This definitely could reduce time on searching for the application and users.

Meanwhile, the existing hypermarket item locator does not have this functionality. Most of the existing item locator used when user already in that hypermarket. [5] This means, existing item locator cannot help their user to find required item from the nearest hypermarket to user location especially to the one who travelled to unfamiliar place.

Thus, on the next section we will describe more on how this GPS technology could be integrated into the hypermarket item locator.

2.3 Resolving Issues – Integration between GPS technology with Hypermarket Item Locator

By referring to the architecture by G. Derekenaris a,* et al in their journal *Integrating GIS, GPS and GSM technologies for the effective management of ambulances*, integration need to be done between three component which are GIS (Geographic Information System), GPS (Global Positioning System) and GSM (Global System for Mobile Communication) technologies. In their system (refer to Appendix 1), GPS and GSM technologies will be used to transmit the exact positions of ambulances to the GIS operating in EKAB's Opera-tions Centre. [6]

By referring to this architecture, GPS satellite will detect GPS receiver and GPS receiver will received the location of nearest hypermarket to the user location by the signal transmitted by the satellite. Meanwhile, GSM will be used as a modem to connect the hypermarket item locator with the GPS. This is important to send the information of location of hypermarket to the application. Then, this GSM will send the request to the server in hypermarket (in this case is GIS) showed by GPS earlier to get access to the information of the items required by the user. GIS used the data in database of hypermarket server. Once server give permission to access the data in the database of items in hypermarket, item locator will then do the task on searching those items location and pricing information request by the users earlier. Once the

searching process done, hypermarket item locator then will display the exact location on the screen of user mobile.

Besides this architecture, there is another one possible way to connect the hypermarket item locator with GPS. The method required a middle person to act as a connector between application and GPS services. This middle person will send the request from application earlier to the GPS services to get know the location.

This hypermarket item locator will be developed using Android platform. According to Xianhua Shu, Zhenjun Du and Rong Chen (2009) in their journals entitle *Research on Mobile Location Service Design Based on Android*; Android platform is a new generation of smart mobile phone platform launched by Google [7]. Once launched, Google's Android platform for mobile devices has quickly developed into a serious open source alternative. This includes Google Map library where Google Map API is located. For the next method to connect the hypermarket item locator with GPS receiver, Google Map API will act as the middle person. Google Map API will be used to determine the location of nearby to the user location by collecting speed and location information from the GPS receiver [8]. Once Google Map API receives the information, it will send the information to the application for further action. This method seems more flexible and relevant to be implemented into the product development.

CHAPTER 3

METHODOLOGY

The major contribution in this project is on how to integrate GPS technologies with item locator application. This is because GPS technologies will help the application to narrow down the searching task which only focuses to the item in the nearest hypermarket showed by the GPS. Thus, a proper plan or methods is crucial in order to gather information about the process of integration between GPS technology and item locator application.

There are two major part of methodology which is research methodology which being conducted to gather data for the documentation purpose, while the second part is software engineering methodology which involves the steps on developing the product.

3.1 Research Methodology

According to Cambridge Dictionaries Online, © Cambridge University Press (2003), research can be define as a detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding.[9] Research is a process involving in finding and gathering information for the purpose of initiating, modifying or terminating related issues to our studies or research area. In this research methodology, qualitative research has been choose as to gather as much information as possible. There are several methods in doing qualitative research which include Case Studies, Participant Observation, Direct Observation, Interviews, Public Records and Personal Records. [10]

Two major methods in this qualitative research are chosen; Participant Observation and Public Records. Participant Observation is the method where quality information is gathering by involving in particular group or event as to achieve quality

information by observing and get own experienced while mixing around with the audience or group of people. While Public Records practice gathering data from any external or internal records which includes reports, records, newspaper archives, journals, etc as to gain near of the others people work [11]. For this project, most information is coming from journals, articles, books, thesis and trusted website. These sources are useful as they gives a lot of information needed.

