



Requirements

VERSION 4.0

Cognitive Contact

This document outlines the requirements and use cases for the TheraTouch project of the Senior Design team Cognitive Contact.

Texas Christian University

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Revision Sign-off

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

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Revision History

VERSION	DATE	CHANGES
Version 1.0	10/20/2011	Initial Draft.
Version 2.0	02/19/2012	Minor maintenance and updates.
Version 3.0	04/05/2012	Added new activities and did maintenance.
Version 4.0	04/24/2011	Final Draft.

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1. Introduction

1.1 Purpose

This document describes the requirements and scope of the TheraTouch system. It also identifies the use cases, prototypes, and components of our system.

1.2 Target Audience

The target audience for this document is the development team from Texas Christian University, representatives from THR, who helped define and will ultimately use the product developed, and project sponsors.

1.3 Project Scope

The scope of TheraTouch is to provide a system that allows users to perform cognitive and neuromuscular rehabilitation. The system will provide users with different activities and keep track of rehabilitation progress by storing the activity options and results into a database. The system will have the ability to keep track of multiple users and will be able to store one current session for a user. It will also keep track of previous sessions for viewing.

1.4 References

Glenrose Rehabilitation Hospital/University of Alberta
<http://www.youtube.com/watch?v=YTQpQjvyHIA>

Using a Multi-touch Tabletop for Upper Extremity Motor Rehabilitation. M Annett, et.al.
<http://webdocs.cs.ualberta.ca/~wfb/publications/C-2009-OzChi.pdf>

Cooks Children's in Ft Worth
<http://techpsych.blogspot.com/2009/08/microsoft-surface-multi-touch.html>

Media Integration and Communication Center (MICC)
<http://www.micc.unifi.it/projects/multi-user-interactive-table-for-neurocognitive-and-neuromotor-rehabilitation/>

Frog & Toad memory video
<http://sdr.seas.harvard.edu/sites/default/files/frogs.wmv>

Hands, Tables, and Groups Make Rehabilitation
<http://webdocs.cs.ualberta.ca/~wfb/publications/C-2010-Annett.pdf>

Harvard's SEAS SDR lab
<http://sdr.seas.harvard.edu/content/multi-touch-rehabilitation-intervention-tools>

Surface Overview

<http://www.microsoft.com/surface/en/us/default.aspx>

Surface Development Downloads

<http://www.microsoft.com/surface/en/us/downloads10.aspx>

Surface Development Guide

<http://msdn.microsoft.com/en-us/windows/hh241326.aspx>

Tests and diagnosis of Aphasia

<http://www.mayoclinic.com/health/aphasia/DS00685/DSECTION=tests-and-diagnosis>

Cognitive games as therapy for children with FAS

<http://dl.acm.org/citation.cfm?id=1836897>

Design Tangible Tabletop Interfaces for Patients in Rehabilitation

<http://sunsite.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-415/paper9.pdf>

iPad Games Help People with Autism and Cerebral Palsy

<http://digital-outcasts.com/?p=207>

1.5 Overview

Section 2 provides the overall description of the requirements.

Section 3 provides general system architecture.

Section 4 provides the external interface requirements.

Section 5 provides the functional requirements of our system.

Section 6 provides the non-function requirements of our system.

Section 7 provides the domain requirements of our system.

Section 8 provides a glossary of commonly used terms in our project.

Appendixes will provide all of our use cases and prototypes.

2. Overall Description

2.1 Product Perspective

The TheraTouch system is an extension of the Healing Touch project that was completed as the Senior Capstone Project by the Computer Science Department seniors in 2011. It consists of a database backend, a web application named TheraLink, and activities programmed on the Microsoft Surface that collect data through therapy. It is meant to aid in therapy and rehabilitation, specifically targeting cognitive and neuromuscular therapy.

2.2 Product Functions

2.2.1 User and Session Setup

Staff can create and edit users for the TheraTouch software using the TheraLink web application. The staff can also create sessions by picking a user and identifying specific activities and activity options for the session. A user can have only one unfinished session and staff will be able to view all previous sessions.

