HIT3061 – Software Team Project - Semester 2, 2013

Tremor Detection with Leap Motion

Project Plan

**Daniel Corsaletti**

SID: 6450458

E: 6450458@student.swin.edu.au

M: 0433 536 150

**Joshua Stopper**

SID: 5571391

E: 5571391@student.swin.edu.au

M: 0430 714 887

**Shengwei Li**

SID: 749999x

E: 749999x@student.swin.edu.au

M: 0420 478 750

**Minh Duc Nguyen**

SID: 171001x

E: 171001x@student.swin.edu.au

M: 0412 179 265

**Tran Xuong Tran**

SID: 6700691

E: 6700691@student.swin.edu.au

M: 0433 345 105

**Table 1. Document Change Control**

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Author | Changes |
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| 1.1 | 02/09/2013 | Daniel Corsaletti | Filled in sections in 2 and 3 |
| 1.2 | 02/09/2013 | Minh Duc Nguyen | Filled in section 8 budget |
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| 1.7 | 4/10/2013 | SHENGWEI LI | Continue the section 4 and 6 |
| 1.8 | 8/10/2013 | SHENGWEI LI | Complete section 4 |
| 1.9 | 1/11/2013 | Daniel Corsaletti & Josh Stopper | Rewrote sections of the document, fixed errors |
| 2.0 | 04/11/2013 | Daniel Corsaletti | Publish final version |

**Table 2. Document Sign Off**

|  |  |  |
| --- | --- | --- |
| Name | Signature | Date |
| Joshua Stopper |  |  |
| Minh Duc Nguyen |  |  |
| Tran Xuong Tran |  |  |
| Daniel Corsaletti |  |  |
| Shengwei Li |  |  |

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# Introduction

## Purpose of Document

The purpose of this document is to specify the details of the project. This includes who the development team is, whom the key stakeholders are, the objectives and boundaries of the project, the deliverables and schedule as well as the resources and risks associated with the project’s processes. This project plan is for the client and the development team as it will only provide a clear overview of the whole project as well as give detailed steps to completing the project.

## Background

Over one year ago, Dr. Philip 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. Philip Michael has brought the project to Swinburne University to make the advancement a reality.

In collaboration with Swinburne University, Dr. Philip 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 details about select points of the hand and fingers.

In continued analysis by Dr. Philip 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 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.

Fueling the drive for the project is the belief that the outcome can change an existing complicated and expensive process of detecting attributes of tremor into an easy to use, non-invasive and cheap process.

## Key Project Personnel

### Client

Dr. Philip Michael of the Royal Victorian Eye & Ear Hospital is the client who brought the project to Swinburne University of Technology.

### Stake holders

**Unit Convener:** Ryszard Kowalczyk

Professor Ryszard is the unit convenor for Software Team Project. As convenor, Professor Ryszard ultimately decides whether or not the work completed is satisfactory. Professor Ryszard also provides a secondary (elevated) point of contact for the team in the event that there is an issue that can’t be resolved internally.

**Project Supervisor:** Caslon Chua

Caslon Chua is the project supervisor for this project. Caslon decides whether or not the work completed is satisfactory. Caslon also provides a first point of contact for the team in the event that there is an issue that can’t be resolved internally.

**Swinburne Project Contact:** Mark Schier

As a client contact, Mark has an interest in the outcome of the project, as he would like to see the project succeed. Mark has domain knowledge that will be useful to the project.

**Development Team:** Daniel Corsaletti

As a student enrolled in Software Team Project, the success or failure of this project will directly affect the received mark for this unit.

Role: Documentation

**Development Team:** Joshua Stopper

As a student enrolled in Software Team Project, the success or failure of this project will directly affect the received mark for this unit.

Role: Developer and Team Leader

**Development Team:** Shengwei Li

As a student enrolled in Software Team Project, the success or failure of this project will directly affect the received mark for this unit.

Role: Documentation

**Development Team:** Minh Duc Nguyen

As a student enrolled in Software Team Project, the success or failure of this project will directly affect the received mark for this unit.