3.2 Software Engineering Methodology

The most suitable model of Software Engineering methodology for this project is Waterfall Model. This is because this model allows any improvements to be done quickly without need to wait to complete the whole processes. Besides, it allows quick recovery and corrective measure to be taken. Below is the further explanation regarding to this methodology:

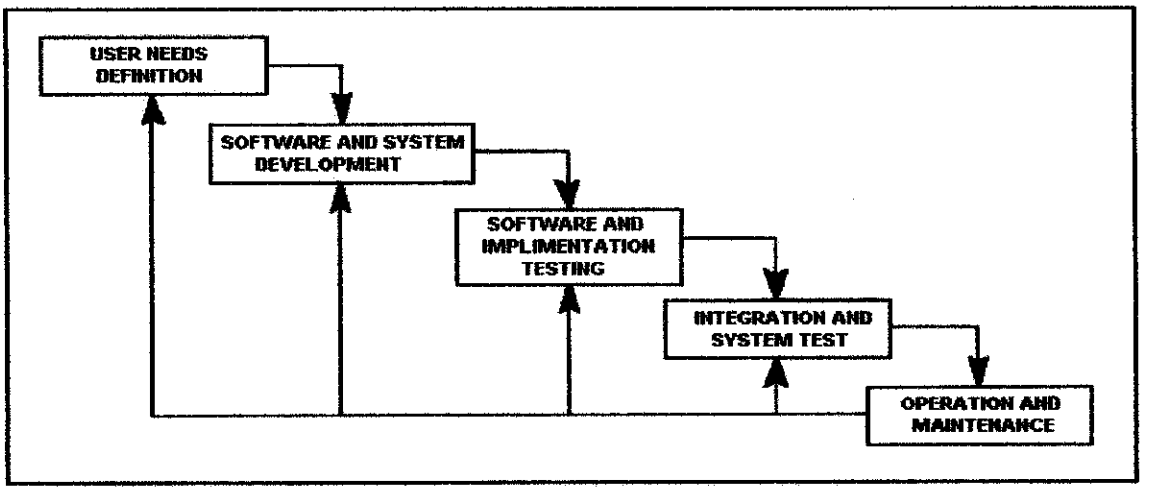


Figure 1: Methodology (Waterfall Modeling)

3.2.1 User needs definition:

This process also could be defined as planning and analysis phase where a proper work plan of control and direct system is developed. This includes finding the

problem of current system and study on how to improve it. Hypermarket item locator with GPS project is basically a study on how to integrate GPS with the application to narrow down the searching work. In this phase, early architecture is developed in order to have brief idea on how the system will look alike. All the data that are beneficial for the system development is gathered and documented. Currently the progress of the system is in this process.

3.2.2 Software and System Development:

This process is the second process where the product will start to be developed. There are several things that need to fulfill while developing the system. This includes:

- Interface design

  The application should be human interaction which easy to understand and to be used by the users. The interface should be simple and interactive enough so that the user did not find any difficulties while using the application.

- Programming language

  Java Android language will be used to develop the application together with Android Software Development Kit (SDK). SDK is selected for its open development platform, which offers developers the ability to build extremely rich and innovative applications especially on mobile application.

3.2.3 Software and Implementation testing:

Systematic and suitable testing is needed as to ensure the product's reliability and correctly functional. In this section, the testing would be regarding the ability of GPS to send the information needed by hypermarket item locator accurately. Besides, various level of testing (unit, integration and system) needs to be conducted such as to ensure technical bugs are fixed before User Acceptance Testing is conducted.

At the end of product release, User Acceptance Testing will be conducted. Usually the end users who will be using the applications will do the test. This type of testing gives the end users the confidence that the application being delivered to them meets their requirements. Another test that needs to be conducted is Usability test. Usability test is conducted to fulfill the human-computer interaction concept where user will be asked on their satisfactory about the creativity and interactivity of the system design.

3.2.4 Deliver and Maintenance:

The final process is to maintain the system so that it will run as per required. But for this project, there is no support or maintenance will be provided upon the product delivered as the author is considered as already completed her FYP project by handling the project to her FYP supervisor and the external examiner. However, the project may be extended by other FYP student in the upcoming semester.

3.3 Project Activities, Key Milestone and Gantt chart

Below are the target activities and expected week to accomplish it.

