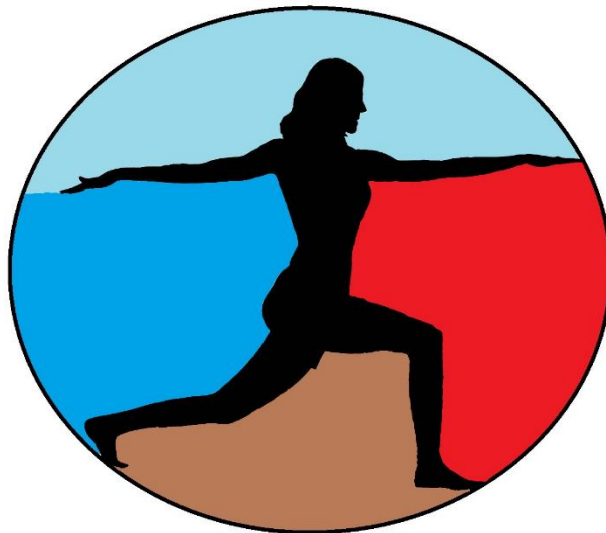


# Elemental Kinection



## Project Plan

Version 2.1

2 May 2016

## Revision History

All revision history listed below.

Version	Change Summary	Date
1.0	<ul style="list-style-type: none"><li>• Initial Draft</li></ul>	13 October 2015
1.1	<ul style="list-style-type: none"><li>• Format changes</li><li>• Proofreading</li><li>• Additional background information.</li></ul>	25 October 2015
2.0	<ul style="list-style-type: none"><li>• Adjusted timeline</li><li>• Added and removed software components</li><li>• Added to the glossary</li><li>• Minor content changes</li></ul>	22 April 2016
2.1	<ul style="list-style-type: none"><li>• Minor reformatting</li></ul>	2 May 2016

## Revision Sign Off

The following asserts that all team members have read the document and assert that the information contained within this document is complete and correct.

Name	Signature	Date
Samuel Kent		
Jack Kempner		
Nathan Johnson		
Aakash Tyagi		

## Table of Contents

Revision History .....	i
Revision Sign Off.....	ii
Table of Contents .....	iii
<b>1 Introduction .....</b>	<b>1</b>
1.1 Purpose .....	1
1.2 Overview .....	1
<b>2 Project Overview .....</b>	<b>2</b>
2.1 Scope and Objectives .....	2
2.2 Project Background .....	2
<b>3 Resource Specification .....</b>	<b>3</b>
3.1 Software.....	3
3.2 Hardware .....	3
3.3 Contacts.....	3
<b>4 Project Management .....</b>	<b>4</b>
4.1 Milestones and Deliverables .....	4
4.2 Team Member Roles and Responsibilities .....	5
4.3 Monitoring and Reporting Mechanisms .....	6
4.3.1 Meetings .....	6
4.3.2 Communication .....	6
4.3.3 Requirements Control .....	6
4.3.4 Weekly Activity Reports.....	6
4.3.5 Walk-throughs.....	6
4.4 Risk Management.....	7
4.4.1 Risk Identification and Analysis.....	7
4.4.2 Risk Planning and Management.....	7
<b>5. Glossary of Terms .....</b>	<b>8</b>

# **1 Introduction**

## **1.1 Purpose**

This document provides a plan for the completion of the Elemental Kinection project and all its supporting elements. This entails a summary of the project, preliminary schedule, required resources, deliverables, risks, and an overview of team management.

## **1.2 Overview**

**Section 2** - Provide primary objectives of the project and background to the project.

**Section 3** - Specifies the necessary software, hardware, and contacts for the project.

**Section 4** - Specifies the team members and provides a tentative schedule. Additionally, it details our work process. Finally, it identifies risks and details plans to mitigate these risks.

