

**DEVELOPMENT AND TESTING OF THERAPEUTIC VIDEO
GAMES FOR ACUTE SPINAL CORD INJURY PATIENT**

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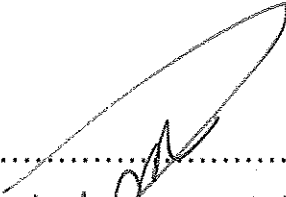
This Report Is Submitted In Partial Fulfillment of the Requirements
BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (MEDICAL
ELECTRONIC) WITH HONOUR

Jabatan Kejuruteraan Elektrik
Politeknik Sultan Salahuddin Abdul Aziz Shah

June 2016

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APPRECIATION

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals. I would like to extend my sincere thanks to all of them.

Foremost, I would like to express my sincere gratitude to my supervisor Pn. Nurul Maisarah binti Kamaruddin for the continuous support of my degree study and research, for her patience, motivation, enthusiasm, and immense knowledge. Her guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better supervisor and mentor for my degree study.

Besides, I am heartily thankful to my academic advisor Dr. Baharuddin, whose encouragement, guidance and mental support from the initial to the final level enabled me to develop a successful project.

In addition, I sincerely thank to my head of project lecturer Pn. Puspa, for the management, guidance and also teaching me in this course.

Furthermore, many thanks go to the head of the degree program, Engr. Dr. Zunuwanas Mohamad, who have invested his full effort in guiding the student in achieving the fun, experience and goal of the project.

Moreover, I also owe a great many thank to great many lecturer who helped and supported me during the process of development of project or the presentation of the project.

My thanks and appreciation also go to my classmates in developing the project and to the people who have willingly helped me out with their abilities.

Last but not least, I would like to express my gratitude and thanks towards my parents for their kind co-operation and encouragement which helped me in the completion of this project.

ABSTRACT

In the world, 25% of wheelchair patients with acute spinal cord injury is developing pressure ulcer each year. Wheelchair patient that get pressure ulcer due to no blood circulation on back and the buttock .For traditional method, the alarm will sound the doctor. The doctor will go to move the patient body or monitoring and alerting them do exercise. However, our researches is going to bring a change to the current situation. In this project created an interesting therapeutic video games with Microsoft Xbox 360 Kinect that will stimulating the patient to do exercise, as well as prevention from getting the pressure ulcer. At the beginning, the project study about the article, journal and paperwork about the video games therapy which they successes, fails, problems, ideas, and so on. After that, the study going through every example that people had made. Finally, it have been decided to uncovering the niche area for the usage of therapeutic video games for the acute spinal cord injury patient. The therapeutic video games is specifically make to prevent pressure ulcer disease for acute spinal cord injury patient. Secondly, the hardware of therapeutic video games is chosen for Microsoft Kinect and with chosen solution of exercise. The research is started with the action of exercise required for pressure ulcer prevention, the software required to making the game, the software interface between Microsoft Kinect and video games. After the research, the project form the prototype. Thirdly, the prototype were undergo testing and survey. The development and testing of the therapeutic video games of acute spinal cord injury, it is found that the therapeutic video games is moderately useful for the prevention of pressure ulcer for the wheelchair patient.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

With the advanced development in the video games industry. Oversea developed country started to try and use video games to replace the simple the therapy form rehabilitation center or hospital. Why this trend are will occur? Because the reducing the cost of sending the patient to rehabilitation center and hospital, reducing number of therapist that needed to treat patient and video games have the effect to stimulate the interest of patient to do the therapy exercise. [1]

Acute spinal cord injury patient is exist because of injury from falls, motor vehicle accidents (automobiles, motorcycles, and being struck as a pedestrian), sports injuries, diving accidents, trampoline accidents, violence (gunshot or stab wounds), infections that form an abscess on the spinal cord, birth injuries, which typically affect the spinal cord in the neck area. As the result of these injury, the patient usually have to use wheelchair support to spend rest of their life activities. And one of the prevalent disease that usually happen on the wheelchair patient is pressure ulcer on buttock. [2]

There are few ways to prevent the wheelchair patient having pressure ulcer on buttock. Firstly, always changing the person's position, such as laying on bed for a while than sitting back to the wheelchair. Secondly, using better cushion or mattresses to design the sitting part of wheelchair. Thirdly, doing some exercise after sitting too long hour on wheelchair

The all ideas from the above statement are useful, yet exercise is the most efficient ways to prevent pressure ulcer form buttock since when wheelchair person exercise can switching and rotated the pressure exert on the buttock. Therefore, the project mainly focus in on third idea of exercise.

