VIRTUAL CONGKAK LEARNING TOOL USING AUGMENTED REALITY

SHAHANAZ NATASHA BINTI JAMIHIL @ JAMIL

Bachelor of Computer Science (Software Engineering)

UNIVERSITI MALAYSIA PAHANG
SUPERVISOR’S DECLARATION

I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Software Engineering).

_______________________________
(Supervisor’s Signature)

Full Name : Bariah Binti Yusob
Date : 07 January 2019
STUDENT’S DECLARATION

I hereby declare that the work in this project is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

_______________________________

(Student’s Signature)

Full Name : Shahanaz Natasha Binti Jamil @ Jamil
ID Number : CB15081
Date : 07 January 2019
VIRTUAL CONGKAK LEARNING TOOL USING AUGMENTED REALITY

SHAHANAZ NATASHA BINTI JAMIHIL @ JAMIL

Thesis submitted in fulfillment of the requirements
for the award of the degree of
Bachelor of Computer Science (Software Engineering)

Faculty of Computer Systems & Software Engineering
UNIVERSITI MALAYSIA PAHANG

JANUARY 2019
ACKNOWLEDGEMENTS

Alhamdulillah. First and foremost I would like to give all this gratitude to Allah SWT because without His Blessings I will never be able to complete my Final Year Project successfully. I want to express my deepest thanks to my supervisor Dr Bariah Binti Yusob, who gave guidance and helps in many aspects throughout this project. I also want to thank my supervisor during PSM1, Dr Mansoor AbdulLateef AbdulGabber for his supports and guidance for the documentations of this project.

My sincere appreciation for my family especially my parents for the non-stop motivation, supports and always become my backbones during my studies. Also not to forget my colleagues who always give the helping hands when I needed.

Last but not least, to all lecturers of Faculty System Computers & Software Engineering for all the knowledges given to me. May Allah bless all of you.
ABSTRAK

ABSTRACT

Nowadays, we live in a life where technology has become a part of our lives. Technology has evolved in many ways where it helps us every day. People cannot see themselves without smartphones, computer and etc. Because of the evolution of technology era, many traditional cultures got lost and being forgotten. Some of it were important where it symbolize ourselves. For an instance, traditional games are the symbol of one’s culture. In Malaysia, we have our own traditional games to identify the identity of each cultures we have such as Malay, Chinese and Indians. From Malay’s culture, Congkak is one of a famous game played among the generation. But due to the technological sophistication, people are more attracted to play mobile games instead of traditional games especially to the younger generation. To overcome this problem, Virtual Congkak Learning Tool in Augmented Reality has been developed. This tool was created for the beginners of Congkak because the young generation may be not familiar with the rules of Congkak at all. So this tool will be helpful for them. And also, the idea of creating this learning tool in an augmented reality environment is to expose and attract these young generations to play traditional games, especially Congkak following the advanced technologies today. This application follows Rapid Application Development (RAD) methodology. Virtual Congkak was built using Unity 3D platform with supports of Vuforia for augmented reality. The result of this project was it meets all the objectives and the main functions worked and met the requirements.
# TABLE OF CONTENT

DECLARATION

TITLE PAGE

ACKNOWLEDGEMENTS ii

ABSTRAK iii

ABSTRACT iv

TABLE OF CONTENT v

LIST OF TABLES viii

LIST OF FIGURES ix

LIST OF ABBREVIATIONS xi

CHAPTER 1 INTRODUCTION 1

1.1 Introduction 1

1.2 Problem Statement 2

1.3 Objectives 3

1.4 Scope 3

1.5 Significant of the Project 4

1.6 Chapter Summary 4

CHAPTER 2 LITERATURE REVIEW 5

2.1 Introduction 5

2.2 Review Existing System 6

2.2.1 Congkak 6

2.2.2 Father.IO 8
2.2.3 Mancala 10
2.2.4 Comparison on Existing System 12
2.3 Techniques 13
2.4 Chapter Summary 14

CHAPTER 3 METHODOLOGY 15

3.1 Introduction 15
3.2 Rapid Application Development (RAD) 15
  3.2.1 Requirements Planning Phase 16
  3.2.2 System Design Phase 16
  3.2.3 Development Phase 23
  3.2.4 Cutover Phase 23
3.3 Hardware And Software Specification 23
  3.3.1 Hardware Specification 23
  3.3.2 Software Specification 24
3.4 Gantt Chart 24
3.5 Implementation 24