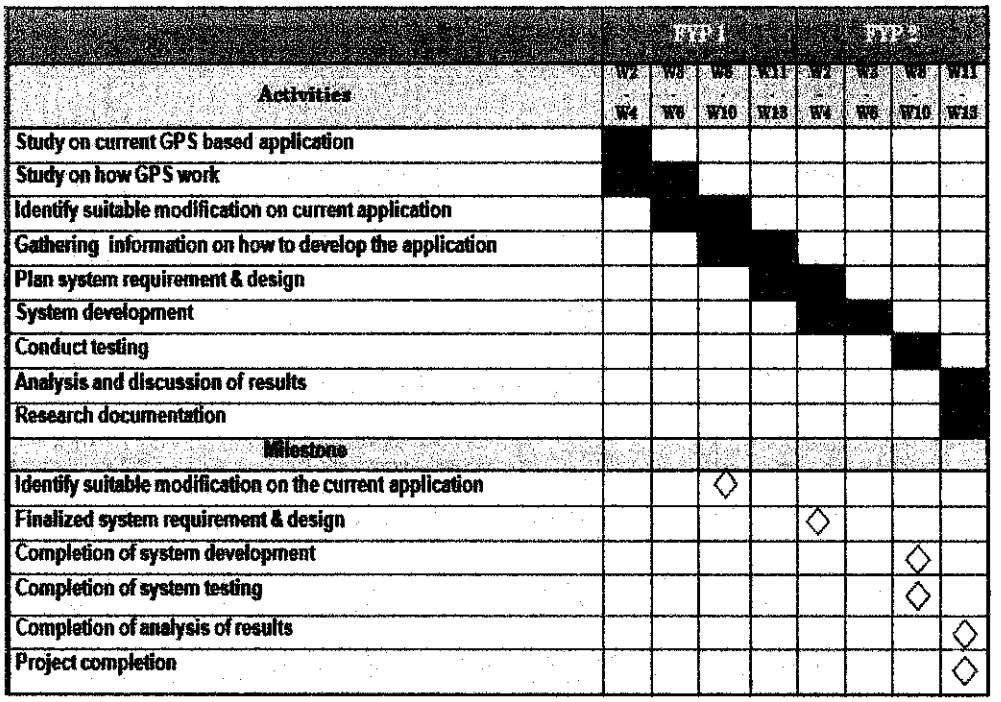


Figure 2: Project Activities, Key Milestone and Gantt chart

3.3.1 Project activities

As mentioned before, there are two phases of completing this project which is documentation phase and development phase. Both phase need to be completed within 'Final Year Project 1' and 'Final Year Project 2'. Thus, the project activities are divided into two major classes of tasks which are main task and sub-task. The main tasks are consisted of:

Main Task	Status
User needs definition	*Accomplished*
Software and system development	*Accomplished*
Software and implementation testing	*Accomplished*
Deliver and Maintenance	*Accomplished*

Table 1: Main Task

The sub-task is consisted of:

Sub-Task	Status
Progress report	*Accomplished*
Pre – EDX	*Accomplished*
Dissertation Draft	*Accomplished*
Viva	*Accomplished*
Technical Paper	*Accomplished*
Final Dissertation	*Accomplished*

Table 2: Sub Task

3.4 Tools

Software

- Hypermarket item locator will be developed by using Android Software Development Kit (Eclipse IDE) and the programming language used to develop Android applications is Java language. Java language is easy to learn and understand. It is designed to be platform-independent and secure.

- Android Emulator and the Tools Plug-in for the Eclipse Integrated Development Environment act as virtual mobile device on computer. It simulates the function of a mobile device and allows running simultaneous applications. Product prototype will be shows on this Android Emulator instead of in the real mobile.

Database Support

- SQLite Android databases as known as android.database.sqlite contains the SQLite database management classes that use to manage its own private database. It allows the developer to easily store information in Android's built-in databases and view them in a List or Card format. It can be used for storing things like home inventory, bank transactions, telephone calls, personal

CHAPTER 4

RESULT AND DISCUSSION

4.1 Findings

4.1.1 Methods used

A lot of research being done to determine the best method to integrate GPS services with hypermarket item locator. As stated in the literature review part there is two main methods that can be used which is by following the Ambulance Integrated System architecture and the other one is by having intermediate person between GPS receiver and the application. In this finding part, the author has come out with the best architecture for this product after considering pro and cons for both architecture.

Author decided to have intermediate person as the representative of hypermarket item locator to get information of nearest hypermarket from user location. This is the second method that being discuss earlier. Author found that by having this intermediate person, it become much easier for both GPS receiver and application to communicate with each other.

As mentioned above, this application will be developed by using Android developer (Java language and Android SDK). Android developer has the right to access into Google Maps library. By using Google Maps library, developer could create simple map application. In this library, there is also a service known as Google API. This Google API is used to integrate Google Maps into other application. Google API allows communication with GPS receiver as to know the exact position of requested location. Thus, in this product architecture, Google API will act as the intermediate person between GPS receiver and hypermarket item locator as to communicate to each other. Hypermarket item locator application will invoke request to the Google API to have the nearest hypermarket from user location. After that, Google API will communicate with GPS receiver and come out with a map of nearest hypermarket as

per request by the application. Besides, to make this application more users friendly and easy to be used, author suggests having navigation assistance for user to read the map while driving. Thus, Google Maps Navigation for Android 2.0 will be used to create this navigation features as it help user to search the location by voice instead of looking at the map.

