

**IMPLEMENTATION OF 3D AUGMENTED REALITY IN MOBILE  
APPLICATION TO NURTURE CHILDREN KNOWLEDGE FOR MUSEUM  
ARTIFACT**

TAN YEN NEE

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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APPLICATION TO NURTURE CHILDREN KNOWLEDGE FOR  
MUSEUM ARTIFACT

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(TANDATANGAN PENULIS)

Alamat tetap: No. 15, Jalan Seri Kemawan 2,  
Taman Seri Kemawan 2, Kampung. Jawa  
85000 Segamat, Johor

Tarikh: \_\_\_\_\_

\_\_\_\_\_  
(TANDATANGAN PENYELIA)

Pn. Norazlin Mohammed

Tarikh: \_\_\_\_\_

CATATAN: \* Tesis dimaksudkan sebagai Laporan Akhir Project Sarjana Muda (PSM)

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IMPLEMENTATION OF 3D AUGMENTED REALITY IN MOBILE APPLICATION  
TO NURTURE CHILDREN KNOWLEDGE FOR MUSEUM ARTIFACT

TAN YEN NEE

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

FACULTY OF INFORMATION AND COMMUNICATION TEKNOLOGY  
UNIVERSITY TEKNIKAL MALAYSIA MELAKA  
2014

## DECLARATION

I hereby declare that this project report entitled

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APPLICATION TO NURTURE CHILDREN KNOWLEDGE FOR MUSEUM  
ARTIFACT**

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STUDENT : \_\_\_\_\_ Date: \_\_\_\_\_  
(TAN YEN NEE)

SUPERVISOR : \_\_\_\_\_ Date: \_\_\_\_\_  
(PN. NORAZLIN MOHAMMED)

## DEDICATION

To my beloved parents and family, thank you for your unconditional support with my studies. I am honoured to have you as my parents and family. Thank you for giving me a chance to prove and improved myself through all my walks of life.

To my supervisor, Mrs. Norazlin Mohammed, thank you for guidance and encouragement during project implementation.

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To my friends who always give me support and together we can pursue a broad knowledge.

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First and foremost, I would like to express my deepest gratitude to my supervisor, Mrs. Norazlin Mohammed, who has supported and guidance me throughout the progress of Final Year Project with her patient and knowledge. Without her, this report and product would not have been completed on time.

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## ABSTRACT

A collection of ancient artifacts preserves in museum and display for individual to understand the past history of the ancient people live in past decade. Every artifact contains different history and knowledge. However, the frequency of visitors that visit to museum becomes fewer from year to year. And hence, the knowledge of people about the history of artifacts becomes more superficial or even empty knowledge on it. Even though there have different kinds and types of artifacts are displayed in museum, there is no interactive manner between the artifacts and the visitor. Visitors only can view the artifacts which place inside glass cabinet and read through the history which provided in front of artifact. Therefore, most of the visitors will refuse to visit again the museum after their first trip to museum. In order to attract visitors and can deliver the knowledge towards everyone especially children, Museum Artifact, a marker-based mobile application which applied Augmented Reality to display the artifact in virtual world has been introduced and developed. Augmented Reality is an advanced technology which allows computer generated virtual imagery information that need to be registered in 3D and overlaid onto a live direct or indirect real-world environment in real time. By applying this technology, Museum Artifact mobile application is aimed to deliver the historical facts to the students and make them feel interested to the artifacts. This mobile application is implemented marker within printed brochure in size of 6cm x17cm. Therefore, they just need to get the brochure in order to use this mobile application. With this mobile application, the problem faced by children when visiting the museum can be avoided or overcome.

## ABSTRAK

Satu koleksi artifak purba yang simpan di muzium dan dipamerkan menggambarkan sejarah manusia purba hidup dalam dekad yang lalu. Setiap artifak mengandungi sejarah dan pengetahuan yang berbeza. Walau bagaimanapun, jumlah pengunjung yang melawat ke muzium setiap tahun semakin mengurang. Dengan itu, pengetahuan individu terhadap artifak telah menjadi semakin cetek atau langsung tidak tahu tentangnya. Walaupun terdapat pelbagai jenis artifak dipamerkan dalam muzium tetapi tidak mempunyai interaktif antara artifak dengan pelawat. Pelawat hanya boleh menikmati artifak yang dikuncikan dalam kabinet kaca dan membaca sejarah yang disediakan. Oleh itu, kebanyakan pelawat enggan melawat lagi museum tersebut selepas lawatan pertama ke museum. Demi menarik dan menyebarkan sejarah tersebut kepada setiap individu terutamanya kanak-kanak, *Museum Artifact*, satu aplikasi mudah alih yang menggunakan *Augmented Reality* untuk memaparkan artifak di dunia maya telah diperkenalkan dan dibangunkan untuk mengatasi isu-isu tersebut. *Augmented Reality* merupakan satu teknologi canggih yang membolehkan komputer menjana maklumat imej buatan yang perlu didaftarkan dalam bentuk 3D dan dilapisi ke persekitaran dunia sebenar secara langsung atau secara tidak langsung. Dengan menggunakan teknologi ini, *Museum Artifact* dapat menyampaikan fakta sejarah kepada para pelajar dan menjadikan mereka lebih berminat kepada artifak. Aplikasi mudah alih ini perlu dilaksanakan sekaligus dengan penanda dalam risalah yang dicetak dalam saiz 17cm x 6cm. Jadi, mereka perlu mendapatkan risalah tersebut untuk menggunakan aplikasi mudah alih ini. Dengan kewujudan aplikasi mudah alih ini, masalah yang dihadapi oleh kanak-kanak ketika melawat muzium boleh dielakkan atau diatasi.