2.2.2 Rehabilitation

The system will allow users to perform cognitive and neuromuscular rehabilitative activities. This is done by using a multi-touch device, which allows for more than one point of contact at a time, so users can use a wide range of motions with their hands and various objects to perform rehabilitative activities.

2.2.3 Reporting

The system will store activity results and provide staff with access to the activity results to monitor user progress.

2.3 User Characteristics

TheraTouch is targeted specifically for users performing cognitive and neuromuscular rehabilitation. It is meant to exercise abilities that are limited or can no longer be performed properly. TheraLink is used by staff to monitor and track the progress of their users.

2.4 Constraints

2.4.1 Limited time

The project is limited to the time frame of the TCU academic year. The group members are also not available to give full-time attention to the project, due to other classes and employment.

2.4.2 Budget

The Microsoft Surface was provided by a donation from RadioShack. The Brazos server and staff workstation was provided by TCU.

2.5 Operating Environment

TheraTouch runs on a Microsoft Surface v1.1 running Microsoft Windows Vista.

The database runs on a workstation running Microsoft Windows Server 2008 R2 with Microsoft SQL Server 2008

TheraLink is a web application hosted on a web server running IIS.

2.6 Assumptions and Dependencies

Microsoft SQL Server 2008 R2

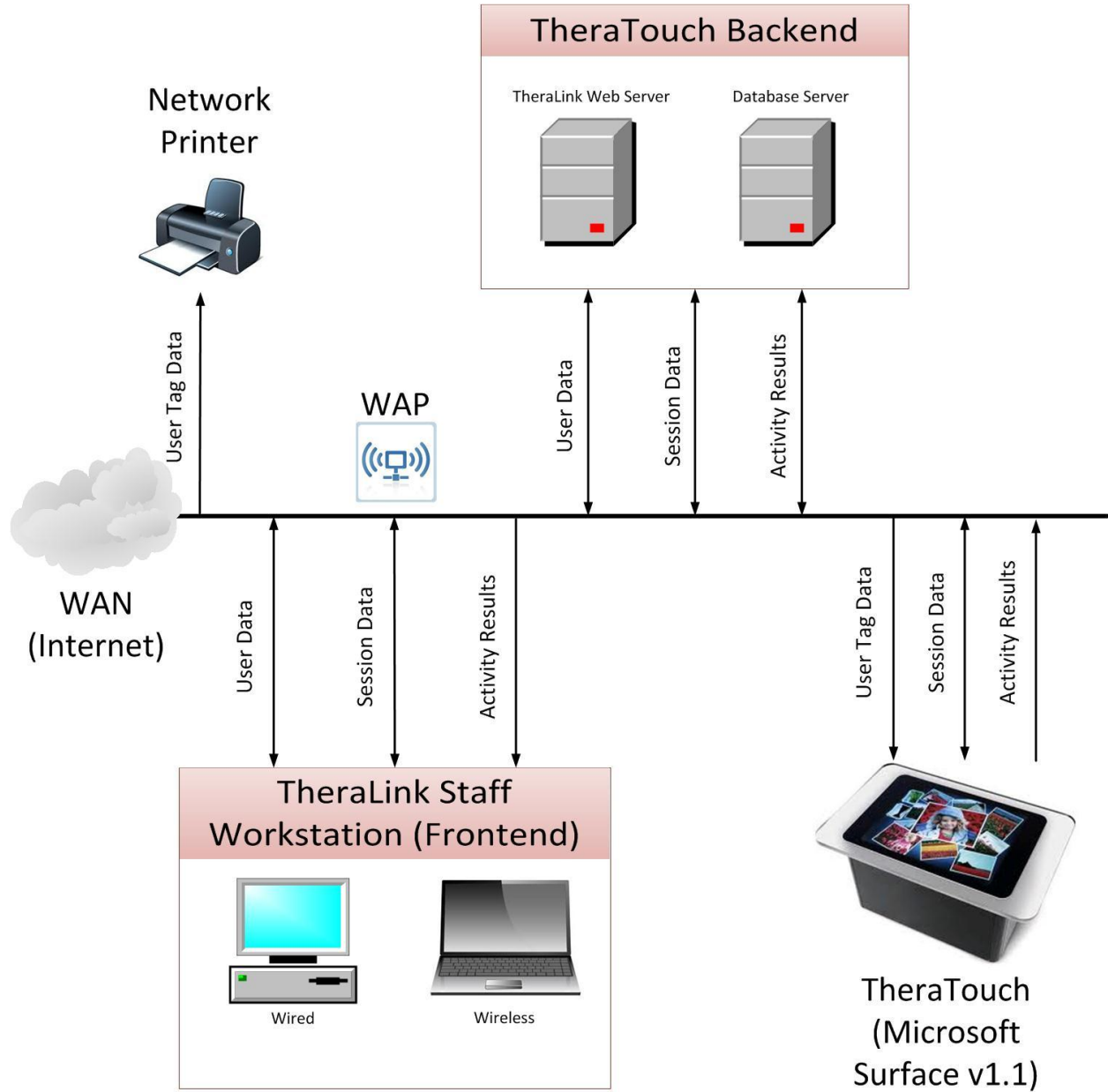
Microsoft Surface v1.1 running TheraTouch

