HIT3061 – Software Team Project - Semester 2, 2013

Leap Motion Development

Test Plan

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**Table 1. Document Change Control**

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| --- | --- | --- | --- |
| Version | Date | Author | Changes |
| 1.1 | 09/09/2013 | Daniel Corsaletti | Create Document |
| 1.2 | 27/09/2013 | Daniel Corsaletti | Updated more sections of document |
| 1.3 | 30/9/2013 | Minh Duc Nguyen | 1.3/ Measurable  4.2/ Technical Environment  5/ Function to be tested (table)  6/ Deliverables ( 6.1 – functional test result, 6.2 – Usability Questionaires |
| 1.4 | 05/10/2013 | Daniel Corsaletti | Made some changes based on feedback.  Compelted section 3 |
| 1.5 | 06/10/2013 | SHENGWEI LI | Add parts on section 3 and 4.  Add more test cases in section 5. |
| 1.6 | 21/10/2013 | Daniel Corsaletti | Made changes based on feedback. Removed unnecessary information |

**Table 2. Document Sign Off**

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# Test Plan

*Discuss in general what you will be testing, then identify the test objectives (about 3 to 10) of the project that are at a high level breakdown of the goal. The test will be measured by whether these objectives are met. The objectives should be measurable statements if possible. List the objectives in order of importance.*

## Introduction

This test plan will be used so we are able to accurately identify and detect which aspects of our application need to be tested to ensure that the data we are gathering and supplying to the client is correct and that the overall project is reliable and fulfils their requirements.

## Objectives

The main criteria to ensure that this project is a success, is to make sure that our application can accurately test a tremor in the user’s hands. In order for this goal to be achieved we must make sure that our methods of calculating a tremor are correct. Our main objectives from testing include:

* Ensure a tremor can be identified
* Ensure the tremor calculating formulas and noise reduction formulas are correct
* Ensure application can be used with 1 hand
* Identify any situations where the Leap Motion device might struggle to capture data accurately
* Ensure ease of use of software
* Identify and report as many bugs and/or issues as possible

## Measurable

The specific objectives of the test plan are to measure:

* Hand Tremor variables for each finger that include:
  + Hertz
  + Amplitude
  + Velocity
  + Acceleration
* The noise filter during the data capturing session, which means that the system should apply a mathematical algorithm to detect whether a movement is a hand tremor or a noise.

# Scope

*Define what will be tested. Specify what the test will and will not accomplish. Examples are data entry, file transfer, security, report generation*

Testing of this application will be used to ensure whether the project meets all of its functional requirements. By assessing the validity of its results and testing its usability, we are able to assess whether what we are handing over to the client is what they required.

The main aim of this project is to prove that by using a Leap Motion device and adding our own functionality it is possible to correctly identify and detect a tremor, so the main focus in testing is to ensure we have calculated tremors correctly. To test the accuracy of our tremor indication, we will need to generate some of our own test data that we can test our tremor calculation formulas on, checking to see if it produces the expected result we would hope to achieve from that test. After checking these formulas this way we can also record vision of a test being completed and then show this footage to our client, along with the results of the test and check if these are the type of results he would expect. All these tests will be used to ensure that the tremor analysis works exactly as we had planned.

Our application will also be tested for usability, to ensure that our client will be able to use it in his own environment. To test this we must have test subjects who are asked to use the software and determine whether all of the instructions given to them about using it are reliable guides. They must be able to understand where they must place their hands and they must be able to figure out how to access their test data.

Other tests that must be completed will rely more upon the reliability of the Leap Motion device. We must ensure it is still able to function correctly under different circumstances that our client might be in. To test for this we will be using the device with different situations of the client in mind, for example, with gloves on, or with freshly cleaned hands. We do not expect there to be any issues, however testing is still necessary.

For our testing purposes file generation will be necessary, however in the final application the client has not asked for any file saving so we will not need to test the effectiveness or the ability to store these files anywhere. As previously stated, the accuracy of the Leap Motion device has already been proven in journal articles so the device’s ability to accurately track movement will not be tested.