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## LIST OF ABBREVIATIONS

<b>3D</b>	-	<b>Three-Dimensional</b>
<b>AR</b>	-	<b>Augmented Reality</b>
<b>API</b>	-	<b>Application Programming Interface</b>
<b>ID</b>	-	<b>Identification</b>
<b>SDK</b>	-	<b>Software Development Kit</b>
<b>VR</b>	-	<b>Virtual Reality</b>
<b>QR</b>	-	<b>Quick Response</b>
<b>2D</b>	-	<b>Two-Dimensional</b>
<b>GPS</b>	-	<b>Global Positioning System</b>
<b>HMD</b>	-	<b>Head-Mounted Display</b>
<b>WWW</b>	-	<b>World Wide Web</b>
<b>IDE</b>	-	<b>Integrated Development Environment</b>
<b>CMS</b>	-	<b>Content Management System</b>

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## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 Project Background**

Museum is an institution that preserves a collection of artifacts which found from long time ago. Ancient artifacts help individuals to understand how ancient people lived during their times and provides different knowledge as well as experience for them. However, the frequency of visitors visit to museum becomes lesser from year to year. In addition, children nowadays are not interested with artifacts due to its historical facts that rendered in a children's storybook or in black and white condition are bored and harder to understand. Although there have different kinds and types of artifacts are displayed in museum, there is no interactive manner between the artifacts and the children. Hence, mostly of the visitor will less to visit the museum after first visit to the museum due to different issues.

Therefore, to let the children have the will to understand the historical facts of artifacts, Museum Artifact mobile application is introduced and developed to explain the origin of the artifacts, so that it could nurture the knowledge of the children. For this mobile application, all of the artifacts are modelled in three-dimensional (3D) shapes and it is a marker-based application. When a camera points at the marker, 3D artifact will overlay at the marker and display on the screen of Android device.

## 1.2 Problem Statements

In Malaysia, museum is an educational institution which propagates the historical facts, cultural history and natural world. However, due to some problem faced by the museum, the frequency of visitors visit to museum is reduced every year. In addition, children knowledge to the artifacts is less or zero.

Firstly, most of the artifacts in the museum are kept inside glass cabinet with it's historical information display stand in front of it. However, there is no interactive manner between the artifacts and the children which causing the children have less interest for visiting the museum.

The next problem is the location of museum. Museum is located far away from the residence area of children. Therefore, the chances that they have to visit the museum are during holidays or weekends with their family or following school trip.

Lastly, the problem is time. There is time constraint for the children when they come to something they are interested, but too much people pushing everywhere during holiday. Hence, they do not have enough time to visit the whole artifacts inside the museum.

## 1.3 Objectives

- i. To develop a 3D Augmented Reality mobile application for Museum Artifacts to deliver the historical facts to the children.
- ii. To implement marker within printed brochure for Augmented Reality Android mobile application to attract the interest of children to the artifacts.
- iii. To evaluate the effectiveness way of using Augmented Reality mobile application to nurture children knowledge about artifact.

## **1.4 Project Scopes**

This project is primarily designed for children that age ranged from 7 to 12 years old. This is because the chance for them to visit the museum is only can follow the school trip or family during holiday. Other than that, they have not sufficient of time to visit the whole museum and hence resulting less contact with the artifacts.

Other than that, this project is focuses on mobile device only. The platform that chosen for this project is Android platform which must acquire those minimum features: Android version 2.3.3 (Gingerbread) or higher, Application Programming Interface (API) level 10 or above and a phone camera. Since Augmented Reality technology is applied on this project, hence identification (ID) marker type is chosen and implemented within a printed brochure with size of 6cm x 17cm.

Next, there have eight artifacts are focused and included in this project and those artifacts are chosen randomly from National Museum. The reason that only eight artifacts are chosen is because there have many artifacts in the museum and this project is developed to evaluate the effectiveness way of deliver knowledge to the students. Hence, only eight artifacts are chosen to use and test for the effectiveness of this mobile application.

## **1.5 Project Significances**

This mobile application is suitable for the children who have the interest to visit the museum but encounter some problems when or before visiting the museum. It is designed to optimize the satisfaction of students and delivered historical facts to the children that age ranged from 7 to 12 years old. This is aims to let them to understand the artifacts easily by using Android device with the brochure.

With this Museum Artifact mobile application and brochure, they do not have to wait for holidays or weekends and go visit museum with their family or following the