



Faculty of Computer Science and Information Technology

INTERACTIVE MAP APPLICATION FOR FCSIT

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**Bachelor of Computer Science with Honours (Multimedia Computing)
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INTERACTIVE MAP APPLICATION FOR FCSIT

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ABSTRACT

Map application is longer a new thing among the smartphones' users. Current map application usually focuses on an outdoor environment. In this project, an indoor interactive map application is built using the available useful part in the smartphone such as the accelerometer sensor, gyroscope sensor, and the magnetic sensor. These sensors are working together with the magnetic field around the building to detect the current location of user in order to guide them. As an indoor map application, this interactive map is designed to guide new students and visitors of FCSIT in the faculty as they are still not familiar with the building. The processes of developing this project (Interactive Map for FCSIT) are following the Rapid Application Development (RAD) methodology. Each process is divided into smaller tasks according to the RAD methodology. Thus, it is easier to develop, implement, and test the project when it is done part by part. This map application is designed to help and guide user in FCSIT's building. The testing and evaluation done before this application is deployed shows that throughout some limitations, this application is able to provide basic information to users. The conclusion that can be drawn is indoor map applications can benefits users as much as an outdoor map applications serve. The limitations can also be improved later through more researches and studies.

ABSTRAK

Aplikasi peta bukan lagi suatu yang baru dalam kalangan pengguna telefon pintar. Aplikasi peta masa kini banyak tertumpu kepada persekitaran luar. Dalam projek ini, sebuah aplikasi peta interaktif dibina menggunakan bahagian penting di dalam telefon pintar seperti sensor pecutan, sensor giroskop dan sensor magnet. Sensor-sensor ini bekerja bersama dengan medan magnetic di sekeliling untuk mengesan lokasi terkini pengguna untuk menunjukkan arah kepada mereka. Sebagai sebuah aplikasi peta, peta interaktif ini direka untuk menunjukkan arah kepada pelajar baru dan pelawat FCSIT di dalam fakulti kerana mereka masih belum biasa dengan bangunan ini. Proses-proses membina projek ini (Peta Interaktif untuk FCSIT) adalah mengikut metodologi Pembangunan Aplikasi Pantas. Setiap proses dibahagikan kepada tugas kecil mengikut metodologi Pembangunan Aplikasi Pantas. Oleh itu, adalah lebih mudah untuk membina, melaksana, dan menguji projek ini setelah siap dilakukan secara berperingkat. Aplikasi map ini direka untuk menolong dan menunjukkan arah kepada pengguna di dalam bangunan FCSIT. Ujian dan penilaian yang telah dilaksanakan sebelum aplikasi ini digunakan menunjukkan bahawa walaupun mempunyai kekangan, aplikasi ini dapat menyediakan informasi asas untuk pengguna. Kesimpulan yang dapat dibuat adalah peta interaktif dalaman dapat memberi kelebihan kepada pengguna sama banyak sebagaimana diberi oleh aplikasi peta luaran. Kekangan yang dihadapi juga masih boleh diperbaiki selepas melalu lebih banyak penyelidikan dan kajian

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Technologies keep evolving and upgrading themselves within times. It goes the same with mobile devices such as smart phones and tablets. Mobile devices are rapidly increasing their capabilities in graphics and networking (Noguera et.al, 2013). Grabbing this opportunity, a mobile application is actually a great platform on solving problems that arise nowadays.

According to Nurminen (2006), map is a representative of a selected environment that be used as a tool to create images of the spatial relationship of the surrounding. Using the main idea of a map which is as a tool of creating images of the surrounding, an interactive map application is a mobile application that functions as a map that shows the images of the surrounding. An interactive visualization of maps using mobile devices has some features including the mobile guides, personal navigation and the location-based services (Noguera et.al, 2013). The creation of a map application helps navigating and finding places or location with ease.