Staff workstation connected to TheraLink web application

Staff to guide a new user through the system

3. System Architecture

3.1 Project Environment



4. External Interface Requirements

4.1 User Interfaces

4.1.1 Microsoft Surface

The user interface for the Microsoft Surface needs to be designed for a friendly, easy user experience. Clear, concise instructions will need to be shown before each activity as well as easy-to-use navigation buttons. There is a prototype of this in Appendix B.

4.1.2 Workstation with Web Application

The UI will have a login page for staff and the users will be maintained by an Admin Functions page that is permission-protected. The original admin will be inserted into the database through a setup procedure. This admin will then be able to create new users with admin privileges from the Admin Functions page.

4.2 Hardware Interfaces

4.2.1 Brazos Server Workstation

The Brazos web server and database are stored on a workstation in the senior design lab with Windows Server 2008. These will be used for development only. A database and web server will need to be provided by THR after development at TCU is completed.

4.3 Software Interfaces

4.3.1 Microsoft SQL Server Management Studio

This is the software used to access the database from outside of our system.

4.4 Communication Interfaces

4.4.1 Database

The database will be set up to communicate with TheraTouch on the Microsoft Surface and with TheraLink on the web server.

4.4.2 TheraLink

TheraLink will communicate with the database to add new users, modify existing users, create new sessions, modify existing sessions, create new reports, and modify existing reports.

4.4.3 Surface

The Surface will communicate with the database by storing activity data after the completion of each activity in a session and storing session completion info at end of the session. The Surface will also set session options by pulling activities and activity options from the database.

5. Functional Requirements

5.1 General Requirements

5.1.1 GEN-1

A generic framework shall be constructed to allow for easy incorporation of new activities.

5.1.2 GEN-2

The TheraTouch Surface application and TheraLink web application shall be able to communicate with the database to store and retrieve information.

5.1.3 GEN-3

The user shall be able to perform rehabilitative activities on the Surface.

5.1.4 GEN-4

Activity results shall be stored for later retrieval, analysis, and reporting.

5.2 TheraLink

5.2.1 STF-1

Staff shall log into TheraLink with a username and password stored in an ASP.NET Membership database generated by the .NET 4.0 framework.

5.2.2 STF-2

Staff logins shall be secured and have appropriate safeguards against unauthorized attempts at gaining access to the database.

5.2.3 STF-3

Staff shall be able to register users into the database and print an ID card for the new user. Extra, personal information on the ID card will not be saved in the database.

