CHAPTER 1

INTRODUCTION

1.1. Background

Cambodia is located in mainland Southeast Asia, covering a land area of around 181,035km^2 with a population of approximately 14 million. Cambodia is geographically located between 10 and 15ºN and between 102 and 108ºE. This coordinates indicate that Cambodia is a tropical, warm and humid country that is favorable for travelers all year around. Cambodia is one of many countries in Southeast Asia filled with a blend of charming touristic sites, cultural and traditional attraction, and culinary tourism, (Chheang, 2008). Tourism sector is one of the most significant fields in Cambodia's economy after agriculture and garment sectors, as well as being the second largest contributor of foreign earning behind the garment sector (PLC., 2013), (Ministry of Tourism, 2015).

Phnom Penh, is known as the 'Pearl of Asia', is the capital and largest city in Cambodia. The alluring capital city also features a wide variety of historical and cultural attractions, along with myriad chances to sample local Cambodian culture. Phnom Penh city is one of the most interesting and alluring cities for tourist attractions and culinary places in Cambodia. In recent days, most local and international tourists have difficulties to find tourist information such as attractions and culinary places because they do not have adequate information about these places. Most of tourists still use the conventional map to find the desired destinations where they want to go. Sometimes they need to ask the local people about information of these places and route to get there. This way is not effective

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and efficient because of time wasting and much costing to find the exact tourism site as they want to visit. Also, it is not practical to carry manuals all the time, manuals are not trusted because anyone can print and publish them. Moreover, the Cambodian government has not taken advantage of advanced mobile technology to widely expose the existing tourist attractions and culinary places information in Phnom Penh city.

Nowadays, the use of information technology plays a vital role in user's daily life, especially mobile phones. Mobile phone has become popular and powerful medium size running machine where on application level there are many applications which are running and many data that is stored. One of the mobile operating systems is Android (Emir Kremić, 2011). Android has been selected as a platform in the research because Android operating system is open source product which developed by Google and runs on an x86 CPU (Patil & Ramteke, 2014). The main feature of the Android operating system is an open source, Java support, and multitasking support. Because of these features, this make developers easy for coding by using Android operating system (Rayarikar, Upadhyay, & Pimpale, 2012). With the rapid advancement of information technology, users can get the information that they want easily by using mobile technology. Because of that reason, the mobile technology has been utilized as a way for promoting the tourism information which is available in Phnom Penh city to increase the interest of tourists' visit. This factor is regarded as a contributor to affect the income increase of Cambodian government. The location based Augmented Reality (AR) technology is utilized as an information service of tourism location which take

advantage of some features available in mobile device such as camera, GPS, accelerometer sensor, digital compass and along with data connection.

Augmented Reality (AR) is the integration of virtual objects with a 2D or 3D real environment in real time session (Azuma, 1997). Virtual and real objects appear simultaneously in a real-time session in a way that the user sees the real world and virtual objects superimposed upon the real objects. The user's perception of the real world is improved and the user interacts in a more natural way. Virtual objects can be utilized to display extra information about the real world that is not directly perceived. AR provides the nice and interactive user interface. AR on mobile device integrates digital generated information virtually to real environment so that users can see all the information on real-time environment (Aurelia, Durairaj, & Saleh, 2014).

Location Based Service (LBS) is a mobile computing application which provide services to users based on geographical location (Shek, 2010), (D'Roza & Bilchev, 2003). The LBS technology improves the content information which provides users an easy way to look for a location from their surrounding area. Mobile devices are becoming increasingly popular and rich in resources with the LBS technology (Harrison & Dey, 2009). Positioning is a basic precondition used for realizing the track of mobile device through user's position continuously (Uzun, Salem, & Küpper, 2013).

The integration of AR and LBS technologies on mobile devices is the best tool for a mobile user to look for a location. The application will display the information of all locations in real-time environment which is detected by GPS. The

point of interest (POI) coverage is a classical requirement in mobile wireless sensor applications (Erdelj, Razafindralambo, & Simplot-Ryl, 2013). The locations are assigned as POI where the information will be displayed on mobile device in the form of text and objects. The information is displayed and overlaid in the mobile screen in real-time by using camera feature, digital compass, accelerometer sensor and AR technology. This information is helpful for mobile user to know about a location. With the use of this blend technology, the user can search the information of tourist attractions and culinary places easily and accurately by pointing out the camera straight at any direction around them in Phnom Penh city, Cambodia.

