

PROJECT PLAN



Kinecticons

Version 2.2

May 07, 2013

TEXAS CHRISTIAN UNIVERSITY

Revision History

The following is a history of document revisions.

Version	Changes	Edited
Version 1.0	Initial draft	10/03/2012
Version 1.1	Revised initial draft, update formatting	10/11/2012
Version 1.2	Revised Version 1.1, updated schedule	11/28/2012
Version 1.3	Updated schedule and walk through dates, removed need for 2 Kinects.	12/12/2012
Version 1.4	Updated schedule for Developer Manual, User Manual, and Test Plan. Corrected copyright years. Used proper Revision Sign-Off text. Updated Project Name.	12/13/2012
Version 2.0	Updated to version 2.0	2/19/2013
Version 2.1	Updated formatting, schedule and readability.	4/22/2013
Version 2.2	Updated dates on schedule and walkthrough. Updated project roles.	5/07/2013

Revision Sign-off

By signing the following, the team member asserts that he has read the entire document and has, to the best of his knowledge, found the information contained herein to be accurate, relevant, and free of typographical error.

Name	Signature	Date
Davis Farish		
Scott Grace		
Kyle Sarantsev		
Chris Walton		
Chris Witter		

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1. Introduction

1.1. Purpose

The purpose of this document is to provide an overview of the planning for project Therapy Kinection. Specifically, this project plan identifies resources, dictates the development process, details milestones, sets team member responsibilities, as well as discusses the project management. Also included is some useful information for those that are not familiar with technical and specific terms.

1.2. Overview

The document contains the following sections:

Section 2 - Project Overview: Outlines the scope and objectives of the project as well as provides background information on the system and the Vail Sport Test.

Section 3 - Resource Specification: Identifies the necessary software, hardware and contacts for the project.

Section 4 - Project Management: Identifies the team members of project Therapy Kinection, their responsibilities, meeting times and location, as well as possible project risks.

Section 5 - Glossary Terms: Informs the reader of any technical terms and/or abbreviations used throughout this document.

2. Project Overview

2.1. Project Background

The Vail Sport Test is an evaluation used by physical therapists at Texas Health Ben Hogan Sports Medicine to judge if an athlete is ready to return to their sport following an Anterior Cruciate Ligament (ACL) injury. Currently, the test is subjective since the therapists cannot make precise measurements during certain portions of the test. The test consists of 4 components that allow the therapists to assess the athlete. Component 1 judges how well the patient can perform a single-leg squat for 3 minutes. Component 2 evaluates a lateral bound for 90 seconds. Component 3 evaluates forward jogging for 2 minutes. Lastly, Component 4 evaluates the patient while backward jogging for 2 minutes. Each test is done with a band around the leg or waist of the athlete to simulate resistance one might experience while playing the sport.

Mike Macko and Craig Garrison, physical therapists from Texas Health Ben Hogan Sports Medicine, want a more objective way to measure therapy routines. The Microsoft Kinect provides a way to do this by using infrared sensors on the device. Kinect is a motion sensing input device developed by Microsoft. Using technology developed by Microsoft, the Kinect can track up to 20 joints on the human body in 3-dimensional space at 30 Hz. The Kinect can also support facial recognition, and voice commands.

2.2. Scope and Objectives

The main goal of project Therapy Kinection is to develop a tool for physical therapists at Ben Hogan Sports Medicine to easily and objectively evaluate patients during the Vail Sport Test. This will be accomplished using a Kinect unit connected to a computer. Real time feedback will be provided during the test, to help patients correct their movements during the test. Data from the test and patient information will also be stored in a database for the physical therapists to view at a later time.

