A STUDY OF DIGITAL VIDEO EXPRESSION USING DOUBLE PROJECTION MAPPING TECHNIQUES

Suhaimi Lim

Bachelor of Applied Arts with Honours
(Fine Art)
2018
A STUDY OF DIGITAL VIDEO EXPRESSION USING DOUBLE PROJECTION MAPPING TECHNIQUES

SUHAIMI LIM

This project is submitted in partial fulfilment of the requirements for the degree of Bachelor of Applied Arts with Honours

Faculty of Applied and Creative Arts
UNIVERSITI MALAYSIA SARAWAK
2018
UNIVERSITI MALAYSIA SARAWAK

Grade

Please tick (✓)
Final Year Project Report ✓
Masters
PhD

DECLARATION OF ORIGINAL WORK

This declaration is made on the ........../.........day of...........2018.

Student's Declaration:
I, SUHAIMI LIM (55073) FACULTY OF APPLIED AND CREATIVE ARTS hereby declare that the work entitled A STUDY OF DIGITAL VIDEO EXPRESSION USING DOUBLE PROJECTION MAPPING TECHNIQUES is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

Date submitted Suhaimi Lim (55073)

10 July 2018

Supervisor's Declaration:
I, MOHAMAD ZAMHARI BIN ABOL HASSAN hereby certifies that the work entitled A STUDY OF DIGITAL VIDEO EXPRESSION USING DOUBLE PROJECTION MAPPING TECHNIQUES was prepared by the above named student, and was submitted to the FACULTY OF APPLIED AND CREATIVE ARTS as a *partial / full fulfillment for the conferment of BACHELOR OF APPLIED ARTS HONOURS (FINE ART) and the aforementioned work, to the best of my knowledge, is the said student’s work.

Received for examination by:
Mr. Mohamad Zamhari bin Abol Hassan

Date: 10 July 2018
I declare that Project/Thesis is classified as (Please tick (✓)):

☐ CONFIDENTIAL  (Contains confidential information under the Official Secret Act 1972)*
☐ RESTRICTED  (Contains restricted information as specified by the organisation where research was done)*
✓ OPEN ACCESS

Validation of Project/Thesis

I therefore duly affirmed with free consent and willingness declare that this said Project/Thesis shall be placed officially in the Centre for Academic Information Services with the abiding interest and rights as follows:

- This Project/Thesis is the sole legal property of Universiti Malaysia Sarawak (UNIMAS).
- The Centre for Academic Information Services has the lawful right to make copies for the purpose of academic and research only and not for other purpose.
- The Centre for Academic Information Services has the lawful right to digitalise the content for the Local Content Database.
- The Centre for Academic Information Services has the lawful right to make copies of the Project/Thesis for academic exchange between Higher Learning Institute.
- No dispute or any claim shall arise from the student itself neither third party on this Project/Thesis once it becomes the sole property of UNIMAS.
- This Project/Thesis or any material, data and information related to it shall not be distributed, published or disclosed to any party by the student except with UNIMAS permission.

Student signature:  
Supervisor signature:

Current Address:

No 61 Blok C Jln. Sabak-Rompin
Kg. Deraman, 26800,
Kuala Rompin, Pahang

Notes: * If the Project/Thesis is CONFIDENTIAL or RESTRICTED, please attach together as annexure a letter from the organization with the period and reasons of confidentiality and restriction.

[The instrument is duly prepared by The Centre for Academic Information Services]
ACKNOWLEDGEMENT

Project entitled A Study of Digital Video Expression using Double Projection Mapping Techniques prepared by Suhaimi Lim and submitted over Faculty of Applied and Creative Arts as eligible for Bachelor of Applied Arts with Honours (Fine Arts).

Received for examination by:

(Mohamad Zamhari bin Abd Hasasan)

Date: 

10 July 2015
Validation

It is admitted that I am Suhaimi Lim accompanied by writing entitled *A Study of Digital Video Expression using Double Projection Mapping Techniques* as eligible for Bachelor of Applied Arts with Honours (Fine Arts) in Programme of Fine Arts accepted.

