THE IMPLEMENTATION OF AUGMENTED REALITY (AR) TECHNOLOGY IN PROMOTING SAVING ENERGY AWARENESS AT HOME

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THE IMPLEMENTATION OF AUGMENTED REALITY (AR) TECHNOLOGY IN PROMOTING SAVING ENERGY AWARENESS AT HOME

ATIRAH NURAIN BINTI AMINUDDIN

This report is submitted in partial fulfillment of the requirements for the Bachelor of [Computer Science (Interactive Media)] with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

DECLARATION

I hereby declare that this project report entitled

[THE IMPLEMENTATION OF AUGMENTED REALITY (AR) TECHNOLOGY IN PROMOTING SAVING ENERGY AWARENESS AT HOME]

is written by me and is my own effort and that no part has been plagiarized without citations.

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I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of [Computer Science (Software Development)] with Honours.

SUPERVISOR : _____ Date : 7 September 202

ASSOC. PROFESSOR TS. DR. AHMAD NAIM BIN CHE PEE

DEDICATION

For the endless support and guidance of my beloved parents, family, lecturers and my fellow friends. This work is also dedicated to my supervisor, Assoc. Professor Ts. Dr. Ahmad Naim Bin Che Pee whom I am grateful for his teaching and guidance to help me achieve the new knowledge I always wanted to explore, which is AR Technology.

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ABSTRACT

Nowadays, people tend to spend the energy more luxuriously. It is including the energy we use at home, office, huge building and institution. Sometimes, the excessive energy consumption happened without us noticing it. One of the ways we able to help in order to achieve green earth is by starting to save energy at our own home. In order to create awareness amongst the general population, an awareness application on saving energy at home has been develop. This application uses an interactive Augmented Reality (AR) technology which able to give the user some tips on how to save energy focusing at home. By implementing the AR technology, this app will allow the user to scan the flash card and thus, information regarding electrical appliances energy's usage will revealed. For example, when we scan a refrigerator flash card, a 3D animation model will appear and can be rotated. Then, there are audio to explain the amount home energy used and the details. Other home appliances including in this apps are the television, computer, air-conditioner and many more. Then, there is also a mini quiz to test the user's knowledge by asking the user a few questions and a score will be given at the end of the mini quiz. Some of the additional features include videos with other ways to save energy at home. There are also images slideshow of energy-saving logos found on electrical appliances. This application also have icon to jump on related websites. Hence, a fun and interesting application created to bring awareness to save energy in home among general population.

ABSTRAK

Pada masa kini, ramai orang cenderung menggunakan tenaga dengan sewenang-wenangnya. Ini termasuk tenaga yang kita gunakan di rumah, pejabat, bangunan-bangunan dan institusi. Kadang kala, penggunaan tenaga yang berlebihan berlaku tanpa kita sedari. Salah satu cara yang dapat kita lakukan untuk mendapatkan dunia "bumi hijau" adalah dengan mula menjimatkan tenaga di rumah masing-masing. Demi mewujudkan kesedaran di kalangan masyarakat umum, aplikasi "AR Technolgy for Awareness to save energy at home" telah dicipta. Aplikasi ini menggunakan teknologi Augmented Reality (AR) interaktif yang dapat memberi pengguna beberapa tips tentang langkah penjimatan tenaga di rumah Dengan menerapkan teknologi AR, aplikasi ini akan membolehkan pengguna mengimbas kad flash dan dengan itu, maklumat mengenai penggunaan elektrik tenaga yang digunakan dari peralatan akan dinyatakan. Sebagai contoh, semasa mengimbas kad flash peti sejuk, model animasi 3D akan muncul dan dapat diputar. Kemudian, terdapat audio yang menjelaskan jumlah tenaga rumah yang digunakan dan penerangannya. Peralatan rumah lain adalah termasuk televisyen, komputer, penghawa dingin dan banyak lagi. Kemudian, terdapat juga kuiz mini untuk menguji pengetahuan pengguna dengan mengajukan beberapa soalan kepada pengguna dan skor akan diberikan pada akhir kuiz mini. Beberapa tambahan adalah video berkaitan langkah lain untuk penjimatan tenaga di rumah. Terdapat juga gambar luncur dengan beberapa gambar logo penjimatan tenaga yang terdapat pada peralatan elektrik. Aplikasi ini juga mempunyai ikon untuk membolehkan pengguna pergi ke laman web yang berkaitan. Oleh itu, aplikasi yang menyeronokkan dan menarik dicipta untuk memberi kesedaran untuk penjimatan tenaga di rumah antara kalangan semua masyarakat.