4.1.1 Get current location using GPS and Google Maps API

Author has tried several tutorials in order to determine current location of a user. The first tutorial manage to gets the Latitude and Longitude information from GPS and displays the exact (or nearest, at times) location in Google Maps. There are several steps need to be done before come to the final product. First, author need to get a Google Maps API key which requires the application to be signed with a certificate and notify Google about Hash (MD5) fingerprint of the certificate. For finding the MD5 of a certificate, we run the command:

```
keytool -list -alias androiddebugkey -keystore debug.keystore
-storepass android -keypass android
```

Figure 3: MD5 certificate command

The output of the command will be like this:

```
C:\Program Files\Java\jdk1.6.0_11\bin>keytool -list -alias androiddebugkey -keys
tore "C:\Users\user\.android\debug.keystore" -storepass android -keypass android

androiddebugkey, Oct 29, 2011, PrivateKeyEntry,
Certificate fingerprint (MD5): AF:21:52:2E:D2:6B:01:17:84:25:06:DE:C3:E4:01:35

C:\Program Files\Java\jdk1.6.0_11\bin>
```

Figure 4: MD5 certificate key

The second step is to create new Android project in Eclipse tools. Before the author can start using MapView control from Google APIs, author need to add Google Maps External Library (com.google.android.map) to the library. Therefore, **uses-library** tag is used to add the library into the project. This tag needs to be added to *AndroidManifest.xml*. Apart from the library, several relevant permissions need to be added as well. For adding permissions, author use **uses-permission** tag. For this application, author will add the following permissions:

- android.permission.ACCESS_COARSE_LOCATION: Allows application to access coarse location (Cell ID, Wi-Fi etc.)
- android.permission.ACCESS_FINE_LOCATION: Allows application to access GPS location.
- android.permission.INTERNET: Allows application to open network sockets.

Besides, author did add MapView control to *main.xml* which also to include the API key that author determine before. In this tutorial, there are several function included such as display Google Map view, zoom in and out controls, and find address for GPS Location. In order to change the address of a location, author need to do it manually by inserting Longitude and Latitude of location in DDMS of Android SDK which can help to change GPS location of Android Emulator. The steps are: Click Window->Open Perspective->DDMS. Scroll down in Emulator Control on the left, till Location Controls and type in Longitude and Latitude, and click send.

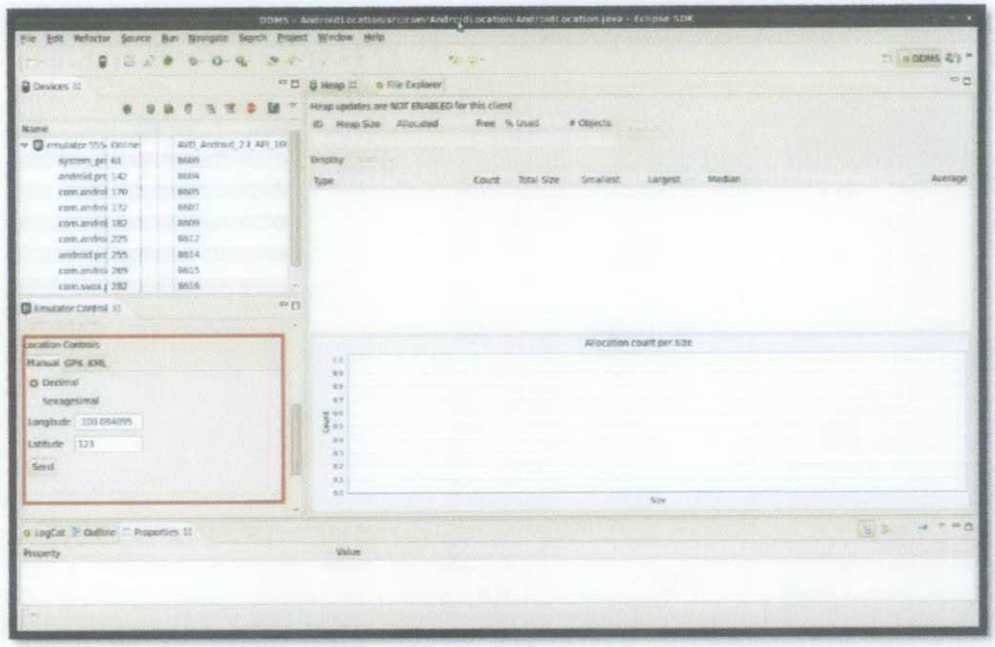


Figure 5: DDMS Android Emulator

Thus, the final view of the tutorial will be like this:

