

# 3D SIMULATION OF 2-STROKE AND 4-STROKE ENGINE

MOHD IKBARUDDIN B. MAT RANI

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**BORANG PENGESAHAN STATUS TESIS\***JUDUL: SIMULASI ENJIN 2-LEJANG DAN 4-LEJANGSESI PENGAJIAN: 2010/2011Saya MOHD IKBARUDDIN DIN MAT RANI

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(TANDATANGAN PENULIS)

Alamat tetap: 69 C Kg. Huda,  
Jln. Sultan Yahya Petra,  
15200 Kota Bharu,  
Kelantan.

Tarikh: 14 / 7 / 2011


(TANDATANGAN PENYELIA)

Cik Sarni Suhaila bt. Rahim  
Nama Penyelia

Tarikh: 14 / 7 / 2011

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MOHD IKBARUDDIN B. MAT RANI


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

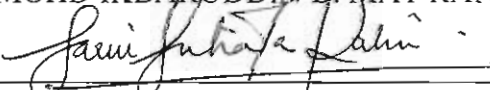
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
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is written by me and is my own effort and that no part has been plagiarized  
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STUDENT :  Date : 14/7/2011  
(MOHD IKBARUDDIN B. MAT RANI)

SUPERVISOR :  Date : 14/7/2011  
(CIK SARNI SUHAILA BT. RAHIM)

**DEDICATION**

*For all the time that passed by.....*

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In the name of Allah S.W.T., The Most Beneficent, The Most Merciful, it is with the deepest sense of gratitude to the Al-Mighty Allah who has given me the strength and ability to complete this project.

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I am as ever, especially indebted to my parents and all of my friends for the loves and support throughout my life. Last but not least, to those who have directly or indirectly assisted me to accomplish this project.

## ABSTRACT

3D Simulation of 2-Stroke and 4-Stroke Engine is the Final Year Project (FYP) for Projek Sarjana Muda (PSM). This project is developed mainly for students and teachers in Sekolah Menengah Teknik in Malaysia. This project is mainly on how to differentiate between 2-stroke engine and 4-stroke engine. This project will be simulate the view of the engines, components involved inside the engines and how both 2-stroke and 4-stroke engine works. This documentation will explain the process of the development of the project. Currently, students and teachers are using paper-based materials such as books and hand-outs as their references or manual in learning. It will be dangerous to deal with dangerous machineries especially for beginners. That is why this project is developed. This project is an animation of 3D effects where there are no more still images which are used in the textbooks and hand-outs. The project will help teachers and students in the learning process. They will no more have to deal with dangerous machineries before they know and learn about the machines. This animation will explain in details on the 2-stroke and 4-stroke engine. The explanations' covers the overview of each engine, the main components in each engine and also the work for each engine. This will help students to understand and attract them in learning method. This project will cover one of the topics provided for the Automotive students in their learning process. There will be an animation, sound effects, and music's in this product to attract students' attention. This project will be very useful product to be used in every Sekolah Menengah Teknik all over Malaysia as a new learning method to attract students' interest to the subject and to provide better understanding for them.

## ABSTRAK

'3D Simulation of 2-Stroke and 4-Stroke Engine' adalah Projek Tahun Akhir (FYP) untuk Projek Sarjana Muda (PSM). Projek ini dibangunkan terutamanya kepada pelajar dan guru-guru di Sekolah Menengah Teknik di seluruh Malaysia. Tujuan utama projek ini adalah untuk membezakan antara enjin 2-lejang dan 4-lejang. Projek ini akan mensimulasikan pandangan keseluruhan enjin, komponen yg terlibat di dalam enjin dan bagaimana kedua-dua enjin 2-lejang dan 4-lejang berfungsi. Dokumentasi ini akan menerangkan segala proses pembangunan dalam projek ini. Pada masa ini, pelajar dan guru-guru menggunakan bahan-bahan yang berasaskan kertas seperti buku dan nota tangan sebagai rujukan atau manual mereka dalam pembelajaran. Ia akan berbahaya untuk berhadapan dengan jentera-jentera berbahaya terutama untuk pelajar baru. Itulah sebabnya mengapa projek ini dibangunkan. Projek ini adalah animasi kesan 3D di mana tiada lagi gambar-gambar yang digunakan dalam buku teks dan nota tangan. Projek ini akan membantu guru-guru dan pelajar dalam proses pembelajaran. Mereka tidak perlu lagi untuk berhadapan dengan jentera-jentera yang berbahaya sebelum mereka tahu dan belajar tentang mesin. Animasi ini akan menjelaskan secara terperinci pada enjin 2-lejang dan 4-lejang. Penerangannya meliputi gambaran keseluruhan setiap enjin, komponen utama dalam setiap enjin dan juga kerja-kerja bagi setiap enjin. Ini akan membantu pelajar untuk memahami dan menarik minat mereka dalam pembelajaran kaedah. Projek ini akan merangkumi salah satu topik yang disediakan untuk pelajar-pelajar dalam proses pembelajaran mereka Automotif. Terdapat kesan animasi, bunyi, dan muzik dalam produk ini untuk menarik perhatian pelajar. Projek ini akan menjadi produk yang sangat berguna untuk digunakan di setiap Sekolah Menengah Teknik di seluruh Malaysia sebagai satu kaedah pembelajaran yang baru untuk menarik minat pelajar kepada subjek dan untuk memberi kefahaman yang lebih baik bagi mereka.