**Section 5** - Provides a glossary of terms used in this document and in the project.

## **2 Project Overview**

### **2.1 Scope and Objectives**

This project's objective is to create a set of programs for physical therapists and their patients. Therapists will be able to conduct therapy sessions remotely with the use of the Kinect v2 and a website. Using these, therapists will be able to upload new exercises and assign exercises for a patient to complete in a session. The patients will have access to an engaging desktop application that automatically retrieves sessions for the patient to perform and sends the results of those sessions back to the therapist.

### **2.2 Project Background**

Various physical disability are an increasingly evident problem caused in part due to the aging baby boomer population. According to the WHO Media Centre, over a billion people suffer from some sort of physical disability. Physical therapists help people combat these disabilities and regain their former strength, but they face several challenges.

Since recovery requires a long period of time, therapists assign patients a list of exercises to finish at home. However, many patients either dislike performing exercises or are bored by them, so they end up not performing the sessions that the therapist has assigned.

With the development of the Microsoft Kinect, it is possible to track a person's movements while performing exercises and recognize when a person has performed that particular exercise. Additionally, it lets patients receive direct instruction on how to perform an exercise properly, without needing to be at the therapist's clinic.

Several development teams have already constructed programs that perform this service; however, these programs are limited to a set series of exercises. Elemental Kinection aims to provide an engaging exercise environment, while also letting therapists create and add new exercises to the program.

### **3 Resource Specification**

#### **3.1 Software**

- Amazon Web Services
- Camtasia
- Django
- Kinect Plugin for Unity 5
- Microsoft Kinect SDK v2 for Windows
  - Visual Gesture Builder
  - Kinect Studio
- Microsoft Visual Studio 2015
- Microsoft Windows 8
- MySQL
- Nginx
- Slack
- Unity 5 Personal edition

#### **3.2 Hardware**

- Desktop PC, with a USB 3.0 port.
- Microsoft Kinect v2
- Screen with minimum of resolution of 1360x768

#### **3.3 Contacts**

- Dr. Donnell Payne - [d.payne@tcu.edu](mailto:d.payne@tcu.edu)

## 4 Project Management

### 4.1 Milestones and Deliverables

Milestone/Deliverable	Date
Project Plan V1.0	October 13, 2015
Skeleton Website	October 13, 2015
Project Support Environment	October 15, 2015
Requirements Documentation V1.0	November 18, 2015
Design Documentation V1.0	December 3, 2015
Iteration I	December 10, 2015
Faculty Presentation	February 2, 2016
Iteration II	February 22, 2016
SRS Abstract	March 3, 2016
Iteration III	March 26, 2016
SRS Poster	March 31, 2016
SRS	April 8, 2016
NTASC	April 16, 2016
Iteration IV	April 24, 2016
User Manual	April 24, 2016
Developer Guide	April 28, 2016
Final Presentation	April 28, 2016
Documents and DVD	May 3, 2016

#### *Iteration I*

Core functionality of application for guiding and measuring exercises is complete.

Extent of Unity contribution is decided and environment is created. Beginning stages of integration with Kinect are established.

Web-based technologies for the database and website are researched and selected at this point. Core schema of the database is determined. Basic integration of website and database is complete.



### *Iteration II*

Application for guiding and measuring exercises is in the stage of being combined with Unity for a complete package for users.

Method for how therapist will store sessions in the database is finalized.  
Interface for therapist to upload and store sessions and new exercises is finalized.

Work begins on linking local applications into the web-based database.

### *Iteration III*

Therapist is able to load new exercises and sessions to web-based site/database.

Application is able to update with these sessions and exercises to serve the user.

Application is able to transmit results.

### *Iteration IV*

A customer ready product is produced.

If a client has emerged at this point extensive cooperative testing is conducted.

General testing and tweaking is finished at this point.