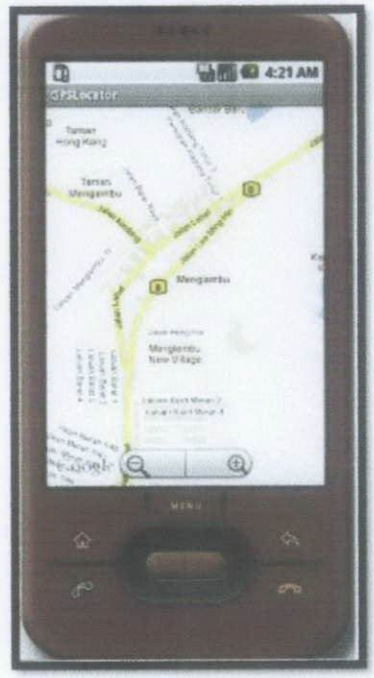


Figure 6: Output of the tutorial

4.2 Data Gathering / Data Analysis

4.2.1 Working flow

Below is the expected working flow of the hypermarket item locator.

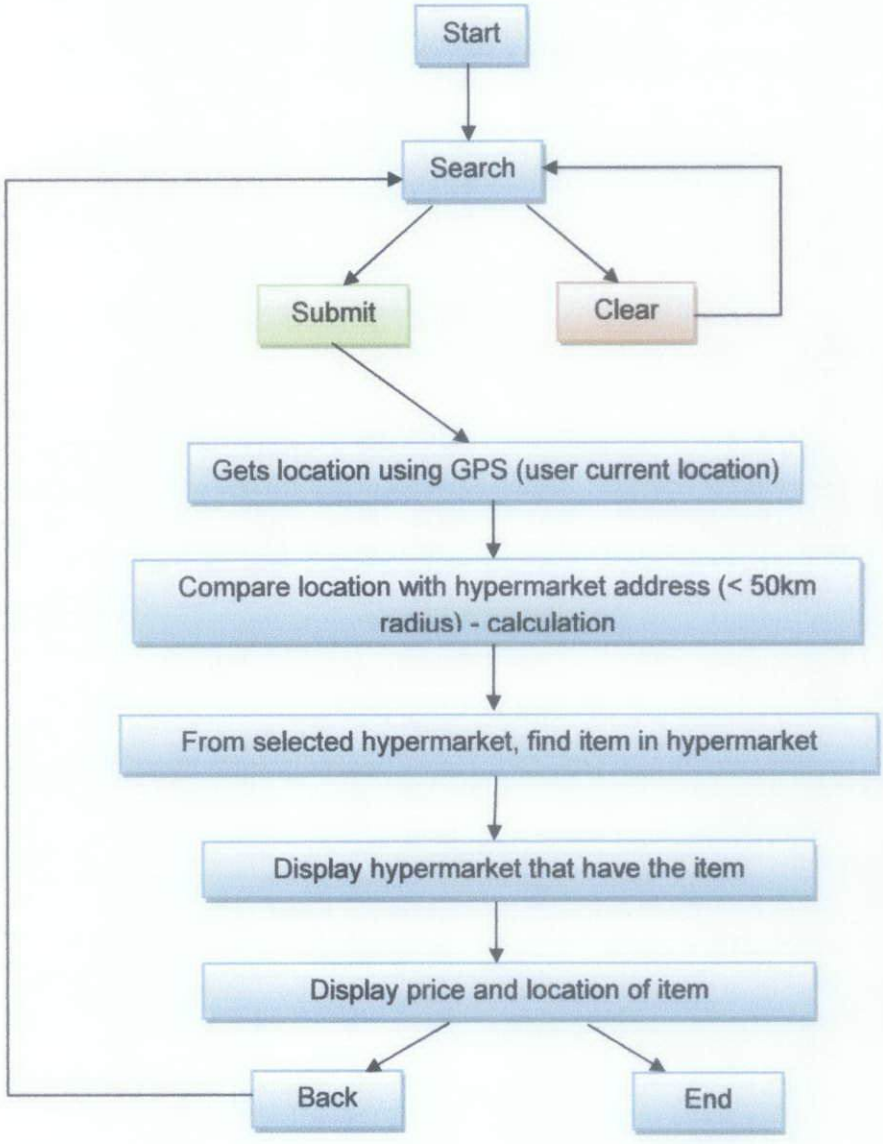


Figure 7: Working flow of hypermarket item locator

Once the application starts, user required to insert item that they want to search in the search text box. Then, if they intended to proceed, click the 'Submit' button. Else,

'Clear' button. Once 'Submit' button is pressed, the application invokes the GPS to get the user current location (longitude and latitude). This is important because from the information, GPS could retrieve the nearest hypermarket to the user location. This can be done by having calculation between these two points. The distance then will be compared by the application. Only hypermarket within radius 50km to the user location will be selected to be display in the application. Item then will be search from selected hypermarket. Price and location of the item then will be display in the application.