Most of the interactive map application develop nowadays is focusing on the outdoor mapping where the application functions as a guide on road and finding building and places. There are only few interactive maps that focus on the building and most of them are web-based application. The web-based interactive maps available nowadays usually act as the building directory itself. For example, users are allowed to see the floor plan online with the information and details of the location and also able to search the staff in charge on the location for more information.

Faculty of Computer Sciences and Information Technology (FCSIT) only has a map displayed on the notice board in each level to guide students, staffs and visitors around the building. FCSIT does not have any digitized map except in the Photoshop file format which is built for printing purpose. The printed map might be sufficient on guiding people in some certain area within the building, but would it be better if the technologies are inserted in it. Using mobile platform to guide people in the building is much easier as it is portable and can be used anywhere. This idea can be seen as a golden opportunity in the context of interactive map.

A portable interactive map application using mobile platform that is accessible anywhere and anytime is a chance to enhance the technology used in helping others to doing their job and responsibilities effectively as they can get the information of the building easily.

1.2 PROBLEM STATEMENT

Map is important on guiding people ways and directions. Basically, each place and location does have the map of themselves to ease people. Same goes to FCSIT which this faculty has the map or building plan to guide people in the building. This faculty only has map in the format of Photoshop file for printing purpose.

The map of the building is put on the notice board on each level. It is not portable where people need to look and remember the map before finding their ways. However it is quite hard on remembering places by just looking at the map. They tend to ask around and lost few times before they can actually be familiar with the faculty's buildings.

New students and visitors are having a hard time on familiarizing themselves in the faculty as they are still have not been around before and new to the surroundings. Finding ways and directions will be harder without any guide and help. They tend to get confused on the rooms such

as lectures' rooms and tutorial rooms or laboratories that they are looking for. There is so few of them which are actually referring to printed map on the notice board because most of them chose to ask around for directions. It is normal to find new students or visitors lost while finding rooms and laboratories because they did not know the building plan well.

1.3 OBJECTIVES

1. To digitize the map of FCSIT.
 - Vectorise the printed map using the vector graphic editor, Adobe Illustrator.
2. To design and develop an interactive map application for places in the faculty.
 - Design the interface and the flow of application using diagrams.
 - Develop the interactive map application in Android platform.
3. To guide new students and visitors (new to the faculty) on finding places.
 - Include the name and information of places in the faculty inside the application.
 - Provide ways and directions in the application.
 - Test the application using the User Acceptance Testing to know the ability of this application to guide new students and visitors to find places.

1.4 METHODOLOGY

Methodology is a guideline or a framework to obtain, organize and analyse the data on developing a project (Polit & Hungler, 1999). The methodology chose in developing this project is the Rapid Application Development (RAD) methodology. This project is using this methodology due to the shorter time needed to produce a product. Since this project need to be finished on short period of time, this methodology is suitable for this project. RAD methodology enables the

development of quality products faster (CASEMarker Inc., 2002). Thus, the product of this project is having more quality compare to the time it takes to develop it.

In addition of that, RAD methodology is an incremental model where the components, features or functions of the project are developed in parallel as small tasks (ISTQB, 2014). Smaller tasks provide higher chance to detect errors and mistakes. This methodology provides an environment where the functions of the interactive map first be divided into few groups to be developed in parallel. Thus, users can see the flow of the map even though it is not fully developed.

