

VIRTUAL REALITY DRIVING GAMES

AZIE BINTI RASID

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

VIRTUAL REALITY DRIVING GAMES

AZIE BINTI RASID

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

**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2010**

BORANG PENGESAHAN STATUS TESIS*

JUDUL: VIRTUAL REALITY DRIVING GAME

SESI PENGAJIAN: 2009/2010

Saya AZIE BINTI RASID

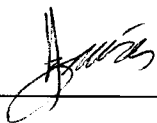
mengaku membenarkan tesis (PSM) ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik Universiti Teknikal Malaysia, Melaka.
2. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (/)

_____ SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

_____ TERHAD (Mengandungi maklumat terhad yang telah di tentukan oleh organisasi/badan di mana penyelidikan dijalankan)

_____/_____/_____ TIDAK TERHAD



(TANDATANGAN PENULIS)
Alamat Tetap: 115, Block 21, Jln Tepian 8/2,
Seksyen 8 40000 Shah Alam, Selangor.
Tarikh: 30 Jun 2010



(TANDATANGAN PENYELIA)
MUHAMMAD HAZIQ LIM ABDULLAH

Tarikh: 30 Jun 2010

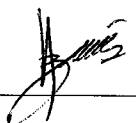
CATATAN: * Tesis dimaksudkan sebagai Laporan Projek Sarjana Muda (PSM)
** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa.


DECLARATION

I hereby declare that this project report entitled

VIRTUAL REALITY DRIVING GAME

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

STUDENT :  _____ Date: 30 June 2010
(AZIE BINTI RASID)

SUPERVISOR :  _____ Date: 30 June 2010
(MUHAMMAD HAZIQ LIM BIN ABDULLAH)

DEDICATION

I dedicate special thanks to my parents who giving me support and motivation throughout my PSM. This dedication is also to my PSM supervisor, Mr Muhammad Haziq Lim for the consultation, advices, comments and support just to make sure that I can finish this PSM successfully. I also want to thanks to all my friends that always are by my side as I working on this project.

ACKNOWLEDGEMENT

First and foremost, all praises and thanks to Allah, Lord of the worlds, for His guidance and will, for me to complete the Final Year Project.

My appreciation and grateful thanks to my Faculty Supervisors, Mr. Muhammad Haziq Lim Bin Abdullah who gives ideas, guidance and constructive criticism to improve every works I did during the Final Year Project. Thank you for spending and allocating his time in obtaining all answers for those questions I have been asked.

Also, I would like to extend thanks to my colleagues; Nanthakumaran S/O Doraisamy, Tan Kai Chian, Mohd Ridhwan bin Raqib, Kwoo Swee Hee and students at Department of Interactive Media, either directly or indirectly helping me in giving support and advice, ideas and criticism. Also to all people who have tested and given feedback, answered surveys and helped me in making this game.

Last but certainly not least, I would also like to dedicate my deeply thanks and appreciation to my beloved parents; Mr. Rasid Hussin and Mrs. Hafsa Abdullah who morally gives support to keep me on continue struggling against the challenges. Without their support, motivation and pray, I would not be possible to finish my Final Year Project in time.

ABSTRACT

Virtual Reality Driving Game (VRDG) is a final project of Final Year Project (FYP) that fulfills the characteristic of enhancement value, commercial value, new founding and have upgraded existing system. Its objectives are to identify and analyze factors of color and font size towards low-vision players, to develop a potential used of technology for low vision's kids and to determine effectiveness of low-vision's factor in different gaming environment; two-dimensional and three-dimensional. This scope of project is for low vision kids aged 6 to 10 years old in context of extreme light sensitivity and tunnel vision. This game development is using Prototype Methodology which consists of five phase; Planning, Analysis, Design, Implementation and Testing. This game is using Flash Player as the main platform to let user play. The approach that introduce in this game is introducing the selection of color illumination as it helps player to see better while playing. Player may chose five different colors; red, green, blue, yellow or normal color. An analysis has been conducted and 32 percent of testing showing that effectiveness of color gives a tremendous change in their vision. However, this game is unsuccessfully to draw excitement into player since have some bugs in this game. But in future, this game is potentially to grow further.