Role: Developer

**Development Team:** Tran Xuong Tran

As a student enrolled in Software Team Project, the success or failure of this project will directly affect the received mark for this unit.

Role: Documentation

### Project Supervisor, Team Leader and key Project Members

**Project Supervisor:** Caslon Chua

Email: cchua@swin.edu.au

**Project Client:** Philip Michael

Email: philip.michael@me.com

Mobile: 0468 756 960

**Project Member:** Daniel Corsaletti

Email: 6450458@student.swin.edu.au

Mobile: 0433 536 150

**Project Member:** Joshua Stopper

Email: 5571391@student.swin.edu.au

Mobile: 0430 714 887

**Project Member:** Shengwei Li

Email: 749999x@student.swin.edu.au  
 Mobile: 0420 478 750

**Project Member:** Minh Duc Nguyen

Email: 171001x@student.swin.edu.au

Mobile: 0412 179 265

**Project Member:** Tran Xuong Tran

Email: 6700691@student.swin.edu.au

Mobile: 0433 345 105

# Terms of Reference

## Goals

To develop software that will interface with the Leap Motion controller and detect attributes of tremor in the hand.

The target audience is varied. Firstly, the application developed will be for surgeons who want to test the level of tremor in their hand pre-operation. Additional goals that would hopefully be achieved are being able to use the application to visualize improvement in steadiness and movement in an individual’s hands and to hopefully be useful for patients with conditions like Parkinson’s.

## Objectives

* Software can capture and analyze movement of a hand, including measuring the frequency, velocity, acceleration and amplitude as outputs of data capturing.
* Software can validate valid hand position in order to start recording.
* Software is able to implement a noise filter on the data captured by the Leap Motion device, reducing noise in the movements and getting a more accurate reading

## Scope

The project is being developed as a proof of concept, to determine whether the an application is able to correctly determine a tremor in a user’s hands by using a Leap Motion device. The application should be able to identify the attributes of a tremor in a user; however this will not be used to give a rating on how steady a user’s hands are, instead the application will be used to give a visual representation to the idea of a user having varying tremors under different circumstances.

The final outcome of this project will allow a user to check the characteristics of the tremor in their hands in different situations. A completed test will return statistics about the velocity, frequency and amplitude of the tremor in each of the user’s fingers. The results of the tests are then output to the screen for the user to check analyze.

Primary development on this project will mainly consist of using the Leap Motion API to develop a JavaScript application that allows us to track movements of a user’s hands. Once the basic framework for the application is in place we must put a lot of effort into correctly analyzing a tremor in hand movement. With the API already available some aspects of this project may be finished relatively early, however the implementation of the noise filter could prove to be a big challenge.

We have planned to initially only gather this information from a user holding a steady hand over the leap motion sensor, however as per Philip’s request, if we find we have the necessary time and capabilities we may try to test for steadiness by other methods, like drawing a horizontal line with a pen and analyzing how straight its path remains.

## Critical Success Factors

* The implementation of our tremor calculation functionality must be correct. We must ensure that the functions that will determine the frequency, acceleration, amplitude and velocity are all working correctly and as intended
* The Leap Motion device should be easily used by surgeons and potentially patients, our application must make it easy to interface with. The aim of this project was to gather this data in a cheap and easy method, so it must get accurate data easily
* We need to maintain a great degree of communication with the client while we develop this project. Constant input and feedback from the client will ensure that this project is really suited to their needs

## Acceptance Criteria

For the client to accept this project they will have to determine whether the application we have created for them is an effective and accurate way of capturing tremors in a user’s hands. If the program is not able to effectively measure these tremors, whether by error of calculation or an issue with the Leap Motion device, then the conclusion our project will reach may prove that it is not possible to develop an application to correctly analyze tremors using a Leap Motion device. This does not mean the project will have failed as it is still determining whether it is possible or not.

If the project does effectively capture all of this data, it will still have to be easily useable by the client. The client already has methods of capturing this data, however these methods are expensive and difficult, meaning if our project can gather data easily it will be a success and can be accepted by the client.