5.2.4 STF-4

A staff member with a manager permission level shall be able to create new staff users on an Admin Functions page. The manager will also be able to view and edit current staff users as well as manage the two roles: manager and clinician.

5.2.5 STF-5

Staff shall be able to view and edit user data. The user's status (Active or Inactive) will be the only editable information.

5.2.6 STF-6

Staff shall be able to create a new session of activities for a user. A session definition specifies the activities to be performed, the options set for each activity, and whether or not the activities must be performed in a specified order.

5.2.7 STF-7

Staff shall be able to copy all activities and their respective options from a previous session.

5.2.8 STF-8

Staff shall not be able to modify a completed activity by editing the options or reordering it.

5.2.9 STF-9

Staff shall be able to view and edit the session definitions. Staff can edit the activity options, change the order of the activity in the session, set the session as locked or unlocked, and mark the session as closed.

5.2.10 STF-10

Staff shall be able to export all of the session activity results and options from the database to a file.

5.2.11 STF-11

Staff shall have the ability to create or modify reports.

5.2.12 STF-12

Staff shall have the ability to generate reports.

5.2.13 STF-13

The web app shall handle any errors that occur with database connectivity.

5.3 Database Requirements**5.3.1 DBR-1**

The database shall allow for the TheraTouch application to connect to it using SQL Server Authentication.

5.3.2 DBR-2

The database shall allow for the TheraLink web application to connect to it to add/modify users, add/modify/delete sessions, and add/modify/delete reports.

5.3.3 DBR-3

The database shall store activity results after the completion of each activity in a session.

5.3.4 DBR-4

The database shall allow only one "current"/"open" (see glossary) session per user.

5.3.5 DBR-5

The database shall flag a session as complete after all activities in a session have been completed. After the completion of an activity, the Surface will check if all other activities in the session are complete and then flag the session as complete if they are.

5.3.6 DBR-6

The database shall store a TheraID that can be matched with a user's TheraTouch ID card number.

5.3.7 DBR-7

The database shall store user demographic information from the staff workstation in accordance with HIPAA regulations regarding private health information.

5.4 TheraTouch Requirements**5.4.1 SUR-1**

The Surface shall confirm that a current session has been set up with TheraLink before a user logs in.

5.4.2 SUR-2

The Surface shall allow a user to log in with a printed TheraTouch ID card.

5.4.3 SUR-3

The Surface shall only show the activities of the user's current session.

5.4.4 SUR-4

The Surface shall allow a user to practice an activity while a session is in progress.

5.4.5 SUR-5

The Surface shall have a demo for each activity before the start of that activity.

5.4.6 SUR-6

The Surface shall save activity results after the completion of each activity.

5.4.7 SUR-7

Staff shall be able to log a user out at the end of a session.

5.4.8 SUR-8

The Surface shall allow the user to press a quit button to exit the session. All activities played up to that point have been saved.

5.4.9 SUR-9

At the completion of a session, the CurrSessionID for the completed session shall be set to null in the database table UserInfo.

5.4.10 SUR-10

The Surface shall allow a staff member to pause an activity during the session with their admin tag.

5.5 Activities

5.5.1 ACT-1

ATM shall implement Total Number, and Path Type as activity options. Total Number will be an even number option between 2 and 10 and Path Type will be a choice between number/letter or shape/shape.

5.5.2 ACT-2

ATM shall return Time Elapsed, Shapes Found, Correct Path, Patients Path, Possible Paths, Correct Paths, and Accuracy. Time Elapsed will be returned in seconds, Shapes Found will be an integer, Correct Path consists of pairs indicating the correct path to take, Patient Path consists of pairs indicating which path that the patient took, Possible Paths will be an integer, Correct Paths will be an integer, and Accuracy will be the percentage of correct path segments.

5.5.3 ACT-3

During ATM, the user shall draw a path by selecting objects in order from smallest to largest while following the pattern (i.e. small circle > small triangle > medium circle > medium triangle > large circle > large triangle...). Activity is complete when Submit button is pressed.