Verified By:

Mohamad Zamhari bin Abol Hassan

Supervisor
ACKNOWLEDGEMENT

I would like to take this opportunity to gratitude especially for my supervisor, Encik Mohamad Zamhari bin Abol Hassan with all the guidance in this final year project. His comments, information and suggestions have make this research successfully proof. I also would like to express my gratitude to all the lecturers, for spent their times and knowledge on my research. A special gratitude also to my friends for guides me through the spirituality.
Table of Content

<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report Status Declaration Form</td>
<td>i</td>
</tr>
<tr>
<td>Declaration</td>
<td>iii</td>
</tr>
<tr>
<td>Supervisor Validation and Signature</td>
<td>iv</td>
</tr>
<tr>
<td>Introduction</td>
<td>v</td>
</tr>
<tr>
<td>Table of Content</td>
<td>vi</td>
</tr>
<tr>
<td>List of Figure</td>
<td>ix</td>
</tr>
<tr>
<td>List of Diagram</td>
<td>x</td>
</tr>
<tr>
<td>List of Table</td>
<td>xi</td>
</tr>
<tr>
<td>Abstract</td>
<td>xii</td>
</tr>
<tr>
<td>Chapter 1: Introduction</td>
<td></td>
</tr>
<tr>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Background Study</td>
<td>2</td>
</tr>
<tr>
<td>1.3 Research Hypothesis</td>
<td>3</td>
</tr>
<tr>
<td>1.4 Research Questions</td>
<td>4</td>
</tr>
<tr>
<td>1.5 Research Objectives</td>
<td>5</td>
</tr>
<tr>
<td>1.6 Research Statements</td>
<td>6</td>
</tr>
<tr>
<td>1.7 Scope of Study</td>
<td>7</td>
</tr>
<tr>
<td>1.8 Research Expectations</td>
<td>8</td>
</tr>
</tbody>
</table>
# Table of Contents

## 1.9 Conclusion

### Chapter 2: Literature Review

- 2.1 Introduction
- 2.2 Concept of Lighting
- 2.3 Projection Mapping
- 2.4 Double-Projection Mapping

### Chapter 3: Research Methodology

- 3.1 Introduction
- 3.2 Data Analysis

### Chapter 4: Experimental and Data Analysis

- 4.1 Introduction
- 4.2 Experimental on Suitable Form
- 4.3 Experimental on Different Types of Video
- 4.4 Experimental on Manipulate Projection Mapping into Video Expression
- 4.5 Process of Final Artwork
  - 4.5.1 Idea Development
  - 4.5.2 The Editing Process
  - 4.5.3 Experimental of Video Projection Mapping on the Object
  - 4.5.4 Installing the Final Artwork

---

vii
Chapter 5: Conclusion

5.1 Conclusion

Bibliography
List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Experimental on Cylinder Shape</td>
<td>17</td>
</tr>
<tr>
<td>Figure 2</td>
<td>The Concept of Final Artwork</td>
<td>20</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Shawn Coss's Artwork</td>
<td>23</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Front view of the sculpture</td>
<td>23</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Back view of the sculpture</td>
<td>24</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Side view of the sculpture</td>
<td>24</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Top view of the sculpture</td>
<td>24</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Editing in Cinema4D</td>
<td>25</td>
</tr>
<tr>
<td>Figure 9</td>
<td>First 3D Modelling design</td>
<td>26</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Front view of final design</td>
<td>27</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Back view of final design</td>
<td>27</td>
</tr>
<tr>
<td>Figure 12</td>
<td>3D modelling design of <strong>Trypophobia</strong></td>
<td>28</td>
</tr>
<tr>
<td>Figure 13</td>
<td>3D modelling design of <strong>Ophidiophobia</strong></td>
<td>28</td>
</tr>
<tr>
<td>Figure 14</td>
<td>3D modelling design of <strong>Arachnophobia</strong></td>
<td>29</td>
</tr>
<tr>
<td>Figure 15</td>
<td>3D modelling design of <strong>Aletheophobia</strong></td>
<td>29</td>
</tr>
<tr>
<td>Figure 16</td>
<td>Editing process in Adobe Premiere Pro</td>
<td>30</td>
</tr>
</tbody>
</table>
Figure 17: Final artwork installation

Figure 18: Close-up projected sculpture

Figure 19: Close-up projected sculpture
List of Diagram

<table>
<thead>
<tr>
<th>Diagram</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagram I: The light direction from both projector.</td>
<td>17</td>
</tr>
</tbody>
</table>
Abstract

This research is about creating a digital video expression by using double projection mapping in order to create a new genre of projection mapping. The purpose of the research is to investigate the characteristics of using two projector in projection mapping through experimentation.