ABSTRAK

Virtual Reality Driving Game (VRDG) adalah sebuah Projek Akhir Sarjana Muda yang memenuhi keperluan industri dari segi nilai komersil, nilai peningkatan, penemuan baru dan peningkatan daripada system sedia ada. Objektif bagi projek ini ialah untuk mengenal pasti dan menganalisa faktor warna dan saiz tulisan terhadap kanak-kanak yang menghidap kurang penglihatan, untuk membina teknologi yang berpotensi untuk membantu mereka dan akhir sekali ialah menentukan keberkesanan ciri-ciri kurang penglihatan dalam suasana permainan; dua dimensi dan tiga dimensi. Skop projek ialah untuk kanak-kanak yang menghidap kurang penglihatan separa di lingkungan umur 6 sehingga 10 tahun. Pembangunan projek ini menggunakan Metodologi Prototaip; Perancangan, Analisis, Rekabentuk, Implementasi dan Ujikaji dimana ia mempunyai unsur-unsur fleksibiliti. Permainan ini menggunakan Pemain *Flash* sebagai platform utama kepada pemain. Permainan ini menggunakan pendekatan lima pilihan warna illuminasi yang berbeza; merah, kuning, biru, hijau dan warna biasa. Analisis telah dijalankan dan terbukti bahawa penggunaan warna yang bersesuaian boleh membantu kanak-kanak ini melihat dengan lebih jelas. 32 peratus daripada ujikaji yang dijalankan menunjukkan keberkesanan dari segi warna memberi impak yang besar dalam penglihatan mereka. Bagaimanapun, permainan ini tidak dapat melahirkan rasa keseronokan memndangkan terdapat masalah di dalam pembangunan projek ini. Namun begitu, permainan ini adalah sebuah permainan yang berpotensi di masa akan datang sekiranya di tambah baik.

TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENTS	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	xii
	LIST OF FIGURES	xiv
	LIST OF ABBREVIATION	xvi
	LIST OF APPENDICES	xvii
 CHAPTER I	 INTRODUCTION	
	1.1 Project Background	1
	1.2 Problem Statements	3
	1.3 Objectives	4
	1.4 Scope	5
	1.5 Project Significance	6
	1.6 Conclusion	8

CHAPTER II	LITERATURE REVIEW AND PROJECT METHODOLOGY	
2.1	Introduction	9
2.2	Domain	10
2.3	Existing System	12
	2.3.1 Terraformer Game	12
	2.3.2 Hand To	15
	2.3.3 Nanogames Bouncing Balls	16
	2.3.4 Traditional Board Games	17
	2.3.5 Comparison of Existing System	18
2.4	Project Methodology	20
2.5	Project Requirement	22
	2.5.1 Software Requirement	23
	2.5.2 Hardware Requirement	23
2.6	Conclusion	23
CHAPTER III	ANALYSIS	
3.1	Current Scenario Analysis	24
3.2	Requirement Analysis	29
	3.2.1 Project Requirement	29
	3.2.1.1 Need and User Analysis	29
	3.2.1.2 Technical Analysis	31
	3.2.1.3 Requirement Gathering	32
	3.2.2 Software Requirement	33
	3.2.3 Hardware Requirement	35
	3.2.4 Others Requirements	35
3.3	Project Schedule and Milestones	36
3.4	Conclusion	38

CHAPTER IV	DESIGN	
4.1	Introduction	39
4.2	System Architecture	40
4.3	Preliminary Design	41
	4.3.1 Storyboard Design	42
	4.3.2 Characters Profile	47
4.4	Conclusion	48
CHAPTER V	IMPLEMENTATION	
5.1	Introduction	49
5.2	Media Creation	49
	5.2.1 Production of Text	50
	5.2.2 Production of Graphic	52
	5.2.3 Production of Audio	55
	5.2.4 Production of Animation	56
5.3	Media Integration	57
	5.3.1 Multimedia Components Integration	58
5.4	Product Configuration Management	60
	5.4.1 Configuration Environment Setup	60
	5.4.2 Version Control Procedure	61
	5.4.2.1 Alpha Testing	61
	5.4.2.2 Beta Testing	62
	5.4.2.3 Release Candidate 1 and Release Release Candidate 2	62
	5.4.2.4 Golden Master Release	62
5.5	Implementation Status	63
5.6	Conclusion	65

CHAPTER VI	TESTING AND EVALUATION	
6.1	Introduction	66
6.2	Test Plan	67
6.2.1	Test User	67
6.2.2	Test Environment	68
6.2.3	Test Schedule	69
6.2.4	Test Strategy	70
6.3	Test Implementation	71
6.3.1	Test Description	71
6.3.2	Test Result Analysis	73
6.3.3	Analysis Testing	76
6.4	Conclusion	78
CHAPTER VII	PROJECT CONCLUSION	
7.1	Observation on Weaknesses and Strength	79
7.1.1	Project Weaknesses	79
7.1.2	Project Strengths	81
7.2	Proposition for Improvement	81
7.3	Contribution	82
7.4	Conclusion	82
REFERENCES		83
APPENDICES		
A	Gantt Chart	84
B	Forms for Functionality Testing by Multimedia Expertise	85