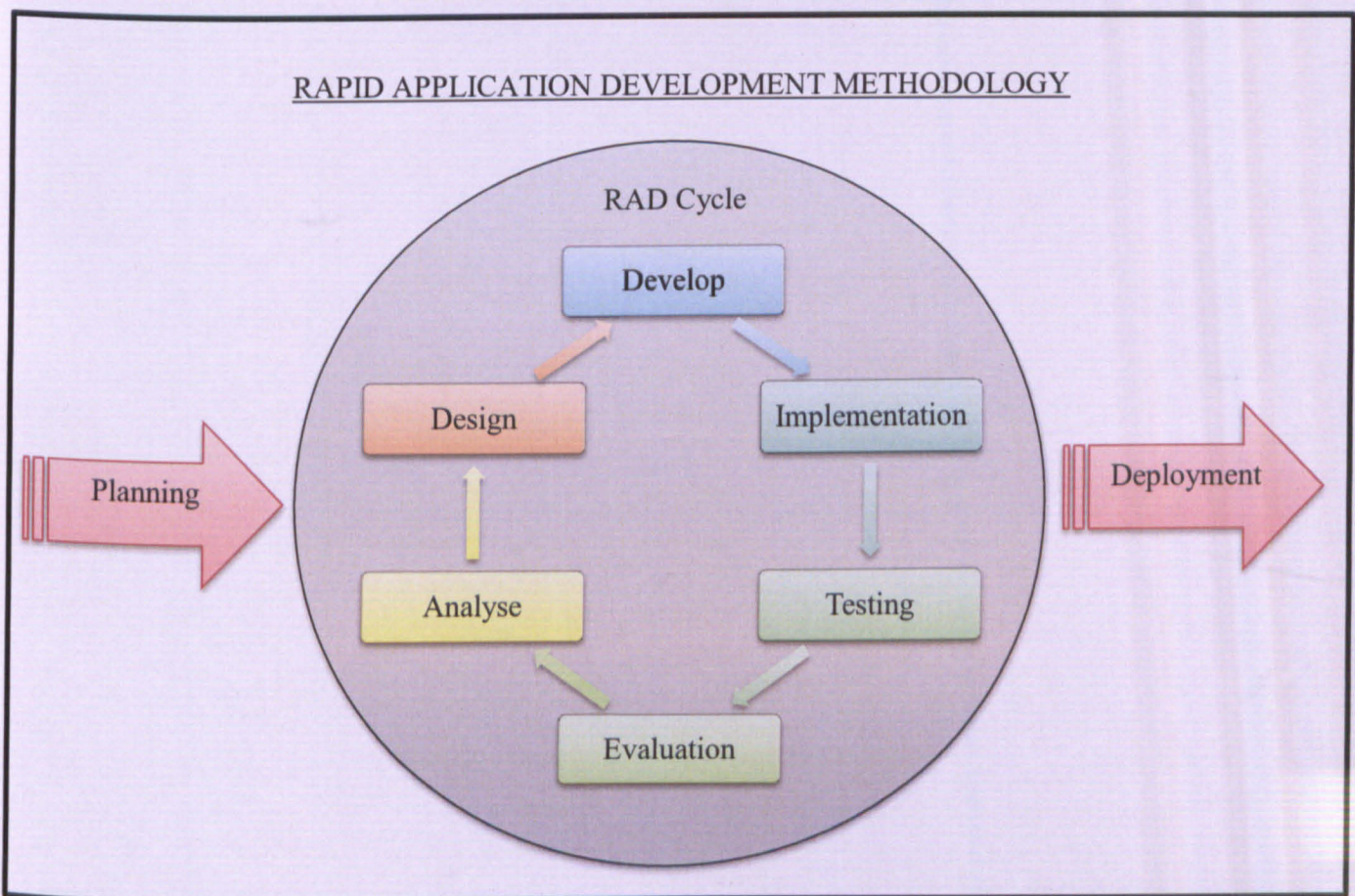


Figure 1.1: Rapid Application Development Methodology

RAD methodology is designed as an improvement of the traditional System Development Life Cycle (SDLC). There are three phases in this methodology which is the Planning Phase, RAD Cycle, and Deployment Phase. Figure 1.1 illustrated the phases in the RAD methodology.