# Test Strategy

*Discuss what test strategies will be used in your project. Examples are automated testing, stress and load testing, security test, recovery test, user acceptance test.*

## Function Testing

The main functionality of the application is the ability to correctly analyse a tremor. As the Leap Motion device is already capable of correctly tracking a user’s hand movements, we need to ensure that our implemented formulas are capable of correctly calculating the frequency, amplitude, velocity and acceleration of a tremor. To test these, we will need to create some test data to run through our formulas. We will use Unit Testing to test each of the characteristics of a tremor separately. That way we will require at least 4 different sets of test data, each one of them focussed on testing the analysis of either the frequency, velocity, amplitude or acceleration. Testing this functionality separately allows us to ensure that all of the values are being correctly calculated.

Another function to be tested is the implementation of the noise filter. Our application will be filtering any noise in the movements of the user’s hand, in order to correctly detect the different aspects of a tremor. To test this functionality, we will again be feeding our functions some test data to check if the actual result is the same as the expected result.

The other functionality of the application that is being tested has been outlined below in the Functions to be tested section. Each Use Case will be analysed by team members and will be tested to ensure all functionality is complete and working correctly.

## Usability Testing

The Usability of the application will be tested by each member to ensure that we are all able to easily use and conduct a test on the application while also using a Leap Motion device; however the main tester of the applications Usability will be our client. As this application is being developed specifically for him we do not have to ensure it is usable for a large audience, only to ensure it is usable for him.

Since there is not a large amount of navigation required for somebody to use this application and conduct a test, it is also not necessary for us to conduct any tests in a usability lab. Our client will be able to open this application and interact with it straight away to begin a test, there is no need to test all the aspects of this application as if it were a final product. Our aim is to make this application as usable as possible for our client, but we will try to accomplish that by asking our client for direct feedback on whether he is able to effectively use the software with ease and is satisfied with how it operates.

# Environment Requirements

*Identify work places, computers, user accounts, server accounts, DBMS, and stationary*

*required for testing.*

## Physical environment

To get an accurate assessment on how well our program correctly calculates tremors we initially planned to use software that already detects tremors and then compare the results. This meant getting the client to supply us with some test data from the machines that he already uses and maybe add in a Leap Motion device to track the hand movements as well. We also talked about testing the application while also using high speed cameras and accelerometers; however this was beginning to complicated things further than we believed they needed to be. We deemed these methods to be unfeasible and decided against it and will instead focus on providing tests that we are able to control.

Since we are not actually trying to test the accuracy of the Leap Motion device and are instead testing the implementation of our calculations we have decided to set up a test case where a user will have their hand movements recorded on camera and then both the recording and results of the test are shown to our client to see if he believes these results look accurate. It may not be an ideal testing situation but if the client is happy with this type of testing it could be useful. For these tests we will also require a camera and have our client (or another surgeon familiar with tremors) to come in and check recorded tests.

Test data will also be created to be run through the program. This will be used to check if the calculations we are performing on the data produce a result that is the same as what we would expect the program to output for a test with those figures.

Another aspect of the program to test will be testing the program under different circumstances that the client will be in. As a surgeon we believe it is possible he could be wearing gloves or having freshly washed hands which could raise or lower the temperature of his skin. A user may also be wearing rings or jewellery that may interfere with the Leap Motion device so it’s important we test for these factors too. As the Leap Motion devices uses light to capture movement we also decided to test the application under different lights. We aim to replicate these situations and test to make sure these do not interfere with the results.

## Technical Environment

Hardware:

* CPU: Core 2 Duo 2.0Mhz
* RAM: 2 GB
* Free space for software application requires at least 500 MB
* Monitor: 32bits or higher display adapter
* Keyboard
* Mouse
* LeapMotion device

Software:

* Internet browse.IE 8, Google Chrome,firefox.
* Windows XP, 7macOSX lion
* Apache Server for hosting the web application such as WarmpServer, Mampstack, Uniserver, etc
* LeapMotion device driver

Network:

* Web application works in either online or offline network connection

Place:

-Swinburne hawthorn Library

# Functions to be tested

The main functionality of our software will be to accurately analyse a tremor in a user’s hand. The different statistics of this tremor that we are trying to capture include the frequency, the amplitude, the acceleration and the velocity of the tremor. We will need to test that each of these is correctly being calculated. It will be difficult to confirm these calculations are correct, however using journal articles we can confirm that the Leap Motion device is accurate, so using simple calculations to gain maximum values and changes in direction is a simple task. As previously stated, a method of testing our calculations would be to show somebody who is familiar with tremors the visual recording of a test and hopefully producing what are expected results. Additional test data will be created to test if the program correctly calculates the tremors. We will create data with an expected outcome in mind and check if the program is able to correctly produce these results.