4.2.2 System Architecture

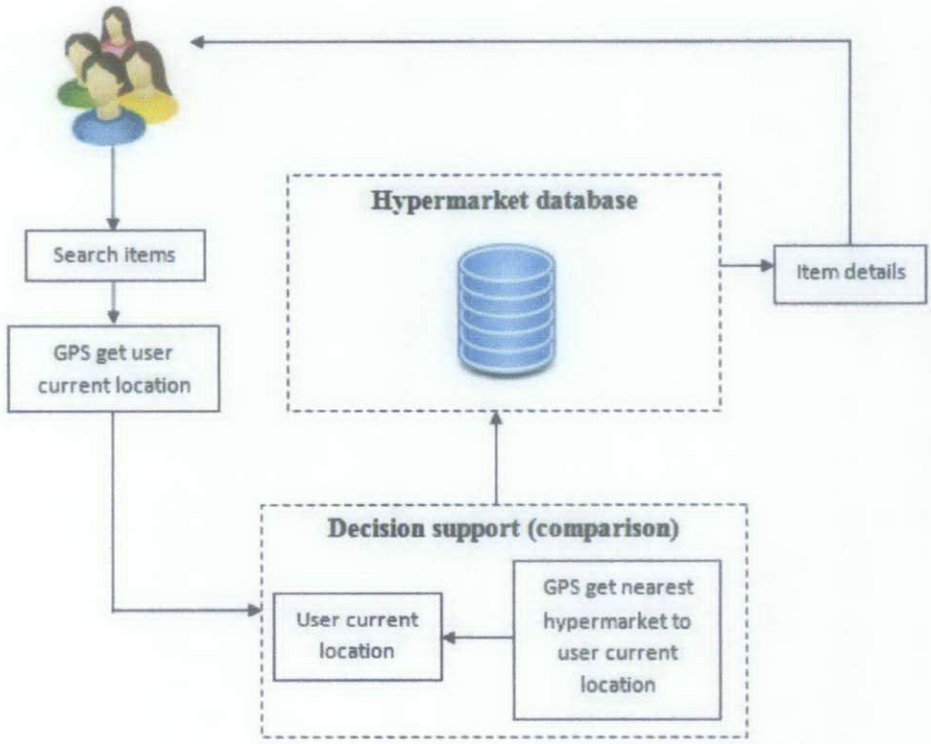


Figure 8: System architecture of Hypermarket item locator

This is the update hypermarket item locator architecture. The architecture shows that there are communication happen between hypermarket item locator and GPS where

GPS need to get user current location in order to determine the nearest hypermarket from the user. Once the GPS has determined the nearest hypermarket, the application will search item details required by the user in the hypermarket database. Then the application will display the details for user reference. The details will include the price and location of the item.

4.2.3 Database Design

The database of the system will be maintained by using SQLite Database for Android developer. There are 3 tables being used by the system which are userItemDetails, itemsInfo, Details and locationPreferences. Below are relational model of the database.