From the scientific perspective, laziness may cause by low dopamine level on our brain system. [3] Plain and boring exercise schedule maybe not easily stimulate majority human to exercise. This condition can be the same applied to the wheelchair patient. Not all will follow the exercise schedule or timing. Thus, the pressure ulcer is easily develop on pressure ulcer patient even after a warning have been given by the doctor or professional rehabilitation therapist.

From study of Stanford University, presented that video games can increase the dopamine level of the brain. As a result, people like to play video games regularly as well as reduce laziness. [4] In short, this thesis study desire to bring video games element in exercise. Make exercise more interesting. Consequently, the study offer a way to prevent wheelchair user to have pressure ulcer on buttock through video games exercise.

Conclusion, the pressure ulcer is a problematic disease that happen throughout the world on the wheelchair user. The uninterested in exercising among the wheelchair user, further increasing the probability for the disease to spread.

1.2 Problem Statement

Pressure ulcers are an injury that breaks down the skin and underlying tissue. They are caused when an area of skin is placed under pressure. They are sometimes known as "bedsores" or "pressure sores". [5] This phenomena is always happen to the wheelchair patient where they tend to have long time sitting on wheelchair than normal person. Therefore, it is easier for them to develop pressure on their buttock. To avoid this from happen, they always need to change the position, such as laying on bed for a while than sitting back to the wheelchair or doing some exercise after sitting too long hour on wheelchair. Sometimes this activity can be challenging and boring thus make them unmotivated to exercise. From the previous study, exercise is the most efficient ways to prevent pressure ulcer form buttock since when wheelchair person exercise can switching and rotated the pressure exert on the buttock. Unfortunately, plain and boring exercise schedule maybe not easily stimulate majority human to exercise. This condition can be the same applied to the wheelchair patient. Not all will follow the exercise schedule or timing. Thus, the pressure ulcer is easily develop on pressure ulcer patient even after a warning have been given by the doctor or professional rehabilitation therapist. Therefore is a need to develop something which can make them interested to do an exercise.

1.3 Objective

The main objectives of this research is to develop the therapeutic video games. In order to achieve the main objective, the sub- objectives of this research are as follows:-

- To design an interactive therapeutic video games that able to prevent the pressure ulcer from patients (acute spinal cord injury wheelchair patient).
- To test the functionality of interactive therapeutic video games.
- To validate the interactive therapeutic video games by getting the feedback from the wheelchair patients.

1.4 Scope of Project

The development and testing therapeutic video games on acute spinal cord injury patient is the video games which created for the paraplegia spinal cord injury patient with chair wheelchair usage. The product is going to test on the public paraplegia spinal cord injury patient with chair wheelchair at Politeknik Sultan Salahuddin Abdul Aziz Shah. The hardware will using the Microsoft Kinect v2, Television, special connection cable between laptop and Kinect and laptop. The software will be using FFAST software and GAMEMAKER software. The video game will cover the movement for the left hand rise up, right hand rise up, waist, hips, shoulder and back, except for legs. (covering upper part of body, exclude the lower part of body)

1.5 Important of the Research

- First for all reason, to reduce the amount of wheelchair patient who affected by the pressure ulcer through Kinect rehabilitation exercise video games.
- Secondly, reduce the time of household, doctor and therapist who take care wheelchair user pressure ulcer condition. The family member not need always remind the wheelchair family member to exercise. The doctor can have more time to look after other patient than this general disease. The rehabilitation center won't be always flooded with the wheelchair patient and therapist no need to motivate the wheelchair user to go for exercise. The Kinect video games can reduce volume of tedious task for by them toward wheelchair patient. Happily, save time.
- Thirdly, reduce the tension faced by wheelchair user (especially lazy exercise wheelchair user) when they are nagging by people to exercise. The Kinect rehabilitation exercise video games is planned to motivate the wheelchair user to automatic have their exercise. Happily, save people from anger.
- Lastly, save money. The family member can save money through the travel fee for to and fro from the rehabilitation center and hospital. Beside, having

pressure ulcer on wheelchair patient, then only going for treatment. It would very high cost especially the treatment usually need operation.

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