BORANG PENGESAHAN STATUS TESIS*

JUDUL : WINDOWS PHONE 8 DIET MONITORING APPLICATION
AMONG OVERWEIGHT AND OBESE ADOLESCENTS
THROUGH AUGMENTED REALITY

SESII PENGAJIAN : 2012 / 2013

Saya YAP PAUL YIN

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WINDOWS PHONE 8 DIET MONITORING APPLICATION AMONG OVERWEIGHT AND OBESE ADOLESCENTS THROUGH AUGMENTED REALITY

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This report is submitted in partial fulfilment of the requirements for the Bachelor of Computer Science (Interactive Media)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2013
DECLARATION

I hereby declare that this project report entitled

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THROUGH AUGMENTED REALITY

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STUDENT : _________________________ Date: _______________
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SUPERVISOR : _________________________ Date: _______________
(SYARIFFANOR BT HISHAM)
DEDICATION

To my beloved family...
ACKNOWLEDGEMENT

This project would not have been possible without the support of many people. A special thanks to Syariffanor Hisham, my supervisor for her guidance, encouragement, and most of all patience throughout the entire process. I would like to acknowledge and thanks to the Faculty of Information and Communication Technology for giving me this chance to carry out this project. I would like to express my appreciation to the lecturers of Faculty of Information and Communication Technology. I couldn’t complete this project without the knowledge that deliver from them to me. And finally, thanks to my parents and numerous friends who endured this long process with me, always offering support and love.
ABSTRACT

Prevalence of overweight and obesity among adolescents is becoming a global problem facing individuals across the developed and developing countries. At present, mobile diet monitoring application that available in market are designed based on eating habits and physical activities of western societies. This project focuses on implementing diet monitoring application for Malaysian overweight and obese adolescents using augmented reality application on Windows Phone 8 platform. The architecture of the application consists of Augmented Reality engine and user interface which are integrated in Microsoft Visual Studio. SLARToolkit was used to build the Augmented Reality engine which is used for marker detection. Prototyping model was used as a development methodology in developing the application. Based on testing and evaluation results, it shows that the application can help adolescents in diet monitoring. There were 17 respondents out of 22 respondents aged between 14-19 years who filled in the self-administered questionnaires were satisfied with the application. This project can potentially benefit to the Malaysian adolescents and indicates promising future works in the area of Augmented Reality for Windows Phone 8 platform. In a nutshell, the application still needs some improvement in order to make it effectively works as an effective mobile diet monitoring application.
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<td>Application Programming Interfaces</td>
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<td>BMR</td>
<td>Basal Metabolic Rate</td>
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CHAPTER 1

INTRODUCTION

1.0 Introduction

In this chapter, the basic concept of this project is introduced. The project background, problem statement, objective, research question, project scope, project framework, and project significance is determined.

1.1 Project Background

Malaysia as a developing country, the prevalence of overweight and obesity among adolescents at increased risk of significant health problems due to hasty exchange in the lifestyles (Rezali, Chin, and Mohd Yusof, 2012). In this new era of high technology, almost everyone own a smartphone. In the market, there are a lot of mobile applications have been developed for diet monitoring such as Fooducate, Food Scanner, and Nutrition.
Among these mobile applications, most of the diet monitoring application is design based on the diet habits and physical activities of western societies and culture. Thus, these mobile diet monitoring application is not suitable for Asian due to different diet habits, lifestyle, and physical activities. Furthermore, these mobile diet monitoring application is using barcode scanning technique to get the nutrition fact of the food. Therefore, the foods without barcode label cannot scan by the application.

This project is expected to develop a mobile diet monitoring application which can scan the food in real world environment using Markerless Augmented Reality (MAR). In other words, this application can scan the nutrient of the food directly without using barcode. On the other hand, this mobile diet monitoring application is design based on the Asian diet habits, lifestyle, culture, physical activities and body composition especially is Malaysian.

1.2 Problem Statements

Current mobile diet monitoring application is offering for adult based on Western lifestyle and eating habits. Those application using barcode scanning technique to track the nutrients of foods. This project aims to create a mobile diet monitoring application for overweight adolescents by using MAR technology to track the food nutrients in real-world environment based on Malaysian lifestyle and eating habits.
1.3 Objective

The objectives of developing this project are:

- To investigate the feasibility of persuasive mobile diet monitoring application among overweight and obese adolescents in Malaysia.
- To explore MAR technique in mobile.
- To develop an Augmented Reality (AR) mobile diet monitoring application for Windows phone.

1.4 Research Question

In order to achieve the objectives in this project, the research question has been raised as below:

a. How AR mobile diet monitoring application can assist in weight management among overweight and obese adolescents in Malaysia?

   The research question is designed to explore the feasibility of AR technique using in mobile diet monitoring application among Malaysian overweight and obese adolescents and will be discussed further in this project.

1.5 Project Scope

This project is proposed to develop a diet monitoring application for person who concerned with their body health. However, the main targeted users of this project are overweight and obese adolescents. This is because to raise health awareness among adolescents and to avoid overweight and obese adolescents
persists their health condition into adulthood.