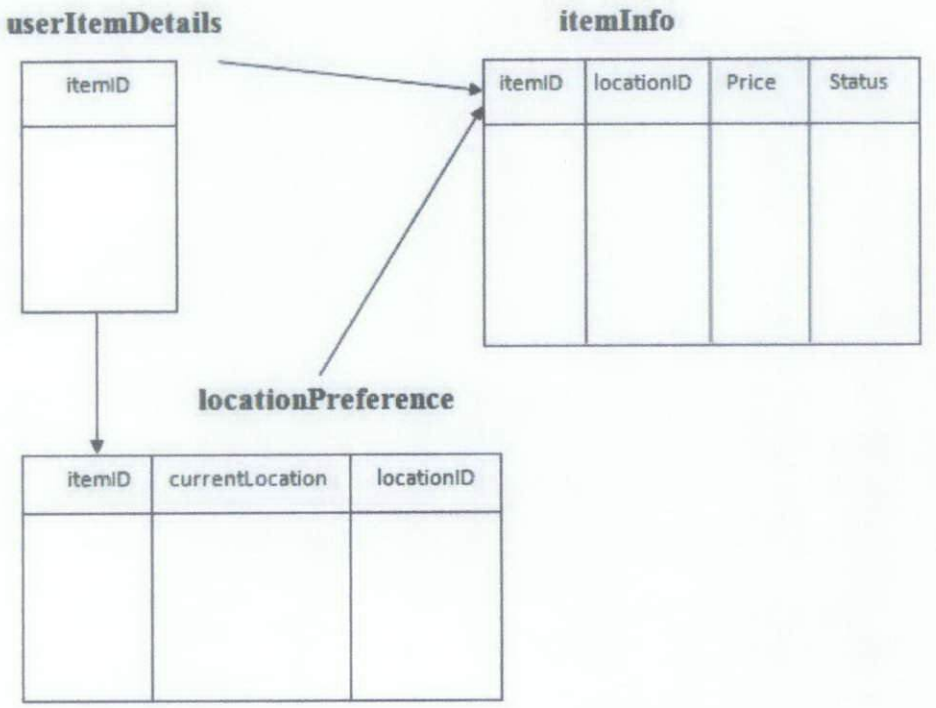


Figure 9: Database design of Hypermarket item locator

4.3 Experimentation / Modeling / Prototype / Project Deliverables

- Below is the first draft of interface design of the expected final product. This screen will appear when user chooses the hypermarket listed by the application earlier. This screen shows three types of categories for user to choose before go to the next page/screen.

Figure 10: First screen of the expected final product

- For the second screen, it shows the items from each category. For example, in fruit categories, there are apple, banana and grapes for user to choose.

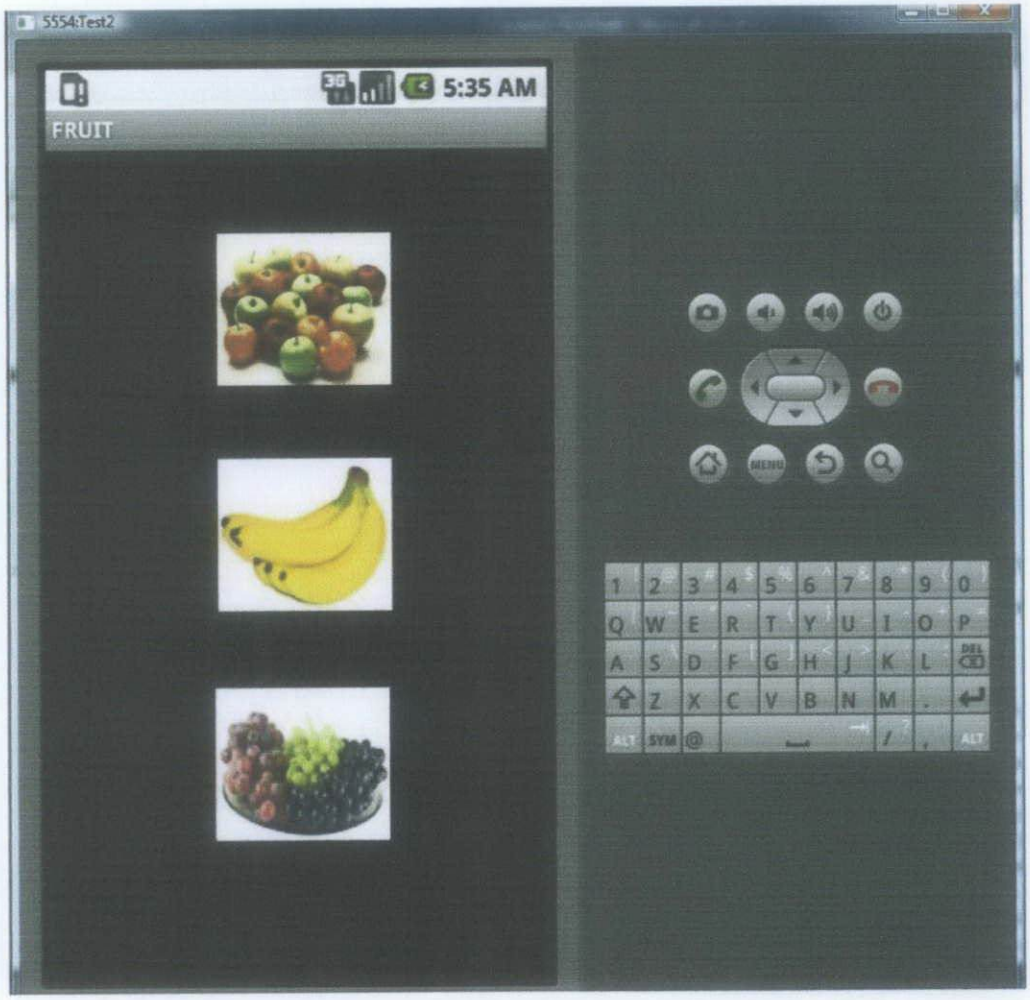


Figure 11: Second screen of the expected final product

- For the third screen, it shows the item information for the selected items. For example, user chooses to know the details of apple.