CHAPTER 4 RESULTS AND DISCUSSION 25

4.1 Introduction 25
4.2 Implementation 25
  4.2.1 System Design 26
  4.2.2 Development 33
4.3 Testing 39
  4.3.1 Results Discussion 44
4.4 Chapter Summary 44
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1.1</td>
<td>Scope of the project</td>
<td>3</td>
</tr>
<tr>
<td>Table 2.1</td>
<td>Advantages and Disadvantages of Congkak</td>
<td>6</td>
</tr>
<tr>
<td>Table 2.2:</td>
<td>Advantages and Disadvantages of Father.IO</td>
<td>8</td>
</tr>
<tr>
<td>Table 2.3:</td>
<td>Advantages and Disadvantages of Mancala</td>
<td>10</td>
</tr>
<tr>
<td>Table 2.4</td>
<td>Comparisons on the Existing System</td>
<td>12</td>
</tr>
<tr>
<td>Table 2.5</td>
<td>Techniques</td>
<td>13</td>
</tr>
<tr>
<td>Table 3.1</td>
<td>Hardware Specification</td>
<td>23</td>
</tr>
<tr>
<td>Table 3.2</td>
<td>Software Specification</td>
<td>24</td>
</tr>
<tr>
<td>Table 4.1:</td>
<td>Main menu UAT form</td>
<td>40</td>
</tr>
<tr>
<td>Table 4.2:</td>
<td>Learn Tutorial UAT form</td>
<td>40</td>
</tr>
<tr>
<td>Table 4.3:</td>
<td>Game Settings UAT form</td>
<td>41</td>
</tr>
<tr>
<td>Table 4.4:</td>
<td>Basic Tutorial UAT form</td>
<td>42</td>
</tr>
<tr>
<td>Table 4.5:</td>
<td>Rules Tutorial UAT form</td>
<td>43</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 2.1 The Main Page of Congkak 7
Figure 2.2 Tutorial of Congkak 7
Figure 2.3 GUI of the Game Playing 8
Figure 2.4 The Main Page of Father.Io 9
Figure 2.5 The Game Modes 9
Figure 2.6 Game Rules for Drone Fight 9
Figure 2.7 Game Rules for Headshot Game 10
Figure 2.9 Tutorial page for Mancala 11
Figure 2.8 The Main Page of Mancala 11
Figure 2.10 Basics Learning of Mancala 12
Figure 3.1 RAD phases 16
Figure 3.2 Context Diagram 17
Figure 3.3 Use Case Diagram for Virtual Congkak Learning Tool 17
Figure 3.4 Tutorial Basic Step 1 18
Figure 3.5 Tutorial Basic Step 2 18
Figure 3.6 Tutorial Basic Step 3 18
Figure 3.7 Tutorial Basic Step 4 19
Figure 3.8 Tutorial Basic Step 5 19
Figure 3.10 Tutorial Basic Step 7 20
Figure 3.11 Tutorial Basic Step 8 20
Figure 3.12 Tutorial Rules Step 1 21
Figure 3.13 Tutorial Rules Step 2 21
Figure 3.14 Tutorial Rules Step 3 21
Figure 3.15 Tutorial Rules Step 4 22
Figure 3.16 Tutorial Rules Step 5 22
Figure 3.17 Tutorial Rules Step 6 22
Figure 4.1 Main Menu 26
Figure 4.2 Learning Basic Tutorial 27
Figure 4.3 Learning Basic Tutorial 28
Figure 4.4 Creating 3D model in 3D Builder 29
Figure 4.5 Apply model texture 29
Figure 4.6 Creating holes 30
Figure 4.7 Creating 3D holes 30
Figure 4.8 Congkak Model 31
Figure 4.9 Creating marble model 31
Figure 4.10 White Marble Model 32
Figure 4.11 Red Marble Model 32
Figure 4.12 Blue Marble Model 32
Figure 4.13 Main page scene 33
Figure 4.14 Coding of Main Page 34
Figure 4.15 Learn Tutorial scene 34
Figure 4.16 Vuforia Developer Portal 35
Figure 4.17 Learn Basic scene 35
Figure 4.19 Learn Basic codes 37
Figure 4.20 Learn Rules scene 38
Figure 4.21 Learn Rules scene 38
Figure 4.22 Learn Rules codes 39
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAD</td>
<td>Rapid Application Development</td>
</tr>
<tr>
<td>SDD</td>
<td>Software Design Document</td>
</tr>
<tr>
<td>SDLC</td>
<td>Software Development Life Cycle</td>
</tr>
<tr>
<td>SRS</td>
<td>Software Requirement Specification</td>
</tr>
<tr>
<td>UAT</td>
<td>User Acceptance Test</td>
</tr>
<tr>
<td>UML</td>
<td>Unified Model Language</td>
</tr>
<tr>
<td>VCLT</td>
<td>Virtual Congkak Learning Tool</td>
</tr>
<tr>
<td>WBS</td>
<td>Work Breakdown Structure</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, augmented reality is rapidly being evolved in technology. Augmented reality is a technology that can superimpose image as a computer generated and provides the user a composite view of the surrounding. (Kipper, 2013) As one of the major hit game in 2016, Pokemon Go became really famous around the globe, the idea of augmented reality are coming to the surface. People are getting their interest into this field. Many game developers today are keen to develop games using this techniques because it is in fact will give so much fun to the player. But, up to these days, there are still a little amount of augmented reality games that available in the applications store.