The mobile diet monitoring application is a standalone mobile application that works on Windows Phone 8.0. The whole development of this project is tested using Nokia Lumia 820 with Windows Phone 8.0 operating system (OS). The application may be compatible with others version of Windows Phone OS.

Some limitations have been identified in developing this project. First, there is no open source toolkits for Windows Phone to develop a natural feature MAR mobile application. The toolkits for Windows Phone to develop an AR application is limited especially for natural feature detection. The other limitation would be accuracy of the marker detection due to the algorithm and the condition of the environment. At last, due to time constraint, only a few foods will be introduced in this project.

1.6 Project Framework

![Figure 1.1: Project Framework](image-url)

**Figure 1.1 : Project Framework**
The project framework of this project is shown in Figure 1.1. In the development process of this project, three application programming interfaces (API) will be used to develop the application. These three API are used to integrate C# and XAML to control the device and design the user interface.

1.7 Project Significance

By the end of this project, a mobile diet monitoring application for overweight and obese adolescents will be developed based on Malaysian adolescents eating habits. Beside this, the developer of this mobile application will be able to gain more knowledge on mobile MAR technology. Furthermore, this mobile application will be fulfil the special need of overweight and obese adolescents. The information in the application would help them in diet monitoring.

1.8 Summary

This project focuses on developing a mobile diet monitoring application which utilizes MAR technology. In addition, this project will also study on the physical activity and eating behaviour of Malaysian adolescents. This is to ensure the project is meet the user requirement.

At the end of this project, the developer can thoroughly understand in MAR technology on mobile phone. Thus, is able to develop a AR mobile diet monitoring application for overweight and obese adolescents. Literature review will be discussed in the next chapter.
CHAPTER 2

LITERATURE REVIEW

2.0 Literature Review

In this chapter, five area of study in this project will be identified. There are adolescents, augmented reality (AR), markerless augmented reality (MAR), Windows Phone, and comparison of AR Toolkits. In addition, current mobile diet monitoring application among IOS, Android, and Windows Phone will be explained further. Next, comparison of existing system will be carried out to determines the project is varies from current system.

2.1 Area of Study

Area of study in this project are related to adolescent, augmented reality (AR), markerless augmented reality (MAR), Windows Phone, and comparison of AR Toolkits. This can help developer to make any decision regarding development of the project.
2.1.1 Adolescents

Adolescents is young teen between the ages of 10 and 19 years old as Figure 2.1. Adolescents fall in between the stage of children and adult. Every adolescent will go through the period of adolescence. During this period, both physical and mental of human body have changed significantly.

![Figure 2.1: Stages of Human Growth and Development](image)

According to Rezali, Chin, and Mohd Yusof (2012), the prevalence rate of overweight and obese among adolescents in Malaysia were increased due to the emerge changing lifestyle in our country. Adolescents are getting fatter at increased risk of suffering from cardiovascular heart disease, type 2 diabetes mellitus and other disease. Overweight and obese adolescent may persists into adulthood, thus it will increase the risk of morbidity and mortality (Mohd Shariff, Khor, K, A.K. & Ang, 2006).
According to Nutrition Society of Malaysia, there are six behaviour causing Malaysian adolescents suffer from malnutrition. Many adolescents in Malaysia having no breakfast and often skip the meals. In adolescence stage, female adolescent will start concern of their body image so they will skip the meals to lose weight. Furthermore, adolescents like to eat fast food, snack and sweet tooth, it will cause they taken too much of fats and carbohydrate. In addition, adolescents in Malaysia love to eat supper. This is a bad habit of current Malaysian. Eating supper will increased calorie intake thus shows up as body fat and leads to overweight and obese.

In a nutshell, prevention is better than cure. In order to avoid the overweight and obese adolescents persists to the adulthood. It must be a solution to overcome this current issues. Thus, this project is carried out to help overweight and obese adolescent concern their body health.

2.1.2 Augmented Reality

Augmented reality is a combination of virtual environment and real environment where user can augment the virtual things in the real environment that generates by computer. According to Azuma(1997), there are three characteristics in augmented reality:

a. Combines real and virtual
b. Interactive in real time
c. Registered in 3D
Figure 2.2 is a diagram to show human-computer interaction (HCI) styles between real environment and virtual environment. In real environment, there have a gap between real world and computer world. In other words, there are no interaction between computer and real world. Both are standalone. In order to make an interaction, user need to switch focus between computer (dashed box) and real world. In virtual environment, there are no real world interaction and user only interact with computer. Augmented reality and augmented virtuality can be defined as mixed reality. In mixed reality, an interaction occurred between computer and real world.

In a conclusion, augmented reality create the interaction between real world and virtual world that generates by computer. Accordingly, it will create a fun and interactive application. In the stage of adolescence, their curiosity is higher than adult. Thus, implementation of AR technology in this project will attract adolescents to use this application.