

**UNIVERSITI TEKNOLOGI MARA  
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**REHABILITATION SYSTEM FOR  
UPPER LIMB: STEERING WHEEL  
CONTROL**

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## ABSTRACT

Rehabilitation using haptic interface are more interesting and enjoyable compared to conventional rehabilitation technique because patient can experience real time effect of their movement. This project proposed to design a haptic based rehabilitation system by mimicking real-life scenario in dot moving game controlled via steering wheel and to analyse the performance of the system. Steering wheel mechanism that provide left and right movement turn of about  $90^{\circ}$  (left) and  $90^{\circ}$  (right). Steering wheel sensing unit and signal interface unit that allows interactions between the steering wheel mechanism with the LabVIEW software. A Dot Moving Games in LabVIEW used to show real times interaction between the steering wheel mechanism with the LabVIEW. Patient need to maintain the dot on curvy road and avoid from hit side wall or the games will over. Patient progress can be analysed based on their score in the game. The result show there has the difference in the average score based on the ages. The young subject gets higher score compare to the elder subject shows that have the different score between the functional ability based on the ages. It shows that the system performs well and has potential to use as an interaction method of rehabilitation for stoke patient.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 OVERVIEW OF THE CHAPTER**

This chapter is about the introduction of the project, problem statement, objective, scope of study and thesis organization. The introduction discusses about cause of stroke attack, effect, stroke rehabilitation and haptic interface in stroke rehabilitation. The problem statements are about the problem facing by stroke patient to survive after the stroke attack. The objective is to solve the problems on the problem statement and the scope of study is the limitation of the project.

### **1.2 INTRODUCTION**

Stroke is a leading cause of disability, according to the latest WHO data published in May 2014 Stroke Deaths in Malaysia reached 15,497 or 12.19% of total deaths [1]. The age adjusted Death Rate is 80.59 per 100,000 of population ranks Malaysia 97 in the world. Strokes happened when blood flow has been interrupted by blood vessel, it will cause lack oxygen and glucose to brain that make brain cell death [2]. It resulting deterioration in speech, movement and memory [2]. Cell death and loss of corresponding neurological function are the effect of the injury to the brain. Many stroke survivors suffer from motor damage such as upper limb hemiparesis went with emotional and cognitive impairments that can affect patient ability to function[3]. This will affect patient to do daily activity such as eating, walking, driving and so on. Some of patient already losing their hope to continue their life because of the deficiency. However, improved technology in rehabilitation method make survival rate for stroke patient increase [4]. Rehabilitation treatments are effective in recovery of function. Nevertheless, patients' engagement is requirement in order to increase the improvements, and research shows that stroke survivors need more opportunities to engage with rehabilitation program outside of the hospital.