CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Stroke appears to be the third largest cause of death in Malaysia, only next to heart diseases and cancer. According to National Stroke Association of Malaysia (NASAM), in the year of 2014 itself, an estimation of 40,000 people suffers from a stroke. In other words, a stroke happens every 40 seconds.

The most difficult part of the journey for the stroke survival will be losing some parts of control of their body. To make the matter worse, a stroke can happen to anyone at any age, but the majority cases affect adults. In addition, stroke contributed to 8% of the total death in the country for the year of 2009, and ranked as the 5th principal cause of death in Malaysia. [16]

Stated by the Stroke Foundation of New Zealand, a stroke is a brain attack which occurs when the blood supply to the brain is disrupted. In reality, there are an enormous amount of blood vessel in our brain consistently supply the blood that contains oxygen and nutrients to the brain. When one of these millions of blood vessel bursts or gets clogged due to certain circumstances, that particular part of the brain starts to die. NASAM also state that, if a person having a stroke is not receiving any emergency procedures, his brain will face permanent damage that lead to disability in certain part of the body, or even paralyzed for the rest of his life.

The damaged part of the brain can never be recovered, because brain cells cannot be regrown under the biological capabilities of human beings. However, the missing parts can be relearned, it only takes a few seconds to do all the damage, but it
takes years or rehabilitation for the stroke survivors to regain the missing part of the
command, or memories.

Another significant challenge for the stroke patient will be maintaining
motivation in the rehabilitation. Stroke rehab requires enormous efforts, patience, and
the slow yet boring progress may cause the patients becoming demotivated and giving
up the rehab. The study indicates that only 31% people with motor disabilities practice
the exercises as recommended from the therapists. Lacking in motivation can be an
obstacle for the patient to actively involve themselves in the therapy sessions, which
eventually affect the overall rehab progress. \[17\]

To counter with the problem, there are researches and projects regarding the
feasibility of implementing the entertainment elements into the rehab process.
Evidently, using video games as an alternative for stroke rehab is able to encourage
the patients in their daily practices. \[17\]

1.2 PROBLEM STATEMENT

Fine motor skills involve the cooperation of brain, eyes, and muscles of the
fingers that enable our hands to write, grasping objects. It can be considered as one of
the crucial skills that we have started to develop from infancy. In fact, fine motor skills
are crucial for the daily routine and even life career.

However, fine motor skills can be compromised after stroke as certain parts of
the brain are damaged. \[1\] Occasions such as injuries at the joints or brain damage from
stroke will affect the abilities in controlling coordinated body movements with hands,
fingers, and even face muscles.

The rehabilitation progress for every patient is differ, referring to the specific
conditions of the patient. From a psychological point of view, an individual who faced
sudden lost in ability in coordinated body movement and hand dexterity has to
withstand frustration due to the physical disability, and the negative emotion will
affects the progress of the rehabilitation. \[18\] Hence, the idea of implementing a serious
game in the rehabilitation can be beneficial to the progress of rehabilitation by
preparing an entertaining and exciting platform to constantly motivate the patients throughout the long duration of practices.

Video games are potentially useful technologies in improving fine motor skills, which involve the patients’ ability to use their hands and fingers. In the market, there are a few existing games designed to aid stroke and coordinated body movement rehabilitation, which majority utilized the benefits from 3D cameras in affordable devices such as Kinect from Microsoft. Some of these games are proven to be beneficial, and had already been integrated as part of the stroke rehabilitation in some rehab centres. Nevertheless, the existing rehabilitation games are mainly focused in gross motor skills. Therefore, there are lacking in engaging elements to motivate the patient to practice in fine motor skills.

More than that, currently there are no existing projects that focused on the fine movement practice specifically. Yet, there are uncertainties in deciding the suitable devices to be implemented in the development of a video game for rehabilitation of fine motor skills.

In summary, the problem statements for this project are defined as:

1) There are no custom-made serious games specifically dedicated to the practice in fine motor skills rehabilitation.
2) There are lacking in engaging elements to motivate the patients to practice fine motor skills in existing systems.
3) There are uncertainties in defining the suitable motion sensor hardware to be implemented in the serious games for fine motor rehabilitation.