3. Resource Specification

3.1. Software

Programming Environment

- Windows 7 64 bit SP 1
- Visual Studio 2010 Ultimate
- Kinect Studio V 1.6.0
- Developer Toolkit Browser V 1.6.0
- Microsoft SQL Server Compact Edition

Support Environment

- Tortoise SVN 1.7.10
- CoreFTP Lite
- Adobe Dreamweaver CS 5
- Microsoft One Note 2012
- GroupMe

Other Software

- Camtasia
- Adobe Photoshop CS 5
- Microsoft Word 2010
- Microsoft PowerPoint 2010

3.2. Hardware

- 1 Kinect for Windows unit
- Quartet Idea Share Board
- PC running Windows 7
 - 2-core 2.66 GHz
 - 2 GB RAM
 - Dedicated power USB

3.3. Contacts

Mike Macko: mikemacko@texashealth.org

Craig Garrison: jamesgarrison@texashealth.org

Texas Health Ben Hogan Sports Medicine: 800 5th Ave., Suite 150, Fort Worth, TX 76104

4. Project Management

4.1. Milestones and Deliverables

Project Proposal	02 Oct, 2012
PSE	11 Oct, 2012
Project Plan V1.0	18 Oct, 2012
Skeleton Website	19 Oct, 2012
Requirements Documentation V1.0	23 Oct, 2012
Design Documentation V1.0	07 Dec, 2012
Iteration 1	13 Dec, 2012
Skeleton GUI, measuring angles, inferring joint data	
Iteration 2	24 Jan, 2013
First two components operational	
Iteration 3	28 Feb, 2013
Last two components operational	
Iteration 4	28 Mar, 2013
Testing, GUI cleanup	
NTASC	13 Apr, 2013
SRS	19 Apr, 2013
Final Presentation	02 May, 2013
Complete All Documents	07 May, 2013
Final Product DVD	11 May, 2013

4.2. Team Member Roles and Responsibilities

Chris Walton: Team Lead, General Programmer

Davis Farish: Graphics and Web Designer, Database Programmer

Scott Grace: Lead Kinect Programmer, User Interface Programmer

Kyle Sarantsev: Testing Lead, Documentation Lead

Chris Witter: Lead Database Programmer, Jack of All Trades

4.3 Monitoring and Reporting Mechanisms

4.3.1. MEETINGS

Meetings take place every week on Friday at noon at Tucker Technology Center. Additional meetings occur when necessary. Meeting times are subject to change based on schedules of team members.

4.3.2. COMMUNICATION

The team has a GroupMe set up that allows for a convenient, quick way to talk to the entire group at once through text messages. Email will also be used for transferring project related data as well as communication with the therapists.

4.3.3. REQUIREMENTS CONTROL

To ensure that the team meets all of the requirements for the project software developers will reference requirement documents during development. The lead tester as well as assistant testers will also test all aspects of the system after each iteration. The group will have a discussion and approve or disapprove of a requirements change based on estimated time to complete the new requirement. If requirements are changed, extra work and meetings will take place to accommodate the changes in the documents and the product.

4.3.4. WEEKLY ACTIVITY REPORTS

Weekly reports will be sent to the scribe by midnight each Friday. The reports will specify everything accomplished during the week and tasks for the next week. The webmaster will post the reports on the website within 48 hours of receiving them.

4.3.5. WALK-THROUGHS

Project Proposal	02 Oct, 2012
PSE	11 Oct, 2012
Project Plan V1.0	18 Oct, 2012
Skeleton Website	19 Oct, 2012
Requirements Documentation V1.0	28 Oct, 2012
Design Documentation V1.0	07 Dec, 2012
Iteration 1	13 Dec, 2012
Complete GUI, measuring angles, and inferring joint data	
First Test	10 Jan, 2013
Second Test	22 Jan, 2013
Third and Fourth Test	26 Feb, 2013
NTASC	13 Apr, 2013
SRS	19 Apr, 2013
Final Presentation	01 May, 2013
Documents	07 May, 2013

4.4. Risk Management

4.4.1. RISK ANALYSIS AND PLANNING

Contingency	Probability/Severity	Mitigation Strategy
Not Finishing	Low/Critical	Starting early, work hard.
Kinect not sensitive enough	Low/Critical	Talk with Craig to see what can be accomplished and do as much of the sports test as we can. Get sample data to verify the Kinect will work as intended.
People get sick	Moderate/Low	Constant communication and having under-study so that no one person is project critical.
Team members showing irresponsibility	Low/Critical	Constant communication with team, dividing tasks, so no one person is overwhelmed or critical, and in dire circumstances talk to Dr. Payne for suggested solutions.