# Establishment

## Processes, Procedures and Standards

In the project, we will use ISO as our standard. Based on ISO 13407 outlines four essential activities in a USER-Centered design project:

* Requirements gathering - Understanding and specifying the context of use
* Requirements specification - Specifying the user and organisational requirements
* Design - Producing designs and prototypes
* Evaluation - Carrying out user-based assessment of the site

Because this application is specially designed for Dr Philip Michael our usability testing will mainly revolve around him. We will rely on his feedback to determine how he would like the application to look and if he is able to use if effectively or not. We will also test in some environments that he or any other doctor or patient might use it in.

## Project Environment

Each team member is equipped to develop and contribute to the project. Each member has a computer and is able to access the freely available JavaScript API for Leap Motion development and the Leap Motion devices are being rotated between each team member, allowing everyone to have an input. The software will be available to run in an Internet browser so as long as the Leap Motion device has been installed, the developed application will run.

## Project team skill development requirements

Team members need to familiarize themselves with JavaScript development as it is the preferred development language for the team. Members of the development team will then be required to learn how to develop applications for Leap Motion using the Leap Motion API. We must also research a great deal about hand tremors to ensure we are able to identify and track them precisely.

# Activities, Deliverables and Capital Resources

## Deliverables

**Client deliverables:**

* Final application
  + The complete application. This will be able to be executed and used by the client on their own machine
* Source code
  + The source code will be supplied to the client so that modifications and enhancements could be completed by another developer in the future
* User manual
  + The user manual will be delivered so that a user has a reliable guide on how to use our application if help is needed
* Technical manual
  + The technical manual will be handed over to the client so that any future developers are able to use it to assist in their developing of the application

These deliverables will be handed over to our client in our final meeting at the end of the project.

**Supervisor deliverables:**

* Memorandum of understanding
  + The document outlining the understanding of the students and client involved in the project
* Project plan
  + This document will be given to our supervisor to show the processes and aims of our project
* Software Requirement Specification
  + This document will be given to our supervisor to outline the specifications of the application we are developing
* Test Plan
  + This document will be given to our supervisor to show the processes planned out for testing our application
* Test Report
  + This report will be given to the supervisor with detailed results about the testing of our application
* Final Project Report
  + A final report will be given to our supervisor, discussing the outcomes of the project and the variations we may take from the plan

These deliverables will be given to our supervisor throughout the semester, with everything required to be handed in after we have completed and presented our project.

## Activities and Tasks

|  |  |  |
| --- | --- | --- |
| Development phase | Life Cycle Process | Activity |
| Software life cycle model planning | 1. Define the software life cycle model | 1. Identify the candidate in software life cycle 2. Select project model |
| Project management | 1. Project initiation 2. Project monitoring and control 3. Software quality management 4. Documentation | 1. Project plan 2. Define the activities 3. Allocate the project resources 4. Set up environment 5. Risk analysis 6. Records 7. Set up check points 8. Quality plan 9. Define metrics 10. Potential improvement |
| Development | 1. Research 2. Requirement analysis 3. Design 4. System set up 5. Implementation | 1. Identify needs 2. Analysis functions 3. Development architecture 4. Customer requirement analysis 5. Define Development requirement 6. Interface design 7. Coding 8. Final project |
| Testing | 1. Test plan 2. Test case 3. Test result | 1. Draft plan 2. Use case 3. Match requirement 4. Function testing 5. Usability testing |
| Review Documentation | 1. Conduct documents | 1. Collect all the requirement for the final deliverable |

# Resources

## Organization and Structure

In our project, we will use functional grouping model for organization design. It’s a great idea for Single-program organizations and most frequently used by our clients. We didn’t need to manage across a large geographic area.

The purpose of this organization is that it develops depth of skills in a particular function, promotes functional innovation, scale and lowers costs. Each member is going to understand their core responsibilities, and to hold them accountable.