5.5.4 ACT-4

BlockBash shall implement Difficulty as the only activity option. Difficulty will be either easy, medium, or hard, where easy consists of randomly placed blocks, medium is a filled in tangram, and hard is the outline of a tangram.

5.5.5 ACT-5

BlockBash shall return Time Elapsed, Average Error, Correct Blocks, and Accuracy. Time Elapsed will be returned in seconds, Average Error will be the average error of all correct blocks in inches, Correct Blocks will be the number of blocks that are fairly close to their targets, and Accuracy will be the percentage of correct blocks to total blocks.

5.5.6 ACT-6

During BlockBash, the user shall match three-dimensional blocks placed in the bottom tray to shapes shown on the screen based upon color, shape, and rotation. Medium and Hard levels of activity present a tangram that the user shall solve using blocks placed in bottom tray. Activity is complete when Submit button is pressed.

5.5.7 ACT-7

BubblePop shall implement Bubble Size and Number of Bubbles as activity options. Bubble Size will range from x-small to x-large, and Number of Bubbles will be a multiple of 5 between 10 and 30.

5.5.8 ACT-8

BubblePop shall return Time Elapsed and Accuracy. Time Elapsed will be returned in seconds and Accuracy will be the percentage of bubble hits compare to all hits registered by the Surface.

5.5.9 ACT-9

During BubblePop, the user shall use their finger to “pop”, or touch, only the bubbles on the screen. Activity is complete when all bubbles have been successfully popped

5.5.10 ACT-10

CardMatch shall implement Grid Size, Shape Types, and Timer Enabled as activity options. Grid Size will be 2x2, 4x4, or 6x6, Shape Types will be either fruits, basic shapes, or random, and Timer Enabled will be a boolean.

5.5.11 ACT-11

CardMatch shall return Time Elapsed, Accuracy, Total Tries, and Number of Wrong Selections. Time Elapsed will be returned in seconds, Accuracy will be correct tries over total tries, Total Tries will be an integer, and Number of Wrong Selections will be an integer.

5.5.12 ACT-12

During CardMatch, the user shall select 2 cards at a time while attempting to find a match. Cards revealed with matching images will disappear. Activity is complete when all matches have been found and all cards have disappeared.

5.5.13 ACT-13

FindTheWay shall implement no activity options.

5.5.14 ACT-14

FindTheWay shall return no results.

5.5.15 ACT-15

During FindTheWay, the user shall navigate the character through the selected floor plan using the arrow buttons. The therapist can assign goals for the user to achieve as they move around the screen (i.e. “Find the fastest way to the bathroom”). Activity is complete when the Quit button is pressed.

5.5.16 ACT-16

Maze shall implement Difficulty as the only activity option. Each difficulty (Easy, Medium, and Hard) will have 10 different mazes.

5.5.17 ACT-17

Maze shall return the Time Elapsed and the number of Wall Hits when the activity finishes. Time Elapsed will be returned in seconds and the number of Wall Hits will be an integer count.

5.5.18 ACT-18

During Maze, the user shall draw a path to solve the maze displayed. Activity is complete when Finish is reached.

5.5.19 ACT-19

Metronome shall implement Speed and Total Time as activity options. Speed is an integer between 1 and 6 and Total Time is a multiple of 15 between 15 and 120.

5.5.20 ACT-20

Metronome shall return Time Elapsed, Accuracy, Correct Hits, Wrong Hits, and Total Buttons Created. Time Elapsed will be returned in seconds, Accuracy will be correct hits over total hits on the Surface, Correct Hits will be an integer, Wrong Hits will be an integer, and Total Buttons Created will be an integer.

5.5.21 ACT-21

During Metronome, the user shall tap dots as they cross into the dotted circle at the bottom of the screen. Dots appear in steady rates set prior to start. If user correctly hits a dot within the target area, the hot air balloon will rise. If a dot is missed or hit too early/late, the hot air balloon will gently fall. Activity is complete when the pre-defined time limit has been reached.