The first phase is Planning Phase where the project flow, information gathering and project scopes are defined. The next phase is the RAD Cycle Phase. This phase is made up of the iteration of few stages in order to create an environment which changes can be altered easily. The phases in the RAD Cycle are Analyse Stage, Design Stage, Develop Stage, Implementation Stage, Testing Stage, and Evaluation Stage. The Deployment is the last phase of this methodology. In Deployment Phase, the complete and fully functional application is deployed to users' environment. The flow of the methodology used will be further discussed on Chapter 3.

1.5 SCOPE

This project is targeting the new students and visitors (new to the faculty) as the target users of this interactive map application. This is to provide them easiness in familiarizing with the building plan.

1. New students

- Inform and advertise the application for them to use through the students' orientation weeks, notice board, guide book and FCSIT's website.

2. Visitors

- Promote the application through the FCSIT's website.
- Inform them when they first come to attend forum or seminar for their next usage.

This application will include some features such as

1. A map of FCSIT buildings for new students and visitors.
2. The name of each rooms and laboratories in FCSIT.
3. The information for the rooms and laboratories.
4. Ways and directions to target destination.

However, there is an exclude which this application does not provide which is in the context of application's maintenance. This application will not upgrade the information of the rooms and laboratories since all the information are under the FCSIT website.

1.6 SIGNIFICANT OF PROJECT

There are direct and indirect significant can be taken from this project of Interactive Map for FCSIT. Direct significance can be seen from students' and visitors' perspectives while the indirect significance can be seen from the faculty and staffs' perspectives.

The significance of this project for new students' perspective is when this interactive map can guide them on the exact location of the rooms and laboratories. They can save time on finding the location of their destination by not getting lost frequently which mean punctuality is no longer a problem for students by using this interactive map. The information stated also helps them on knowing who they need to contact if there is anything happen at the location.

While for the visitors, their business with the faculty will be more effective and efficient since they can be on the business meeting point on time without getting lost. More time can be spent focusing on their business other than finding ways and directions.

Even though the target users for this application are new students and visitors, the faculty's staffs also share the significance of this interactive map. The cost of putting so much signboard for information and direction can be reduced as all the information and directory can be found on the interactive map. Other than that, this map can be a reference regarding the building structures.

Lastly, the outcome of this project will also contribute on promoting of FCSIT as one of the new established faculty in the university.

1.7 PROJECT SCHEDULE

This project began on 9th September 2014 and expected to end on 29th May 2015 with the estimation durations of 6 months and 7 days (187 days). The details of project schedule can be seen in Appendix A.

1.8 EXPECTED OUTCOME

The proposed development of mobile phone application for an interactive map would serve new students and visitors on getting know the FCSIT and its surrounding well. It is actually a portable map of mobile application that capable of showing the real simulation of the building of FCSIT. Simulation is the imitation of an operation of real-world process on a virtual world or digitalizes it over time (Banks et.al, 2009). In addition of that, the interactive map is also expected to be useful as a faculty building directory.

Besides, interactive map of FCSIT should be able on providing some basic information for each room and laboratory for users. Other than that, users should be allowed to ask for instruction on guiding them to their destination.

1.9 REPORT OUTLINE

This project consists of seven chapters where each chapter will introduce and elaborate each task that will be carried out in sequels. All the chapters are planned and carried out according to the methodology chose. This section will explain in brief the overall task and progress of the project that will be done sequentially by chapter.

Chapter 1 is a chapter that consists of the overall view of the project. It describes the flow of the project and details about the projects such as the background study, problem statement, objectives that need to be achieved, methodology used, project's scope, project's significant, project schedule, expected outcome and the report outline itself.

Chapter 2 is a chapter that consists of the comparison and studies about previous or existing works that associate with the project. The review describes the features, advantages and disadvantages of the associated works. In addition of that, there are comparisons between all the works reviewed in this chapter.

Chapter 3 is divided into two parts. The first part of this chapter discusses about the methodology used in developing this project. In addition of that, the details the flow of this project according to the methodology chose are also explained in the first part of this chapter. The second part of this chapter explains on the requirement analysis and design of this project. This part provides a clear view on the details on the analysing and designing stage. Other than that, there are also descriptions on the analysis and design requirement of this project. All the details and information of the requirements needed are included in this chapter.