# Risks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rank | Description | Likelihood | Severity | Contingency |
| 1 | Lack of communication and misunderstand between team members and client | High | High | Create communication plans to improve the communication and understanding |
| 2 | Shortage of time resources due to the nature of the project | Low | Medium | Create project plan to monitor each stage |
| 3 | Lack of technological experiences | High | Medium | Assigned each member learning tasks to get familiar with the coding and structure |
| 4 | Final product does not meet requirement | Medium | High | Nil |
| 5 | Changes to requirements specification during coding | High | High | Pre-define the potential change parts and keep in touch with the client all the time |
| 6 | Specification takes longer than expected | Medium | Medium | Update the specification each week and keep everything on track |
| 7 | Module coding takes longer than expected | High | High | Assign the work to each member and prepare a back plan for the hardest part |
| 8 | Testing demonstrates in design | Low | Low | We had already prepare several version for testing and make sure the final delivery |
| 9 | User training is postponed | Low | Low | We had a manual instruction for all the potential users |
| 10 | Financial problems | Low | Low | All the member are easy to communicate and negotiate |
| 11 | Time for underestimated | High | High | The final delivery will be ahead of schedule |
| 12 | Software components reused | Medium | Medium | Note for the reused parts |
| 13 | File component cannot be processed | Medium | Medium | Keep the text file in right format |

**Mitigation strategies**

* Make sure our team has a meeting regularly. If one of members are not attend to the meeting, that member need to contact to another member to keep on track and understand the progress
* Have a good and efficient plan to allocate tasks and monitor the tasks at every time the tasks change.
* Have a plan that every members can learn to get understand the coding and structure of the project
* Ensure the final product will meet the client’s requirement, present the progress of our requirement to the client and obtain some feedback directly to verify that our project is going on the right way.

# Schedule

## Delivery Phases

### Overview

Project will be completed within a timeframe of 12 weeks starting from 12th August 2013 to 8th November 2013. There was 6 phase in total at each stage of deliverable

### Delivery Phase 1: Unit project

* Group meeting to introduce about each member skills and background
* Allocate roles and tasks
* Analyze project requirement
* Setup development environment
* Research about device API (LeapJS)
* Schedule meetings
* Collect user requirements (meeting with Mark and Philip)

### Delivery Phase 2: Planning and evaluation

* Analyze user requirements
* Design system interface
* Integrate LeapJS API into interface
* Identify tremor standard for assessment

### Delivery Phase 3: Development

* Record user tremor
* Represent captured data in figure
* Evaluate tremor with threshold (standard)
* Generate report as output

### Delivery Phase 4: Testing

* Test plan documentation
* Black box – unit testing
* Black box – integration testing
* White box – unit testing
* White box – integration testing
* System testing
* Usability testing

### Delivery Phase 5: Fixing bug and documentation

* Fixing bugs
* Regression testing
* User manual documentation

### Delivery Phase 6: Release

* User acceptance documentation
* Delivery project
* User sign off

## External Dependencies

* Discuss and get the feedback from client at each deliverable stage
* Meeting and discuss with supervisor to get feedback for the project at each stage

## Assumptions

* Getting the information that provided from client
* Project will be run on schedule
* Resources are available where needed
* Learning new technologies quickly
* Learn and understand the coding for project
* Understand how to use Leap Motion controller

