HIT3061 – Software Team Project - Semester 2, 2013

Leap Motion Development

Software Requirements Specification

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**Table 1. Document Change Control**

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| Version | Date | Author | Changes |
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| 0.9 | 02/09/2013 | Joshua Stopper | Continue to fill out remain sections |
| 0.91 | 02/09/2013 | Minh Duc Nguyen | Continue Section 4 |
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**Table 2. Document Sign Off**

|  |  |  |
| --- | --- | --- |
| Name | Signature | Date |
| Joshua Stopper |  |  |
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# 1 – Introduction

Over one year ago, Dr. Phillip Michael from the Royal Victorian Eye & Ear hospital discovered the capability of the Leap Motion Controller to track 1/100th of a millimeter changes in the location of fingers at up to 200 times a second. In an attempt to advance the state of the industry, Dr. Phillip Michael has brought the project to Swinburne University to make the advancement a reality.

In collaboration with Swinburne University, Dr. Phillip Michael and select students, the Leap Motion Controller will attempted to be used to detect tremors in surgeons hands whilst outputting to a display a variety of characteristics relating to their tremor.

In continued analysis by Dr. Phillip Michael of the Leap Motion Controller and what can be achieved, the use cases attributed with controller expanded from not only surgeons hand but also to patients with Parkinson’s disease. The potential outcome of the controller and developed software in this case will provide Drs. as well as patients the ability to see the level of progression of the disease, as well as whether or not medications to treat the disease are working, however this stage of development is more of a proof of concept.

## – Purpose

The purpose of this document is to detail the requirements of the project so that a product can be developed that meets the requirements. As such, this document is for the client and the developers so that an agreement can be reached.

## – Scope

**Name**

* Tremor analysis with Leap Motion

**What the software will do**

* Display the characteristics of tremor in the hand, providing the amplitude, velocity, acceleration and frequency of the tremor
* Software contains brief tutorials in use of the software
* Software contains instruction in the use of the software in real time

**What the software will not do**

* Provide a specific rating of how severe or mild a tremor is
* Be liable in the event that a surgeon has a tremor during operation
* Give a concrete output whether the surgeon is ready for operation

**Application and potential use of the software**

* Surgeons test their hands pre-operative to determine if they are able to perform
* Drs. Clinics testing tremors in Parkinson’s patients
  + Comparing past results of patients

**Benefits of the software**

* Tremor can be tested in real time without expensive hardware
* Tremor can be detected in a non-intrusive way

**Objective of the software**

* To prove that it is possible to develop software that will interface with the leap motion controller and detect the level of tremor in the hand. This includes tracking the frequency, velocity, acceleration and amplitude of tremors.

## – Definitions, Acronyms and Abbreviations

*Provide the definition of all terms, acronyms, and abbreviations used in the SRS.*

|  |  |
| --- | --- |
| **Word** | **Definition** |
| LM | Leap Motion |
| LMD | Leap Motion Device |
| JS | JavaScript |
| API | Application Programming Interface |
| Local | The software/hardware is being executed/stored on the machine the end user is accessing |
| Remote | The software/hardware is being executed/stored on a machine separate from the end user |
| Hertz | Unit of frequency that defines a rate of change. Hertz defines the rate of change |

# - Overall Description

The product we will be developing will be used as a proof of concept for our client to prove that the Leap Motion device is capable of correctly identifying and measuring a tremor in a user’s hand. The product may be used by our client for his own tests, however we are tasked with proving that this device is able to effectively accomplish what other more expensive and intrusive hardware is able to do.

## 2.1 - Product Features

* Ability to capture the tremor in a user’s hands and analyze the different characteristics of the tremor
* Software possesses ability to measure the amplitude, frequency, acceleration and velocity of a user’s tremor and display this information to the user
* Instructions on how to complete test are available in real time, giving the user feedback on how to use the program correctly

## 2.2 System Requirements

### 2.2.1 - Development Requirements

|  |  |
| --- | --- |
| **Requirement** | **Explanation** |
| Leap Motion Device | This device is what records the motion and sends the data to the computer |
| Leap Motion Driver | This software interfaces with the leap motion device and converts the binary into usable data |
| Leap Motion JSAPI | The Leap Motion JSAPI provides a javascript interface to the leap motion device. |
| Computer | The computer will perform the calculations required by the software |
| Local Web Server | This software will host the code for execution in a web browser |
| Web Browser (Chrome/Firefox/IE/Safari) | The web browser will run the software developed |
| IDE/Text Editor | The software will be developed in this software. |