Chapter 4 is documenting the steps required to develop this project technically. The processes of the implementation are following the features and functions of the application developed for this project.

Chapter 5 comes after the application is finish developed. The plan and results are explained in details in this chapter. From the results, the success of the project is evaluated.

Chapter 6 is the last chapter for the project where it conclude and summarize the project in the progress and it success context. It also contains the future work and suggestion about the improvement that can be done for this project later. Other than that, this chapter will briefly summarizing the achievement of the objectives of the project.

1.10 SUMMARY

In conclusion, this chapter has sum up the overall details of this project. A general overview can be drawn with the information in this chapter. This chapter includes the background of the project which provides the basic idea about this project. The problem statements are found from the background study, while the objectives are built to solve the problems stated. Next, the expected outcomes of this project are drawn from the objectives. At the same time, the significant of the project can be seen clearly supporting that this project will lead to success. In short, this chapter gives a better insight to the others on understanding the flow and details of this project.

CHAPTER 2: LITERATURE REVIEW

This chapter consists of the review of several existing application that related with interactive map and some comparison details on few techniques used to develop an indoor map application. In general, this chapter will first introduce briefly about map, interactive map, and the interactive map application. Next, all the existing applications reviewed are described and compared. It focuses on comparing the existing applications in many side and field. Lastly, this chapter is summarizing the comparison of techniques of developing an indoor map application. The technique chose to develop the application of this project is also stated with reasons and explanation.

2.1 MAP

Map is a plan or a group of diagrams representing a region or an area of real world. All form of maps is defined as a cognitive map by Patel and Vij. Cognitive map is a cartographic illustration of spatial environment representative by a person (Patel & Vij, 2008). Diagrams that representing a spatial environment can be considered as map. All the spatial buildings, road and information are plotted to design a map. This representative of spatial information can be in many medium such as printed and virtually presented.

At first, map is present as paper-based maps but after past few decades, map is used as a medium to share the geographical information of a spatial environment. The need of using a map is also increasing. Thus, the benefits of technology are used to improve the traditional map so that everyone can easily access it. According to Brock (2013), accessible geographic maps are helpful but still possess significant limitations in travel preparation. The idea of converting the paper-based maps into the system-based maps is to make it easier to be used. The system-based maps can be known as the interactive maps.

2.2 INTERACTIVE MAP

Schafer (2001) has mentioned in his journal article that interactive maps are providing ways on supporting collaborative activities and navigate the virtual environments. While navigating, interactive maps are also presenting the existing spatial information to the user. Interactive map does not only displaying the spatial information yet it provide user the information needed. The spatial information of an interactive map is originally graphically-oriented on the web platform. However, as the technology evolves, the spatial information can also be found in the mobile platform.

Interactive maps allow the localization of spatial objects and information, the distance estimations and the directions (Hatwell & Martinez-Sarrochi, 2003). All of these information and features in the interactive map are helpful in term of helping users to move around in the unfamiliar place without a need on using the large traditional foldable paper map.

2.3 INTERACTIVE MAP MOBILE APPLICATION

It is known that smartphones, tablets and the touchscreens' handheld devices nowadays are the current trend for all generations. iPhone, Android, and Symbian are some mobile platforms that have been worked by the developers for various applications and systems. Moving together with this trend, the needs and numbers of applications based on the interactive maps are also increasing. Most of the mobile users have at least one interactive map application in their handheld devices. Interactive map mobile application is a location-based service that presents the spatial information using the mobile platform. Since a handheld devices are easy to hold and always be with the user, this application grabs the opportunity to evolve from the paper-based map to an interactive map application as a problem solver since it is portable and flexible to be used anywhere. It is more convenient and helpful.