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FYP	**-**	**Final Year Project**

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Chapter 1: INTRODUCTION

1.1 Introduction

Augmented reality (AR) is different with Virtual Reality (VR). It is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information. (Schueffel, 2017). Sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory. Augmented reality is related to two largely synonymous terms, which are mixed reality and computer-mediated reality. In virtual reality (VR), the users' perception of reality is completely based on virtual information. In augmented reality (AR) the user is provided with additional computer generated information that enhances their perception of reality.

Today, AR are merged together with 3D Objects to create such interesting technology enhancing its functionality to give users' experience on their devices, and will be continue to be used in future technology implementation. The use of AR nowadays are mostly for educational and gaming purposes. Since it used widely in global now, AR are the most suitable technology to use for creating awareness to save energy at home for the general populations.

As we know in our modern world now, energy are preference to human activity for cooling and heating homes, preparing food, powering travel, and producing goods, among many other purposes. Total energy used is related to population growth and economic output, but there is much variation in the effectiveness of energy use across societies. The amount of energy used, as well as the quality of energy, drives economic productivity; more efficient and flexible energy sources like liquid fuels and especially electricity are associated with higher productivity.

Hence, we need to create the awareness to general populations to save energy at home. Without realizing, the energy that we used every day are actually influence our environment. If we use them thrifty, we can reduce the amount of toxic and protect the our ecosystems from destruction. With that, we will able to contribute to a healthy and green earth world.

1.2 Problem Statements

The identified problem statements are:

i. Most of the people nowadays does not aware of their amount energy consumption.

- People tend to use more energy at their home in their daily life. Some of them are not aware of the electrical appliances that use a lot of energy consumption at their house.

ii. They also not being exposed to the ways of saving energy even at their own home.

- Most of the people and kids nowadays had been given a luxury life by their parents. From that, they never know ways to conserve energy even at their home.

iii. The monthly bills are being costly and they do not know the reason.

- At the end of every month, their monthly bills are high and some of the people never know the reason and just paying them out of curiosity. They actually can save more on their monthly bills by practicing the way to to save energy in their home.

1.3 Objectives

To clearly solve the following problems, the objectives are needed to be clearly stated. This project objectives are as following:

1. To investigate the characteristics of AR technology in providing useful information to the general population.

2. To develop an AR application in promoting saving energy awareness at home.

3. To evaluate the functionality and the usability of the developed AR application in promoting saving energy awareness.

1.4 Scope

This app is intended especially for general population such as kids, young adults, teenagers, adult and senior citizen. People with any age who want to know about ways to save energy at home and maintain green earth are recommended to use this app to understand and learn with fun methods.

1.5 Project Significance

The significance of this project is to be useful to the people in any age for their awareness of saving energy at home. This application will give a big impact to anyone who are using it and most importantly it is fun and easy to understand. With the future of AR technology, it will be more people in future to use this application to educate their loves one and family or their kids for further generation. The additional future like fun quizzes need to be added and improve to enhance their knowledge of way to save energy in their home.

1.6 Conclusion

In conclusion, the main objective of this AR application development is to bring awareness to general population to save energy beginning at home. Wasting energy can have significant impact to environment and more importantly to the greenhouse effects. For the next chapter, literature review and project methodology will be explained.

CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

In this chapter, literature review and project methodology will be explained. They will be conducted in order to complete this AR Technology development. Previous studies and researches are very important in the literature review. The purpose of the literature review is to find, gathering, analyses and conclude from every material that we found and studied. For this AR project, the study found that Agile Software Development has been used for this project. The requirements from this project are observed and comparisons were made through the previous projects and then the problems are identified where new contributions could be made. The comparison are including multimedia elements, user control, user experience for design, consistency, system visibility and project assistance documentation. All the software and hardware requirements are stated to apply the requirements for this project.

2.2 Domain

AR can generally be defined as the enhancement of a real-world environment using layers of computer-generated images through a device (Guttentag, 2010; Jung et al., 2015). Guttentag (2010) posited that AR is a type of VR. This echoes Milgram, Takemura, Utsumi, and Kishino (1994)'s view that AR and VR are related and it is valid to consider the two concepts together. Augmented reality is related to two largely familiar terms which are mixed reality and computer-mediated reality. Augmented reality (AR) are vary from virtual reality (VR) in the sense that in AR part of the surrounding environment is actually real and just adding layers of virtual objects to the real environment.

On the other hand, in VR the surrounding environment is completely virtual. A demonstration of how AR layers objects onto the real world can be seen with augmented reality games. For example, WallaMe is an augmented reality game application that allows users to hide messages in real environments, utilizing

geolocation technology in order to enable users to hide messages wherever they may wish in the world. Such applications have many uses in the world, including in activism and artistic expression.

2.2.1 About Green Earth

Green Earth is an ambition that everyone should thrive for as the planet is inhabited by us, hence it is our duty to keep it healthy. Each and everyone should take the declination of this planet seriously by doing their part in Green Planet as a goal. All the projects related will ensure a healthy and pollution free environment around us so that we can continue living in this one giant global ecosystem.

Green Earth will giving the better place to everyone in the world. Nowadays, a lot of new disease news keep arising. The cause of the disease are actually the pollution from the human activity itself. We are not aware of how to conserve the green earth instead keep using the energy wisely. Practicing energy saving can help in achieving the eco-friendly life cycle. Not doing pollution and controlling the illegal activities to ecosystem made by human will be a big help. The natural pollutant filter are the trees. So each time when a tree is cut down, we are destroying something which supports human life balance. If we are avoiding that, lots of lives can be saved, which also include safety of other living organisms existing in this planet. Pollution is the important factor that has made people to worry about the planet. Urban areas are the most affected ones because there are lots of vehicles land which pollutes the surroundings. The carbon dioxide in takers are cut down in order to increase the infrastructure of the cities. Water is also as important as air, without water life on this planet is impossible. Keeping the earth green means we are improving the quality of water and free them from the pollution waste.

The purpose of the application is to develop an Augmented Reality mobile application in promoting saving energy awareness especially regarding home appliances. This application will able to let us scan the flash card with some electrical appliances at home. For example, when we scan a refrigerator card, it will appear in 3D and there are some animation moving in the model. Then, there are audio to explain the amount home energy used and the details. User can choose the menu to see the amount energy used for that appliances and also the way to conserve the energy. It will

repeat the same for air-conditioner, plugs, and lamps. Then, there is also a mini quiz that asks users to answer a few questions and get a score. Some of the additional features are like videos with other ways to save energy at home. This application also have icon to jump on related websites.

2.2.2 The characteristics of Augmented Reality

Augmented Reality is the combination of real-time elements and virtual features that we can see as digital in real world environment. From that, there are also augmented by computer-generated sensory and produce sound, graphics, video and also GPS data. There are a few basic characteristics of Augmented Reality.

Firstly, it can overlay of real and digital world. It makes Augmented Reality different and more attractive platform for learning and games. For this application, 3D model of home appliances appear in digital world inside the smartphone. But we can look at it like it is real. Next, Augmented Reality is a real-time interaction. It is independent of time and space, global, fragmented, direct and immediate communication, simultaneously synchronous and asynchronous. The third characteristic of Augmented Reality are it is registration and alignment in 3D. The 3D form make it look immersive to the users.

2.3 Existing application

This section describes and discusses the existing energy saving application currently available.