5. Glossary of Terms

Anterior Cruciate Ligament (ACL) - One of the 4 major ligaments of the human knee.

C# - Programming language developed by Microsoft. The language is used for Kinect and general Windows Application programming.

Dynamic knee valgus - The bending angle of the knee inward, past the big toe, towards the opposite leg during the exercise.

Knee flexion - The angle the knee makes while bending the leg.

Microsoft Kinect - Kinect is a motion sensing input device by Microsoft for the Windows PCs. Based around a webcam-style add-on peripheral, it enables users to control and interact with PC through a natural user interface using gestures and spoken commands. The Kinect also recognizes 20 joints on the human body at a capture rate of 30 Hz.

Microsoft Visual Studio 2010 - An IDE that is used for many different types of programming languages, primarily languages developed by Microsoft.

Patella extending past big toe - During the leg squat the patient cannot have their knee pass in front of their big toe during the squat.

Upright trunk - Defined by Craig Garrison as the trunk of the patient being straight up and less than 30 degrees off center in any direction.

Vail sport test - A physical therapy test, co-developed by Craig Garrison, that is used to determine if the patient has regained the proper strength in his or her ACL to return to normal physical activity. A research paper concerning the test can be found here:

http://www.texashealth.org/workfiles/THR%20System/Ben_Hogan/Garrison%202012.pdf

Appendix A: Vail Sport Test

VAIL SPORT TEST™

Name: _____ Date: _____

MD: _____ DX: _____ Mo. S/P: _____

Total Points: _____/54 * Patient must score 46/54 on the test in order to pass

Single Leg Squat (goal: 3 minutes)

1. Knee flexion angle between 30 and 60°

Yes (1) No (0)

2. Patient performs repetitions without dynamic knee valgus

*knee valgus = patella falls medial to the great toe

Yes (1) No (0)

3. Patient avoids locking knee during extension

Yes (1) No (0)

4. Patient avoids patella extending past the toe during knee flexion

Yes (1) No (0)

5. Patient maintains upright trunk during knee flexion

Yes (1) No (0)

Minute 1 _____ Minute 2 _____ Minute 3 _____

Single Leg Squat Total Points: _____/15

• If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1 minute timeframe).

Lateral Bounding (goal: 90 seconds)

1. Knee flexion angle is 30° or greater during landing

Yes (1) No (0)

2. Patient performs repetitions without dynamic knee valgus

*knee valgus = patella falls medial to the great toe

Yes (1) No (0)

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3. Patient performs repetitions within landing boundaries

Yes (1) No (0)

4. Landing phase does not exceed 1 second in duration

Yes (1) No (0)

5. Patient maintains upright trunk during knee flexion

Yes (1) No (0)

1st 30 sec _____ 2nd 30 sec _____ 3rd 30 sec _____

Lateral Bounding Total Points _____/15

- If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 30 second timeframe).

Forward Jogging (goal: 2 minutes)

1. Knee flexion angle between 30 and 60°

Yes (1) No (0)

2. Patient performs repetitions within landing boundaries

Yes (1) No (0)

3. Patient performs repetitions without dynamic knee valgus

* knee valgus = patella falls medial to the great toe

Yes (1) No (0)

4. Patient avoids locking knee during extension

Yes (1) No (0)

5. Landing phase does not exceed 1 second in duration

Yes (1) No (0)

6. Patient maintains upright trunk during knee flexion

Yes (1) No (0)

Minute 1 _____ Minute 2 _____

Forward Jogging Total Points _____/12

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- If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1 minute timeframe).

Backward Jogging (goal: 2 minutes)

1. Knee flexion angle between 30 and 60°

Yes (1) No (0)

2. Patient performs repetitions within landing boundaries

Yes (1) No (0)

3. Patient performs repetitions without dynamic knee valgus

* knee valgus = patella falls medial to great toe

Yes (1) No (0)

4. Patient avoids locking knee during extension

Yes (1) No (0)

5. Landing phase does not exceed 1 second in duration

Yes (1) No (0)

6. Patient maintains upright trunk during knee flexion

Yes (1) No (0)

Minute 1 _____ Minute 2 _____

Backward Jogging Total Points _____/12

- If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1 minute timeframe).