## **4.2 Team Member Roles and Responsibilities**

<b>Team Member Name</b>	<b>Responsibilities</b>
Samuel Kent	Tech Lead
Jack Kempner	Testing Lead
Nathan Johnson	Documentation Lead
Aakash Tyagi	Website Architect

### **4.3 Monitoring and Reporting Mechanisms**

#### **4.3.1 Meetings**

Meetings shall be held from 12pm to 2pm every Friday in the Senior Design lab in the Tucker Technology center. Additional meetings shall be scheduled as necessary.

#### **4.3.2 Communication**

Intra-team communication will be accomplished primarily through face-to-face discussion, phone texts, email, and the online messaging program Slack. Communication with the client will be primarily face-to-face. File sharing will be accomplished through the use of Slack or the internal website.

#### **4.3.3 Requirements Control**

Project requirements will be thoroughly discussed with the client, Dr. Payne. Once these requirements are determined, they will not be altered, unless otherwise determined by the group and Dr. Payne. All documentation will be amended to reflect the new requirements.

#### **4.3.4 Weekly Activity Reports**

These reports will reflect the progress of the project and will be posted at the following location on our website.

<http://brazos.cs.tcu.edu/1516elementalkinection/wars.html>

#### **4.3.5 Walk-throughs**

We will walk our client through our progress at times scheduled by and agreed upon by both the client and the team. Internal walkthroughs will be held during the week on times agreed upon by team members.

## 4.4 Risk Management

### 4.4.1 Risk Identification and Analysis

Risk	Probability/Severity
Team member becomes sick for week or more	High/Moderate
Issues with accuracy of the hardware	Moderate/Moderate
Two of the technologies or services involved do not integrate	Moderate/High
Kinect is stolen or broken	Low/High

### 4.4.2 Risk Planning and Management

Risk	Mitigation
Team member becomes sick for week or more	Each member shares core concepts of what they are working on to prevent islands of expertise
Issues with accuracy of the hardware	Emphasize exercises that perform well and document those that do not
Two of the technologies or services involved do not integrate	Perform proper prior research to ensure two technologies are compatible
Kinect is stolen or broken	Keep the Kinect in the lab and keep the lab locked

## 5. Glossary of Terms

*Amazon Web Services* – A secure cloud services platform for compute power, database storage and content delivery.

*Django* - Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design.

*Kinect Studio* – Kinect Studio is a utility application that you can use to preview Kinect sensor array data, record and play eXtended Event File (XEF) files, control the timeline position, and select 2D or 3D views. Kinect Studio APIs enable you to develop custom tools, to record and play back body data using XEF files.

*Kinect v2* - A motion sensing input devices by Microsoft for PCs. Based around a webcam-style add-on peripheral, it enables users to control and interact with their console/computer without the need for a game controller, through a natural user interface using gestures

*Kinect for Windows SDK 2.0* – A set of developer tools, tutorials, and an API reference put out by Microsoft for the development of Kinect v2 on Windows 8, 8.1 and Windows 10.

*MySQL* – A popular Open Source SQL database management system, developed, distributed, and supported by Oracle Corporation

*Nginx* - A free, open-source, high-performance HTTP server and reverse proxy, as well as an IMAP/POP3 proxy server. It provides load-balancing, security controls and other monitoring tools.

*Slack* – A collaboration tool that allows for instant messaging, file sharing and other customizable plug-ins.

*Telerehabilitation*- the delivery of rehabilitation services over telecommunication networks and the internet.

*Unity* - a cross-platform game engine developed by Unity Technologies and used to develop video games for PC, consoles, mobile devices and websites.

*USB 3.0* - The third major version of the Universal Serial Bus (USB) standard for interfacing computers and electronic devices. Among other improvements, USB 3.0 adds the new transfer rate referred to as *SuperSpeed USB (SS)* that can transfer data at up to 5 Gbit/s (625 MB/s), which is about ten times as fast as the USB 2.0 standard.

*Visual Gesture Builder* - Visual Gesture Builder (VGB) generates data that applications use to perform gesture detection at run time. By using a data-driven model, VGB shifts the emphasis from writing code to building gesture detection that is testable, repeatable, configurable, and database-driven.