CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The research was done in seeking solution for engaging patients in rehabilitation of fine motor skills by integrating the skeletal tracking technology of Leap Motion controller into serious game. More than that, the research is emphasized in creating a safe environment where the patients are able to access to the rehabilitation module in their living place. In addition, fun and excitement elements is fused in the rehabilitation to encourage and motivate the patients throughout the long rehabilitation progress. In addition, failure management is done in deep consideration to deliver a gameplay experience that is balance in excitement of challenges, and avoid demotivation from failure in the game.

The activity to consider during the development are seeking effective modules for fine motor skills rehabilitation, and blend it into the gameplay experience. On the other hand, interesting and excitement elements in multimedia also need to be presented to help the patients in focusing in the rehabilitation progress. Last but not least, a suitable game engine is needed for the development of the game.
3.2 METHODOLOGY

3.2.1 METHODOLOGY USED IN RESEARCH

Methodology used in this project can be presented using SDLC Waterfall Model, a linear sequential software development cycle model. Referring to this model, there are 6 phases in the system development and each phase must be completed in sequential manner where overlapping in phases is not allowed.

The methodology of Waterfall model can be explained in 6 phases as shown in figure 11. Further clarification is done below:

1) Requirement Analysis

In this phase, the research is focused on collecting relevant information to fulfil the project objectives. Intensive research has been done to obtain detailed information regarding rehabilitation of fine motor skills, the causes is supported statistically, yet the feasibility of applying serious game concepts in the case. More
than that, deep study has been done on proposing a suitable solution for fine motor skills rehabilitation integrated with motion sensing technology and HCI elements. Nevertheless, research has also been done regarding the rehabilitation modules, to ensure the effectiveness of the rehabilitation, and avoid possible demotivation due to insufficient consideration in failure management. More than that, research has been done to select the suitable motion tracking device, which Leap Motion, in this case, for the game development.

2) System Design

For the second phase, design of the system is being considered carefully to tailor gameplay algorithms specifically to meet the requirements in rehabilitation progress. Furthermore, consideration in creating a safe environment for rehabilitation in a normal living room, and the movements involves in the game play would not be overcomplicated that may lead to potential injuries.

Next, the gameplay mechanic is designed specifically for fine motor skills rehabilitation. In another words, the gestures involve in the gameplay experience have to be beneficial to the rehabilitation progress for the patients. However, the balancing between challenging elements and failure management is under deep consideration to avoid side effects of possible demotivation.

The movements of palm and fingers will be used as the indicator for game control, to hit the targeted object in gaining scores in certain time limit. The parameters of the game play will practically involve the drawing shape in the air according to the targets on screen, and grabbing an object from one place to another in the limited time.

3) Implementation

For the third phase, necessary development is made to translate the game design into a game executable and compatible with the targeted motion sensing hardware, Leap Motion Controller. Moreover, translation of the game mechanic into the system is done using Java Script and LeapJS API from the Leap Motion Java Script support.