DEVELOPMENT OF MOBILE APPLICATION ON LEARNING CRYSTAL THROUGH AUGMENTED REALITY

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DEVELOPMENT OF MOBILE APPLICATION ON LEARNING CRYSTAL THROUGH AUGMENTED REALITY

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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

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

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DEDICATION

Specially dedicated to my beloved family, friends and supervisor.

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ABSTRACT

The common platforms for learning crystals are website, book and mobile application. The learning materials in these learning platforms may work but lack of interactive, attractive and combination information of crystals chemical knowledge and their metaphysical properties. Hence, this project is proposed with the title "Development of Mobile Application on Learning Crystal through Augmented Reality". The project is aims to study on the marker-less augmented reality on learning the chemical knowledge and functionality of crystals, develop a marker-less augmented reality application in assisting user to learn and recognize crystals, and evaluate the user acceptance of augmented reality in learning the crystals compared to conventional learning methods. This project integrates the information of chemical knowledge and function of crystals. Users can learn the type of crystals through visualization of 3D models. Besides, users can interact with the crystal 3D models and crystal's structure 3D models by using slide bar and button. This project is developed by using Jmol, Blender, Adobe Photoshop and also Unity. The completion of the application will enhance the user understanding about the crystals. The AR mobile application will be the final product at the end of this project.

ABSTRAK

Platform yang biasa digunakan untuk belajar kristal adalah laman web, buku dan aplikasi mudah alih. Maklumat yang dibekalkan di platform tersebut mungkin boleh memanfaatkan pengguna tetapi susah menarik minat pengguna, kekurangan interaktif dan kekurangan gabungan pengetahuan kimia tentang kristal dan sifat metafizik kristal. Oleh itu, projek ini diusulkan dengan judul "Pengembangan Aplikasi Mudah Alih pada Pembelajaran Kristal melalui Augmented Reality". Projek ini bertujuan untuk mengkaji terhadap AR tanpa penanda pada pembelajaran pengetahuan kimia dan fungsi kristal, membangunkan aplikasi AR tanpa penanda yang dapat membantu pengguna mempelajari dan mengenali kristal dan menilai penerimaan pengguna terhadap AR dalam mempelajari kristal berbanding dengan kaedah pembelajaran konvensional. Projek ini menggabungkan maklumat pengetahuan kimia dan fungsi kristal. Pengguna dapat mengetahui jenis kristal melalui visualisasi model 3D. Selain itu, pengguna boleh berinteraksi dengan model 3D kristal dan model 3D struktur kristal dengan menggunakan slaid bar dan butang. Projek ini dibangunkan dengan menggunakan Jmol, Blender, Adobe Photoshop dan juga Unity. Penyiapan aplikasi ini akan meningkatkan pemahaman pengguna mengenai kristal. Hasil produk project ini adalah aplikasi mudah alih AR.

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LIST OF ABBREVIATIONS

FYP	**-**	**Final Year Project**
AR	**-**	**Augmented Reality**
3D	**-**	**3 Dimensional**
API	**-**	**Application Programming Interface**
UAT	**-**	**User Acceptance Test**

LIST OF ATTACHMENTS

CHAPTER 1: INTRODUCTION

1.1 Introduction

Augmented Reality (AR) technology is widely used in learning and education now. According to the survey conducted by the law firm Perkins Coie and the XR Association, 41% of the respondents said the technology is the most applicable for education sectors (Molnar.M, 2019). AR technology is help to enhance the real environment with interactive computer generated input such as visual elements and sound. AR learning is much more interesting than traditional learning methods because the users can interact with the 3D model directly. Through the integration of AR technology with learning tools, users can learn in interactive way rather than self-learning with a dull book. From the results of the survey of use mobile augmented reality for teaching materials by M Fadhil and K Sumardi (2019), the response received from respondents are positive such as AR is fun and interesting and can produce a new learning experience.

Crystals are popular in worldwide to make bracelet, pendant, charm and so on. A crystal is a solid that has long-range positional order and come in many different colors. Natural crystals often form in nature and the process of crystal forming is called crystallization. Crystals can be classified based on the crystal structure, crystal system, lattices and properties. Nowadays, a lot people are using crystals as healing purpose. According to the survey which was performed in the Community Health Centre Paskintan by Ishaque.S, Saleem.T and Qidwai.W, 63% of the respondents were aware of the use of crystals therapy, 28% of them know the usage of gemstone other than jewelry， 24% were current gemstones therapeutics users and 38% had used it before. These healing crystals have particular frequency

and vibration which arise from their molecular composition. According to experts, natural extracted crystals harness the energies of the sun, moon, and oceans to improve human's state. Crystals have been proven scientifically that can induce a placebo effect in body which is helps in medical treatment (TNN, 2019).

This project is aim to integrate the AR technology with crystals learning. The general information of crystals and related chemistry knowledge will be combined to help the learners to differentiate the crystals easily.

1.2 Problem Statement

In chemistry lesson, crystals are discussed about its properties and structure. For the public, crystals are beautiful stones with healing function which are mainly used to make jewelry. The existing system normally just focused on one of the field and the platforms that introduce the crystals are rarely to combine both of the information.

Moreover, crystals can be identified by color, chemical structure and crystal system. The beginner of crystal learners may confuse of the type of crystals because some of the crystals are similar in color but with different chemical structure and vice versa.

Besides, most of the learners are gain the related knowledge from the book or website. The conventional learning methods are dull and some of the learners will give up in learning more about crystals because lack of attractive and interest.

As a conclusion, the current system transformed the crystals' information from offline to online but none of the technology provides visualization features for learning the crystals' knowledge.

1.3 Objective

This project embarks on the following objectives:

1. To study on the marker-less augmented reality on learning the chemical knowledge and functionality of crystals.

2. To develop a marker-less augmented reality application in assisting user to learn and recognize crystals.

3. To evaluate the user acceptance of augmented reality in learning the crystals compared to conventional learning methods.

1.4 Scope

The target user of this project is public especially for the beginners who are interested in crystals and chemistry students. The users can interact with the 3D crystals model and 3D crystals chemical structure model in interesting way. They can view the 3D model in augmented reality and view the information of crystals in the application. The project will use English language as medium to ensure all the people can understand it.

1.5 Project Significance

The project will provide the information of crystals in interactive way by using AR. Moreover, this project will help the public to enhance their knowledge of crystals such as function and chemical knowledge. This project will point out how to differentiate the type of crystals by its chemical structure and color. Augmented reality can improve the learning experience and make the process of learning crystals more interesting compare to conventional learning.

1.6 Conclusion

The project is expected to produce an augmented reality application that introduces the information about the crystals to users. Users are expected to learn the type of crystals, function of crystals, chemical composition of crystals and some others related information through the augmented reality application. The users are expected to learn the crystals in interactive way and get the knowledge more easier than conventional learning way. In conclusion, this chapter is briefly explained the purpose of the project.