## Project Time Line

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| |  |  |  |  | | --- | --- | --- | --- | | Task Name | Duration | Start | Finish | | **Unit Project** | **6 days** | **Mon 19/08/13** | **Mon 26/08/13** | | Group meeting to introduce about each member skills and background | 1 day | Tue 20/08/13 | Tue 20/08/13 | | Allocate roles and tasks | 1 day | Tue 20/08/13 | Tue 20/08/13 | | Analyze project requirement | 1 day | Tue 20/08/13 | Tue 20/08/13 | | Setup development environment | 4 days | Tue 20/08/13 | Fri 23/08/13 | | Research about device API (LeapJS) | 4 days | Tue 20/08/13 | Fri 23/08/13 | | Schedule meetings | 3 days | Tue 20/08/13 | Thu 22/08/13 | | Collect user requirements (meeting with Mark and Philip) | 2 days | Fri 23/08/13 | Mon 26/08/13 | | **Planning and evaluation** | **17 days** | **Fri 23/08/13** | **Mon 16/09/13** | | Analyze user requirements | 7 days | Fri 23/08/13 | Mon 2/09/13 | | Design system interface | 5 days | Mon 2/09/13 | Fri 6/09/13 | | Integrate LeapJS API into interface | 5 days | Fri 6/09/13 | Thu 12/09/13 | | Identify tremor standard for assessment | 7 days | Fri 6/09/13 | Mon 16/09/13 | | **Development** | **25 days** | **Mon 16/09/13** | **Fri 18/10/13** | | Record user tremor | 6 days | Mon 16/09/13 | Mon 23/09/13 | | Represent captured data in figure | 4 days | Tue 24/09/13 | Fri 27/09/13 | | Evaluate tremor with threshold (standard) | 10 days | Mon 30/09/13 | Fri 11/10/13 | | Generate report as output | 5 days | Mon 14/10/13 | Fri 18/10/13 | | **Testing** | **43 days** | **Mon 2/09/13** | **Wed 30/10/13** | | Test plan documentation | 6 days | Mon 2/09/13 | Mon 9/09/13 | | Black box – unit testing | 4 days | Mon 21/10/13 | Thu 24/10/13 | | Black box – integration testing | 4 days | Mon 21/10/13 | Thu 24/10/13 | | White box – unit testing | 4 days | Fri 25/10/13 | Wed 30/10/13 | | White box – integration testing | 4 days | Fri 25/10/13 | Wed 30/10/13 | | System testing | 5 days | Mon 21/10/13 | Fri 25/10/13 | | Usability testing | 5 days | Mon 21/10/13 | Fri 25/10/13 | | **Fixing bugs and documentation** | **10 days** | **Mon 21/10/13** | **Fri 1/11/13** | | Fixing bugs | 5 days | Mon 28/10/13 | Fri 1/11/13 | | Regression testing | 5 days | Mon 28/10/13 | Fri 1/11/13 | | User manual documentation | 5 days | Mon 21/10/13 | Fri 25/10/13 | | **Release** | **5 days** | **Mon 4/11/13** | **Fri 8/11/13** | | User acceptance documentation | 5 days | Mon 4/11/13 | Fri 8/11/13 | | Delivery project | 5 days | Mon 4/11/13 | Fri 8/11/13 | | User sign off | 5 days | Mon 4/11/13 | Fri 8/11/13 | |

# Budget

Estimate hour of each phrase

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phase | Phase name | Task | Estimated Hours (per member) | Actual Hours (per member) |
| 1 | Unit project |  | | |
|  | | Group meeting to introduce about each member skills and background | 0.5 |  |
| Allocate roles and tasks | 0.5 |  |
| Analyze project requirement | 2 |  |
| Setup development environment | 4 |  |
| Research about device API (leapjs) | 4 |  |
| Schedule meetings | 0.5 |  |
| Collect user requirements (meeting with Michael and Philip) | 4 |  |
| 2 | Planning and Evaluation |  | | |
|  | | Analyze user requirements | 2 |  |
| Design system interface | 2 |  |
| Integrate Leapjs API into the interface | 2 |  |
| Identify tremor standard for assessment | 2 |  |
| 3 | Development |  | | |
|  | | Record user tremor | 10 |  |
| Represent captured data in graph | 5 |  |
| Evaluate tremor with threshold (standard) | 20 |  |
| Generate report as output | 10 |  |
| 4 | Testing |  | | |
|  | | Test plan documention | 6 |  |
| Black box – unit testing | 2 |  |
| Black box – integration testing | 2 |  |
| White box – unit testing | 4 |  |
| White box – integration testing | 4 |  |
| System testing | 3 |  |
| Usability testing | 10 |  |
| 5 | Fixing bug and documentation |  | | |
|  | | Fixing bugs | 5 |  |
| Regression testing | 3 |  |
| User manual documentation | 5 |  |
| 6 | Release |  | | |
|  | | User acceptance documentation | 0.5 |  |
| Delivery project | 0.5 |  |
| User sign off | 0.5 |  |
|  |  |  |  |  |
|  |  | **Total** | 114 |  |

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