Another factor that is present in tremor calculations is the identification and removal of any noise in a user’s movements. Once this is calculated then we can get a proper reading of a tremor, and the software’s ability to identify and display information about the tremor can be assessed.

Some of the functionality of this test will be the ability to be guided and interact with the software without the use of a mouse. The user will be able to begin a test by holding their hand over the Leap Motion sensor and being told if they are using the software correctly or not. We need to make sure accessing a test and completing it is possible without even touching a mouse or keyboard once inside the software.

The software will be used on only 1 hand; however ideally it will not have a specific hand that needs to be used. We must test that a user is able to use either a right or a left hand without making any changes to the test. This is mainly for the preference of the user, however if restrictions need to be made and only allow a specific hand then that is a change we will have to investigate.

As part of our testing we are creating output files of all tests, however the client didn’t want any file storage as a functional requirement. He was happy for the software to only display the results on the screen at the end of the test. This means no file storage tests will need to be conducted.

A list of function to be tested is in below table

|  |  |  |
| --- | --- | --- |
|  | **Test Case Objective** | **Expected output (Pass requirements)** |
| 1 | Correctly calculate the frequency of a user’s tremor | Displays an expected result based on the test data |
| 2 | Correctly calculate the velocity of a user’s tremor | Displays an expected result based on the test data |
| 3 | Correctly calculate the amplitude of a user’s tremor | Displays an expected result based on the test data |
| 4 | Correctly calculate the acceleration of a user’s tremor | Displays an expected result based on the test data |
| 5 | Validate noise in movement | Should display appropriate message to indicate user whether current movement is a tremor or a noise during the assessment task |
| 6 | Correctly output tremor analysis values: Hertz, Amplitude, Velocity and Acceleration | A summary page for 4 output values must be displayed after finishing capturing task. |
| 7 | User instruction | A set of user interaction instructions will be shown before and after the measuring task. |
| 8 | Detecting Leap Motion device connection | Display appropriate message to indicate to the user whether the device has been connected/disconnected |

# Deliverables

*Identify and list the documents that will capture the results of your testing. Results must answer the test objectives that are listed in section 1.*

*List test deliverables, and links to them if available, including the following:*

*Test Plan (this document itself)*

*Test Cases*

*Test Scripts*

*Defect/Enhancement Logs*

*Test Reports*

A document that includes the results of the client reviewing our test data footage will be delivered to show the results of our testing. This will include the results of different tests that were conducted by different users and whether our client was satisfied with the results that were produced for each test. We will also include in this document the test data that we created to determine whether our tremor calculations were accurate, along with our expected results and the results produced from our program.

This document will also contain the results for the usability tests of our software. We will identify how easy our software was to use without having to interact with a mouse or keyboard to conduct a test. Here we will also, identify if the software is useable in a variety or possible situations like while wearing gloves or jewellery. We will also discuss the results of what hands can be used while testing.

A defect document will be used to identify any faults or bugs that we discover through testing. This will be used as a document to identify any faults that we discover throughout the design process.

## User Acceptance Questionnaire

1. Do you feel it’s easy to use the system and why?
2. Do you feel that the presentation components are well designed and presentable? If not, please specify
3. Do you think that functionality of capturing tremor data has been meet in accordance to specifications in term of accuracy or needs improvement?
4. Could you specify the level of satisfaction you found while testing the product? (Rate from 1 to 10)
5. Other Comments (if any)

# References

1. Pratiksha , “How to write a test plan", <http://www.wikihow.com/Write-a-Test-Plan>

# Bibliography