Figure 12: Third screen of the expected final product

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

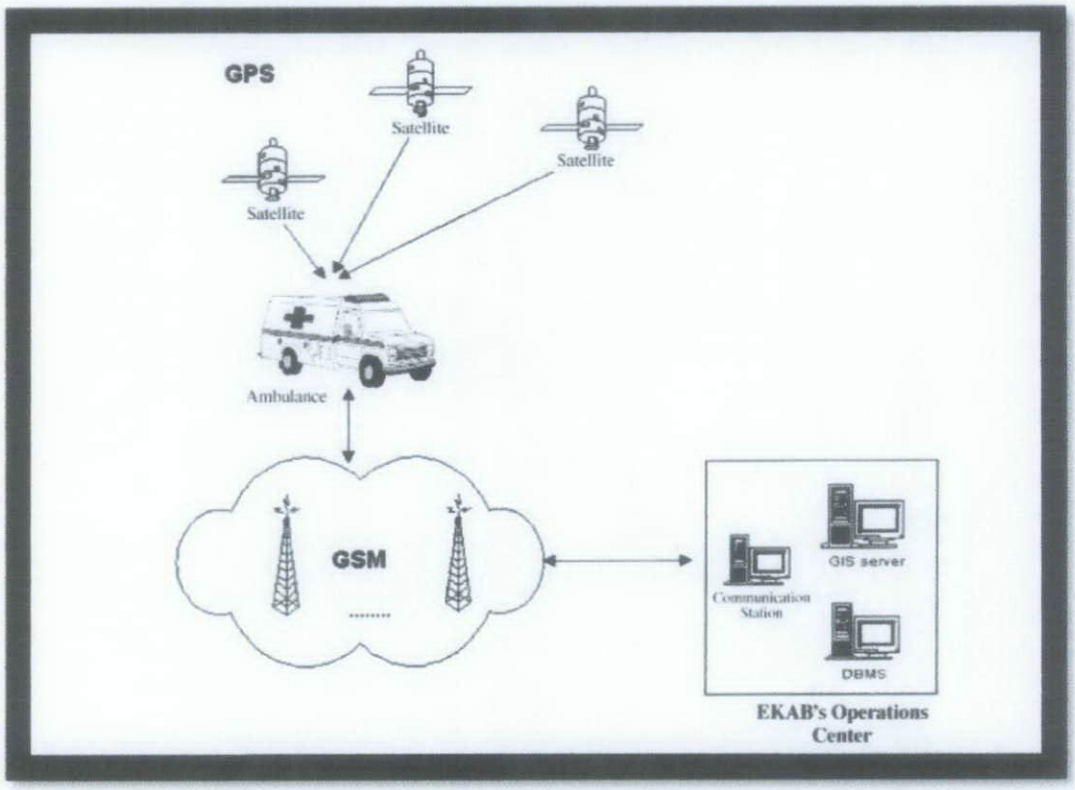
In this report, we can have brief idea on how the product will look like by looking at the system architecture provided by the author. Based on the testing done in this project, it shows that hypermarket item locator can be implementing in the real world and acceptable by the end-user. Most of the parts needed in realizing this project have been successfully done, yet there is one part of this project that is still in progress and has yet to be finished. The part is where to write the coding on communicating both GPS and application. As this part to be done, the project will be considered completed.

Hypermarket item locator with GPS is designed on purpose to ease user to find their preferred item effectively in a short time. This definitely can save user time while shopping. With the support of Android development tool, this project can be transformed into reality which will benefit to all users.

5.2 RECOMMENDATION

The final product of this project will be the prototype of hypermarket item locator with GPS which will be display on the Android emulator instead of in the real mobile. Thus, author would suggest for future developer to embed the application into the real mobile for expansion and continuation of the product. Besides, the database should be put in the server instead of local host (in the phone) in order to reduce capacity of the application. This hypermarket item locator with GPS can be sold to the market once it successfully embeds into the mobile phone with Android Operating System.

APPENDIXES:



Appendix 1: Ambulance Integrated System

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