**Keywords:** Digital media art, Projection Mapping, Two Projector, Video Expression.
Chapter 1

Introduction

1.1 Introduction

The terms projection mapping is three-dimensional Video Projection which consists of video and 3D objects projected on a display or object surface. By making objects which do not physically exist as if they were in existence. This technique enables projector art that combines the real and virtual to be finished by programming the structure and dimensions to precise measurements and projecting CG images and lights.

Projection Mapping is now being used widely in every fields such as in dance performance, concert, museum and gallery. The technology was combined with sound and environment which create another dimensional and new experiences to audiences. Projection Mapping is a method that projected images or videos from a single projector or more.

The usage of projector brings a different effect on projected surface. Through this research, it will focus more on experimentations in digital video by using double projector rather than a single projector. This research is to make applications on another genre of projection mapping.
1.2 Background Study

Projection mapping have become one of the tools which give a new experience to viewers. The evolution of technology help artist itself to express their art more universal. It allow the artist to create 2D or 3D effects and project on plain surface. This study is to create a new genre of projection mapping by using double projector. The purpose of using dual projector is to support the deficiency of single projector and to experiment the usage of double projector.
1.3 Research Hypothesis

Through the past research, this research can come out a hypothesis that the usage of double projection mapping manage to mute the deficiencies of a single projection mapping. Besides that, the projected digital video that will be apply on double projector will help increase the probability of the experimentation.
1.4  **Research Question**

Based on the literature review, this research have come out with 3 problem statement:

1. What is the suitable form that should be projected?

2. What type of video should be apply on the projection mapping?

2. How to manipulate double projection mapping into video expression?
1.5 Research Objective

Based on literature review, this research have come out with 3 objectives:

1. To identify the suitable form to be projected by double projection mapping.

2. To identify the most suitable type of video that should be used in projection mapping.

3. To manipulate double projection mapping into video expression.
1.6 Research Statements

This research statements have come out after the survey of the previous research thesis on literature review. This research have the potential in several aspects:

1. To make experimentation of probability on double projection mapping.

2. To shows the edge of using double projector.

3. To shows another genre of video projection mapping.
1.7 Scope of Study

The experimentation of this research will be more on medium which on projection mapping. Projection is the main purpose of this research, however the medium itself not enough to support the research. This research will also focus on theory of lighting which to support the flow of the experimentation. Both medium and theory will be collaborate to make the final work.

Besides that, this research not only study on the terms ‘projection mapping’ itself, it also including the tools in the research. The experiment of the research will be identify the suitable tools that should be used.
1.8 Research Expectations

The collaborations of medium and theory in this research will make sure the flow of the experimentation. The usage of the projection mapping techniques bring the expectation towards this research is can mute some of the deficiency of projection mapping.

Through the experiments, this research will give the new review to the audiences about the projection mapping.
1.9 Conclusion

As conclusion, researcher have stated introduction, background study, research hypothesis, research question, research objectives, research statements, scope of study and research expectation.
Chapter 2

Literature Review

2.1 Introduction

Literature review is a summary about previous research. Literature review is a process to survey scholarly articles, journal and book that related with the research topic. Literature review is the main source to decide the direction of the research, research methodology and the discussion about the data analysis. Source of literature review divided into three categories which primarily, secondary and tertiary.

2.2 Concept of Lighting

Light is electromagnetic radiation that human eye can detect. According to Prakel, D (2007) in his book *Basic Photography: Lighting*, light is that narrow band of electromagnetic radiation to which human eye is sensitive. Light travels in straight line which that enable us to see our own shadow.

In context of double projection mapping, choosing the right brightness of light is very important. The level of brightness that should be use are depend on three factors which is the content, the image size and the brightness of the room. Based on Projector Expert White Paper Series: Projectors 101 – Educate Yourself about Projectors stated that if you want to project a large image to a large audience, you should choose a bright projector and dim the lights as much as possible. If you want to project a detailed image, you may want to minimize the brightness of the room.

This means that lighting influenced the types of projector that should be used. Light bring the white light that contain rainbow colors through the wavelength called