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**LIST OF ABBREVIATIONS**

3D	-	Three Dimensional
2D	-	Two Dimensional
CD	-	Compact Disk
PC	-	Personal Computer
VCD	-	Video Compact Disk
SPM	-	Sijil Pelajaran Malaysia
RC1	-	Release Candidate 1
RC2	-	Release Candidate 2
SM	-	Sekolah Menengah
SMT	-	Sekolah Menengah Teknik
R	-	Respondent
NO.	-	Number

## CHAPTER I

### INTRODUCTION

#### 1.1 Project Background

This project is a three Dimension (3D) animation which is intended for the user that involve in mechanical or automotive subjects but also compatible for all types of user. The project will shows the user the differences in performance, components and the cycle between 2-stroke and 4-stroke engine.

Currently, only paper-based materials such as books and manuals are used in order to understand how the 2-stroke and 4-stroke engine works. Some users also need an expert to show them how the engine actually works by do the test using the real and dangerous machinery and equipments. Therefore, the development of this project is to help the user to understand the engine cycle with the help of today's technologies which is computers which can be safer, productive and interactive. This is important for the user to really understand it because the processes of differentiating between 2-stroke and 4-stroke engine and identifying components that involved in those engine cycle are the basics before they can go further in other topics about engines. This project will help to make learning more attractive and meaningful.



## 1.2 Problem Statement

In Malaysia, 3D animation can be considered as a new field. 3D animation is widely used not only for entertainment purpose but also for education. A good example of this is the National Geography and other international educational channel whereby they use plenty of simulation or animation to visualize some animals that has already extinct such as the dinosaur. This project will show how 3D can be used not only in entertainment purposes, but also in education purpose or can be called as edutainment.

The users are currently using conventional method such as books and hardcopy as their references. During the testing in a reality situation, they will have to do the compression test practically where they have to handle engines and metal tools, which are extremely dangerous especially for amateurs who are new in handling this kind of equipments. Because of that, they might find that it is hard to really understand on what they need to do in the test. For the trainers, they are facing problems in demonstrating and giving instruction where they have to do it repeatedly every time. Besides that, they only have books as their assistance and references to demonstrate the test.

Hence, this project will help the users to complete their test safely where they can really understand what they have to do and minimizing the numbers of unwanted accidents during the training besides provide them better understanding in an interactive way. This also can help trainers to only show the animations and the rest they only have to guide their students.

### 1.3 Objective

There are few objectives that have to be achieved in this project, which are:

- i. to produce a 3D simulation of 2-stroke and 4-stroke engine,
- ii. to provide easy, safe and more understandable way for user to run the test by using simulation, and
- iii. to generate attractive learning environment to the users.

### 1.4 Scope

The scope involve in this project are:

- i. Target audience  
Students from Sekolah Menengah Teknik who are taking Vehicle Automotive Subject. Besides that, user from age 15 and above who are interested and involved direct or indirectly in automotive arena.
- ii. Content scope  
The content of the project is 3D animation about processes of differentiating between 2-stroke and 4-stroke engine, performance and identifying components involved in those engine cycles.
- iii. Deliverable scope  
The animation will be delivered in a video content which will be saved in Compact Disc (CD) because in school, there are limitations of device to run the program. So, CD is the most flexible and easy deliverable medium because it can be run on many devices such as PC and VCD player.

## **1.5 Project Significance**

The final product of this project will provide useful information for the users especially the students from Sekolah Menengan Teknik who are taking Vehicle Automotive Subject. The successful project will help the user to have clearer understanding of their modules besides attracting them to learn rather than the existing system which using books and hardcopy that is quite boring and uninteresting nowadays. This also will benefit the teachers which is they can explain to student by only using the simulation. As for the educational purpose, this application also can be as an additional tool in learning. So the objectives of the project will be achieved once the project has successfully developed. The project is highly recommended for Kementerian Pelajaran to distribute the simulation to all vocational schools in Malaysia.

## **1.6 Conclusion**

This project was being developed using Autodesk Maya software. At the end of the project, a comparison was made to evaluate which learning method between illustrating using books or 3D animation will produce a better result in attracting student attention in learning process. In the next chapter, it will covers about the literature review and project methodology where it will discusses about domain, existing system, project methodology and requirement.

## CHAPTER I

### INTRODUCTION

#### 1.1 Project Background

This project is a three Dimension (3D) animation which is intended for the user that involve in mechanical or automotive subjects but also compatible for all types of user. The project will shows the user the differences in performance, components and the cycle between 2-stroke and 4-stroke engine.

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## CHAPTER II

### LITERATURE REVIEW AND PROJECT METHODOLOGY

#### 2.1 Introduction

This chapter will discuss about the literature review and the project methodology of the project. Literature review is a summary of important information of the research sources of the project. It also provides a handy guide and a background of certain topics. Literature review is the most important step which helps to justify the choices of researches or project, establishes the importance of the particular topic, provides background information and discovers how a project is related to the works of others.

The other thing that will be discussed in this topic is project methodology. Project methodology is a formalized approach that applies systematic way of project development. Project methodology is also used to describe activities in project development.