C	Form for Usability Testing Form for Parents	86
D	Form for User Acceptance Testing Form for Low Vision Kids	87
E	Proposal Project	88

LIST OF TABLES

TABLE	TITLE	PAGE
1.1	Human Five Senses	2
1.2	Qualitative Performance of Virtual Reality Level	3
2.1	Hardware and Software for Terraformer	13
2.2	Setting values of Nanogames Bouncing Balls	16
2.3	Comparison of Existing Games	19
3.1	Minimum Technical Standards of Project	32
3.2	Game Play Requirement	33
3.3	Minimum Hardware Requirement of Project	35
3.4	Project Duration	36
3.5	Project Schedule for VRDG	37
5.1	Production of Text for VRDG	50
5.2	Configuration Environment Setup	61
5.3	Version Control Procedure	61
5.4	Implementation Status of Module In VRDG	62
6.1	Minimum Hardware Requirement for Testing	69
6.2	Schedule of Testing Activity	70
6.3	Level of Questionnaire's Feedback	70
6.4	Classification of Usability Testing Feedback	72
6.5	Classification of User Acceptance Testing Feedback	73
6.6	Results of Functionality Test	73

6.7 Results of Usability Test 74

LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	3D Scene in Normal Contrast for Sighted Gamers	14
2.2	3D Scenes in High Contrast for Low Vision Gamers	15
2.3	Setting for Low Visions	17
2.4	Displays Game According to Low Vision's Player Setting	17
2.5	Traditional Games for Low-Vision	18
2.6	Prototype Methodology	20
3.1	Navigation Menu of Nanogames Bouncing Balls	27
3.2	Flowchart of Nanogames Bouncing Balls Gameplay	28
3.3	Color Controller	30
3.4	Clear Icon	30
3.5	Car Character	31
3.6	Semi Immersive Workstation	36
4.1	System Architecture of VRDG	40
4.2	The Montage Page	42
4.3	Main Page	43
4.4	Color Illumination Setting	43
4.5	Game on Play (Level 1)	44
4.6	Game on Play (Level 2)	45
4.7	End of Game	45
4.8	Exit	46

4.9	Instruction	46
4.10	Cars (Side character)	47
4.11	Road Sign Board	47
5.1	Diagram Production of Text	51
5.2	Process of Tracing in Three Different Sources	53
5.3	Value of Stroke Style, Height and Color	53
5.4	Image Before Editing Process	54
5.5	Image After Editing Process in Adobe Photoshop CS3	54
5.6	Production of Audio Diagram	55
5.7	Motion Tween Technique Using Adobe Flash CS3	57
5.8	Media Integration Flow	58
5.9	Example of The Action Script for Adding Listener	59
5.10	Publish Settings	60
6.1	Results of Functionality Testing	76
6.2	Results of Usability Testing	77
6.3	Results of User Acceptance Testing	77

LIST OF ABBREVIATIONS

2D	-	Two Dimensional
3D	-	Three Dimensional
AR	-	Augmented Reality
GR	-	Game Reality
PC	-	Personal Computer
VR	-	Virtual Reality
VRDG	-	Virtual Reality Driving Games

LIST OF APPENDICES

APPENDICES	TITLE	PAGE
A	Gantt Chart	83
B	Forms for Functionality Testing by Multimedia Expertise	84
C	Form for Usability Testing Form for Parents	85
D	Form for User Acceptance Testing Form for Low Vision Kids	86

CHAPTER I

INTRODUCTION

1.1 Project Background

This project is particularly developed for low-vision kids. Through my studies, this game has not been developed in Malaysia yet it would be the first Virtual Reality Driving Games (VRDG) to be developed for low vision kids in Malaysia. This project is widely suitable for kids. It is a flash based; a platform that easy to install and portable in any devices of computer and mobile. This game is believed to be most flexible game for low vision due to its consideration in changing mode of color, contrast and font-size.

In this project, this project has been using Virtual Reality's method to attract and create attention of kids who are suffering from low vision. Virtual Reality is a set of images and sounds produced by a computer which seem to represent a place or situation in which a person experiencing it can take part. (*Cambridge International Dictionary of English*, 1999). It applies three main variables altogether; immersion, interaction and imagination to create an intuitive game. Immersion is the sense of being surrounded that a person see, hear, touch, taste, smell or haptic. Interaction helps to extend to which a person can modify form and content of a mediated environment. Meanwhile, imagination is the applications and the ideas to the virtual worlds.