### 2.2.2 – Production Requirements

|  |  |
| --- | --- |
| **Requirement** | **Explanation** |
| Leap Motion Device | This device is what records the motion and sends the data to the computer |
| Leap Motion Driver | This software interfaces with the leap motion device and converts the binary into usable data |
| Leap Motion JSAPI | The Leap Motion JSAPI provides a Javascript interface to the leap motion device. The JSAPI will be included when the web page is loaded, therefore not required locally |
| Computer | The computer will perform the calculations required by the software |
| Web Browser (Chrome/Firefox/IE/Safari) | The web browser will run the software developed |

### 2.2.3 – Hardware Requirements

|  |  |
| --- | --- |
| Component | Minimum Requirements |
| Processor | AMD Phenom ™ II or Intel® Core™ i3, i5, i7 |
| Memory | 2 GB RAM |
| Connection | USB 2.0 port |
| Peripheral | Leap Motion device |

### 2.2.4 – Software Requirements

|  |  |
| --- | --- |
| Software Requirements | |
| Operating System | Windows® 7 or 8 or Mac® OS X 10.7 |
| Browser | Chrome/Firefox/IE/Safari |

## 2.3 Documentation

* Real time tutorials in how to use the software
* Manuals in how to install, plug in, and use the hardware
* Manuals in how to install, configure, and use the software
* Testing documentation during the building of the software
  + Use Cases
  + Software outputs

# 3 System

Our system is use to capture the amplitude, frequency, velocity and acceleration of user hand for tremor analysis with the Leap Motion

For using the Leap Motion system, we need to install the require application that adapt with the system before using the tremor analysis at the installation instruction folder

* Install Leap Motion device driver for computer to recognize the device
  + Windows user: select “device\_driver/Leap\_driver\_for\_windows.exe” file
  + Macintosh user: select “device\_driver/Leap\_driver\_for\_mac.dmg” file
* Install Web browser with the latest version
  + Windows user: select “Browser/chrome\_installer\_windows.exe” file
  + Macintosh user: select “Browser/chrome\_installer\_mac.dmg” file
* Plug-in the Leap Motion controller to the system
* Open the web browser with the “index.html” file to start the application
* When connected, select “tremor record” tab to using the analysis record
* Then click to “start” to begin the analysis
* The image will appear with the instruction “Moving hand to the right spot on top of the device”
* After the instruction disappear in 5 seconds the system will start to tremor the hand
* To finish the analysis by choosing the analyze file at the right side
* The instruction will appear with the inform “Moving hand out of the device”
* Choose the “open file” to open the previous recording that allow the user to observe the amplitude, frequency, velocity and acceleration of user hand
* Choose “close file” to close the record file

Install Leap Motion device driver

Install web browser

Open the web browser and select the “index.html” file

Plug-in Leap Motion controller to the system

Select “tremor record” tab to start the application with the record

Select “start” to capture the analysis

Appear the instruction with “moving hand to the right spot on the device” in 5 sec

Start to tremor the user hand and finish the capture by select the “analyse file”

Select the “close file” to close the record

Select the “open file” to review the analysis record

Figure 1: Showing how the system work

# 4 Interface Requirements

## 4.1 User Interfaces

When the program is running it will require the Leap Motion device to be plugged in to work correctly. The user will be told to interact with the program directly by using their Leap Motion device (Figure 2 shows an example of how the Leap Motion Device is used). The user will be able to see a frame showing the movement of their hand on the screen and instructions will appear about where they should hold their hand. The program will give the user feedback about where they need to move their hand to be in ideal testing range. Once in the correct position for a certain amount of time the program will inform the user that the test is about to begin.

|  |
| --- |
|  |
| Figure 2. Example of how Leap Motion Device is used. Hand movements above the sensor will be captured by the device and can be accessed at a later stage. |

The user will then hold their hand in position for the duration of the test and the program will notify them when their test has completed. Once complete, the results of a user’s test will be displayed on the screen, showing detailed characteristics about their tremor.

## 4.2 Hardware Interfaces

The product will be runnable on any machine that is able to successfully install the Leap Motion drivers. Since our client is using a Mac we will ensure that the application performs correctly on that Operating System. The only physical interfaces this product requires is a USB port for the Leap Motion device to connect to.

## 4.3 Software Interfaces

The system we develop will not need to interface with a database as the results of the test will not need to be saved.

## 4.4 Communication Interfaces

The software will communicate over HTTP to request the pages local or remotely. HTTP Post and get will also be used to place data on the servers.

# 5 References:

Js.leapmotion.com. 2013. *leapjs*. [online] Available at: http://js.leapmotion.com/ [Accessed: 17 Sep 2013].

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