5.5.22 ACT-22

OddOneOut shall implement Number of Tiles, Number of Rounds, Shape Types, and Timer Enabled as activity options. The Number of Tiles will be an integer between 4 and 8, the Number of Rounds option will be an integer between 3 and 10, Shapes Types will be either shapes or random, and the Timer Enabled option will either be true or false.

5.5.23 ACT-23

OddOneOut shall return Time Elapsed, Accuracy, Number of Tries, and Number of Misses. Time Elapsed will be returned in seconds, Accuracy will be correct selections over total selections, Number of Tries will be an integer, and Number of Misses will be an integer.

5.5.24 ACT-24

During OddOneOut, the user shall select the image that does not properly belong within the set of images they are presented. Activity is complete when previously set number of rounds has been reached.

5.5.25 ACT-25

PathTrack shall implement Size, Turns, Rounds, Length, and Show Errors as activity options. Size options include 4x4, 5x5, and 6x6, Turns is an integer between 0 and 5, Rounds is an integer between 1 and 8, Length is an integer between 5 and 10, and Show Errors is either yes or no.

5.5.26 ACT-26

PathTrack shall return the Time Elapsed, Path, Misses, Accuracy, and Incorrect Tiles. Time Elapsed will be returned in seconds, Path will be a list of integers, Misses will be

an integer, Accuracy will be the percentage of correct tiles over total selected tiles, and Incorrect Tiles will be an integer.

5.5.27 ACT-27

During PathTrack, the user shall recreate the path displayed for them on the following screen containing a blank grid. Activity is complete when all rounds are submitted.

5.5.28 ACT-28

SeekShape shall implement Number of Distinct, Total Shapes, and Shape Type as activity options. Number Distinct will be an integer value between 2 and 5, Total Shapes will be a multiple of 5 between 10 and 50, and Shape Type will be either shape, letter, or number.

5.5.29 ACT-29

SeekShape shall return Time Elapsed, Shapes Found, Wrong Hits, Quad 1-4, Total Shapes, and Accuracy. Time Elapsed will be returned in seconds, Shapes Found will be an integer, Wrong Hits will be an integer, Quad 1-4 will be four values with each value representing the ratio of correct selections in a quadrant (Lower/Upper, Left/Right), Total Shapes will be an integer, and Accuracy will be the percentage of total shapes found to total hits.

5.5.30 ACT-30

During SeekShape, the user shall identify and select all instances of the shape originally displayed to them. Activity is complete when Submit button is pressed.

5.5.31 ACT-31

Sequence shall implement Words, Highlight, and Sequence Type as activity options. Words shall be a boolean, Highlight shall be a boolean, and Sequence Type will be either get dressed, mail a letter, make pasta, or brush teeth.

5.5.32 ACT-32

Sequence shall return Time Elapsed, Accuracy, and Number of Attempts. Time Elapsed will be returned in seconds, Accuracy is [Undefined], and Number of Attempts will be an integer.

5.5.33 ACT-33

During Sequence, the user shall drag images to their appropriate place in the ordered set. Once submitted, user will have the opportunity for additional attempts until correct. Activity is complete when the sequence is correctly submitted.

5.5.34 ACT-34

ShapeMatch shall implement Sequence Length, Number of Shapes, and Shape Type as activity options. Sequence Length is an integer between 5 and 25, Number of Shapes is an integer between 2 and 5, and Shape Type is either Shapes, Numbers, or Letters.

5.5.35 ACT-35

ShapeMatch shall return the Time Elapsed, Accuracy, and the Number Correct. Time Elapsed will be returned in seconds, Accuracy will be number correct over total tries, and the Number Correct will be an integer.

5.5.36 ACT-36

During ShapeMatch, the user shall identify if the previous object displayed matches the current object displayed using the “Match” and “Not a Match” buttons. Activity is complete when sequence is finished.