The reason of using Virtual Reality is because it allows better and faster understanding of even complex applications and provides means for intuitive operations and control. Besides, it provides a wide field of regard visual or auditory portrayal medium.

Virtual Reality usually classified in terms of level of immersion; which means related to sense of presence in the virtual environment. Talking about sense, sight contributes the biggest percentage in human senses that takes 70 percent, following by hearing 20 percent, smell is 5 percent, touch is 4 percent and taste is 1 percent. Refer in Table 1.1.

Table 1.1: Human Five Senses

Sense	Percentage (%)
Sight	70
Hearing	20
Smell	5
Touch	4
Taste	1

In this project, a semi immersive level is applied which interaction with the virtual environment can occur by conventional means such as keyboards, mice and trackballs. The advantages are that they do not require the highest level of graphics performance, no special hardware and can be implemented on high specification Personal Computer (PC) clones. In Table 1.2 shows the qualitative performance of VR level in three different features of VR.

Table 1.2: Qualitative Performance of Virtual Reality Level

Resolution	High	High	Low-Medium
Scale (Perception)	Low	Medium-High	High
Sense of situational awareness (navigation skills)	Low	Medium	High
Field of regard	Low	Medium	High
Lag	Low	Low	Medium-High
Sense of immersion	None-low	Medium-High	Medium-High

1.2 Problem Statement

Low vision is individual who have reduced vision even when using the best possible spectacle or contact lens correction available. Initially, kids who suffers from low vision has been confronting with many limitation.

Through the previous studies, based on 2002 Survey of Income and Program Participation there are 189,000 children 6 to 14 years of age (0.5 percent) have difficulty seeing words and letter in ordinary newspaper print(Steinmetz, 2006). They also have limitation in playing games. Directly, we can see there are more children that needs something for their entertainment; gaming. This is what we aiming for. We aimed to gain some insight into how the difficulties they encountered would influence the social interaction between the children.

The idea of Virtual Reality Driving Games using Flash helps to train player to drive safely on the road. It is useful role in the treatment of driving phobia though. The findings a study suggest that VR and GR may have a useful role in the treatment of driving phobia post-accident even co-morbid conditions such as post-traumatic stress disorder and depression are present (David. Walshe, Elizabeth J.Lewis, Sun I.Kim, Kathleen O'Sullivan and Brenda K.Wiederhold, *Exploring the use of Computer Games and Virtual Reality in Exposure Therapy for Fear of Driving Following a Motor Vehicle Accident*). It is a game that has a simple interaction with devices such as keyboard and monitor. For kids level, to bring them a high interactive device could leads to lose. It takes an actual environment among players in such setting/background, sound/effects and so on.

This game particularly is for a single player only. Before starting, player can customize the modes of color. First option is whereby player drives along less than 30 seconds journey on the road or highway and will complete the gameplay without break any laws. This game used a simple device such as keyboard or joystick; to control the speed of the car and to control the mode of color. The integration between these 3 devices is capable to create a simple but interactive game. The reason why this project chooses virtual reality is to create feel in every kids of experience driving cars. So to achieve this aims, a real virtual environment is needed. This is one of approaches that will be discussed in next chapter.

1.3 Objectives

Nowadays, we seen there are lots of new technological product that help towards globalization growth and benefit, no matter for individuals, groups, organizations or the developer itself. Each year, the number of low vision's patients' growth and according to its statistical, 0.5 percent of them are children. Because the number of statistic is small,

majority of big Information Technology companies do not tend and interesting to develop a game for low vision's kids. These project objectives are:

- i. To identify and analyze factors of color and font size towards low-vision players.
- ii. To develop a potential used of technology for low vision's kids so it will help them in difficulties of playing driving games.
- iii. To determine effectiveness of low-vision's factor in different gaming environment; two-dimensional and three-dimensional.

1.4 Scope

Today, games are an integrated part of children's play activities as well as school education. This project will be used by kids widely as it helps to grow their brain. It is a flash game; a platform that easy to install and portable in any devices of computer and mobile. This game is believed to be most flexible game for low vision due to its consideration in changing mode of color, contrast and font-size. Below are project scopes:

i. Target User

This game is focus to a low vision's kids around aged of 6 to 12 only. This game kindly can be used in all countries especially that has small or wide group of kids suffering low-vision. In a new phase of life, kids are tending to play a simple game, interactive and fun. That is reason the scope has been narrow down into range of age. The selection of low vision's kids as the target user is to create awareness to everyone of the increasing number of low vision among kids.