1.2.   Statement of Problem

According to the situations that has described in the background section, there are two problems that need to be solved in this research:

1. How is Android based mobile application designed and developed by using the AR and LBS technologies for searching tourist attractions and culinary places in Phnom Penh city?

2. How is application user interface evaluated for measuring the level of application usability?

1.3.   Scope of the Research

To fulfill the study research on time, some limitations of the research will be drawn as followings:

1. The proposed application is implemented based on Android mobile platform with minimal operating system 4.0 version, which comes packed with built-in sensors GPS and camera.

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2. The tools used for developing the application are Android Studio 2.1 and Wikitude SDK 5.1.4.

3. The number of sample places used in this research is twenty. Ten are tourist attractions and the rest belongs to culinary places.

4. The information of POIs used for overlaying on the mobile phone screen is received from various popular tourist attractions and culinary places in Phnom Penh city, Cambodia.

5. The proposed application requires an internet connection to obtain the information such as list of locations, images, map and so on.

6. The selected tourist attractions and culinary places are located only in Phnom Penh city.

1.4. Originality of the Research

According to the results of literature study, previous researches have not yet conducted location based AR technology and Location Based Services for searching tourist attractions and culinary places in Phnom Penh city, Cambodia. The focus of this research is overlapping the information of popular tourist attractions and culinary places in Phnom Penh city, Cambodia. The information of POI will be overlaid on mobile screen to the user. Additionally, it also presents the map route from the user's current location to the destination. This research has utilized Wikitude SDK as a library for location based AR.

1.5. Expected Outcomes of the Research

The expected outcome of this research is to make a number of contributions to the field of tourism and travelling for AR Android Smartphone. GPS is mainly

intended for location and navigation purposes, while AR can enhance the platform by offering pertinent annotations and other useful information, along with GPS navigation data for a more interactive user experience. The contributions contained in this research are the following:

1. For user: To get the information quickly and accurately of tourist attractions and culinary places located in Phnom Penh city, Cambodia by using location based AR technology and some built-in sensors such as camera, GPS.

2. For Cambodia government: To promote the Cambodia tourism industry to tourists and also non-tourists with location based AR technology using mobile device.

3. For researcher: The results of this thesis can be used as a reference for further research work in the field of location based AR technology for searching locations.

1.6. Research Objective

Generally, the focus of this research supports the integrated use of augmented reality on android powered smartphones with integrated sensors capabilities. Thus, the objective of this research is mentioned as the following:

- Design and develop a mobile application by using AR technology based on location for searching tourist attractions and culinary places in Phnom Penh city, Cambodia

- Integrate the AR technology and Location Based Service (LBS) by giving information about local landmarks of the tourist attractions and culinary places in Phnom Penh city, Cambodia on mobile device

1.7.   Thesis Organization

This thesis has been divided into 6 chapters and is organized as follows:

Chapter 1: This chapter introduces the background of the study, its purpose, research significance, the objectives, scope of the research, research originality, as well as the research questions that guided the study.

Chapter 2: This chapter describes previous researches related to this thesis and gives detailed explanation of theoretical background which related to this study as well such as Augmented Reality, Location Based Services, Global Positioning System, Android and Software Development Kit.

Chapter 3: This chapter looks into the research methodology, includes the information related to the design, setting of the study and flowchart. This chapter also illustrates the required data, tools, hardware and software implementations and research phases that will be used in the thesis.

Chapter 4: This chapter explains the phases of system analysis and design for developing the proposed augmented reality application. It also presents the system architecture, functional diagram and prototype of the proposed application.

Chapter 5: This chapter outlines the outcome of coding implementation of the proposed application and also conducted the system evaluation or testing after system is accomplished successfully.

Chapter 6: This chapter briefly summarize the conclusion of the proposed research and also provides the suggestion for future research.