Games are entertainment and it should thrive to deliver the entertainment. This project will develop a learning tool for Virtual Congkak which is an initiative to bring entertainment, education and Malay cultural heritage together. Virtual Congkak is a Malay traditional game that will be develop in augmented reality technology. Traditionally, to play Congkak, it will use a wooden board filled with marbles. The aim of this game is the players (consist of 2 players) have to collect more marbles than the opponent. But it is not just simply like that, there are rules of every games, and so do the Congkak. Thus, that is the aim of this project, to create a learning tool of Congkak for beginners especially on children.

SD Virtual Studio is the targeted client for this project. It is one of a company that focuses on creating applications based on virtual reality and augmented reality technologies headquartered in Malaysia. SD Virtual Studio was just founded in 2017.
Despite that, they have created several games that using augmented reality. This company’s vision is to develop the best software applications aim to change the public ambivalence perception on technology and to create more exciting games and yet still educating us.

1.2 Problem Statement

The young generation are losing their interest towards traditional games. Traditional games such as tossing the stones, long elephant, kite flying and top spinning are getting forgotten. It must be probably because of there are so many available games in the applications store that is more exciting than these traditional games. The kids maybe think that traditional games are only for their elders. Because, for their generation, computer games and mobile games are the best. (Simplewoman, 2014) Probably, the last generation who still know and play traditional games is the 90’s generation. Because the traditional games is not up to the par of many other games created with advanced technology today. In additional, there is no one that are willing to practically teach these young generation about our traditional games because even the elders nowadays are playing games in their smartphone. In a word, it is not wrong to say that today, nobody would like to play traditional games because everyone prefers to play games in their smartphone. However, some of the children who live in rural area still interested to play the traditional games. (Shuib, 2017)

In this project, a learning tool about filling the wooden board (Congkak) will be develop. This learning tool will be created for the beginners of the game because the young generation may be not familiar with the rules of Congkak at all. So this tool will be helpful for them. And also, the idea of creating this learning tool in an augmented reality environment is to expose and attract these young generations to play traditional games, especially Congkak following the advanced technologies today.
1.3 Objectives

The objectives of this project is:

1. To study a game learning tool of Congkak.

2. To develop Virtual Congkak learning tool using augmented reality.

3. To evaluate the functionality of the system using User Acceptance Test (UAT)

1.4 Scope

Table 1.1 Scope of the project

<table>
<thead>
<tr>
<th>Scope</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>This game tutorial will be very helpful for players from all range of age.</td>
</tr>
<tr>
<td>Technology</td>
<td>Augmented reality.</td>
</tr>
<tr>
<td>Tools</td>
<td>• Unity 2017.3.1f1 (64-bit)</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Word 2013</td>
</tr>
<tr>
<td></td>
<td>• Vuforia Developer 2017.3.1p2</td>
</tr>
<tr>
<td></td>
<td>• 3D Builder 16.0.2611.0</td>
</tr>
<tr>
<td></td>
<td>• Draw.io</td>
</tr>
<tr>
<td>Features</td>
<td>• To teach the player how to play congkak.</td>
</tr>
<tr>
<td></td>
<td>• Allow the player to have the first impression on the game by showing them how the game will works</td>
</tr>
<tr>
<td></td>
<td>• Allow the player to understand the rules of congkak so they can plan the strategic ways to win.</td>
</tr>
</tbody>
</table>
REFERENCES