5.5.37 ACT-37

VendingMachine shall implement Display Total, Number of Rounds, and Limited Supply as activity options. Display Total is either on or off, Limited Supply is either on or off, and Number of Rounds will be an integer between 4 and 9.

5.5.38 ACT-38

VendingMachine shall return Time Elapsed, Accuracy, and Change. Time Elapsed will be returned in seconds, Accuracy is rounds with exact change over total rounds, and Change is a monetary amount for each round.

5.5.39 ACT-39

During VendingMachine, the user shall drag money from the money tray to purchase items from the vending machine using exact change. Activity is complete when the number of rounds is reached.

5.5.40 ACT-40

WhatTimeIsIt shall implement Type and Number of Rounds as activity options. Type is either digital to analog or analog to digital and Number of Rounds is an integer between 4 and 10.

5.5.41 ACT-41

WhatTimeIsIt shall return Time Elapsed and Accuracy. Time Elapsed will be returned in seconds and Accuracy will be number of rounds over total attempted rounds.

5.5.42 ACT-42

During WhatTimeIsIt, the user shall set either a digital or analog clock based upon the time displayed on the opposite clock. Activity is complete when the number of rounds has been reached.

5.5.43 ACT-43

WipeTheTable shall implement Color, Wipe, Ordered, Number of Blobs, Wait Time, and Fade Time as activity options. Color will be a boolean, Wipe will be a boolean, Ordered will be a boolean, Number of Blobs will be an integer between 5 and 25, Wait Time will be an integer between 1 and 5 and Fade Time will be an integer between 5 and 20.

5.5.44 ACT-44

WipeTheTable shall return Time Elapsed, Accuracy and False Hits. Time Completed will be returned in seconds, Accuracy will be correct wipes over total wipes and False Hits will be returned as an integer count.

5.5.45 ACT-45

During WipeTheTable, the user shall use a sponge or hand to wipe away blobs that appear on the screen in chronological order (if ordered option specified). Activity is complete when the numbers of blobs defined have been successfully wiped away.

6. Non-Functional Requirements

6.1 Product Requirements

6.1.1 PRD-1

The activities developed shall be “usable” for the intended client, e.g. clients and staff of THR.

6.1.2 PRD-2

TheraLink will need to be accessible from the staff workstation’s web browser while connected to the THR network.

6.1.3 PRD-3

TheraLink will be developed in ASP.NET and will run on an IIS server.

6.2 Organizational Requirements

6.2.1 ORG-1

The project shall implement TCU and THR branding.

6.2.2 ORG-2

The activities shall be developed for the Microsoft Surface v1.1.

6.3 External Requirements

6.3.1 EXR-1

The TheraTouch system will be set up under the supervision of the THR IT department.

6.3.2 EXR-2

The project shall meet HIPPA regulations on privacy and security.

7. Domain Specific Requirements

7.1 TCU Senior Design Lab

7.1.1 LAB-1

TheraTouch shall run on the Microsoft Surface v1.1 machines in the Senior Design Lab. TheraLink shall be accessible from web browsers on the workstations set up in the Senior Design Lab.

7.2 Texas Health Resources Clinic

7.2.1 THR-1

TheraTouch shall run on the Microsoft Surface v1.1 machine at THR. TheraLink shall be accessible from a workstation set up at THR.

7.2.2 THR-2

All database interaction will be limited to the TheraTouch and TheraLink applications.

8. Glossary of Terms

Classification – Each activity will have a classification that is defined by THR.

Clinician – The staff member that is expected to assist users during a session.

Closed/Previous – These two words can be used interchangeably to describe a user's past sessions.

Cognitive – Cognitive refers to a scientific term that means mental processes, cognition. Thus, cognitive therapy is therapy that helps exercise the mental ability of people.

Demo – The image shown before an activity that demonstrates how to perform the activity.

Freeplay – An activity mode in which no information is collected or saved to the database. No user login required.

HIPAA – Health Insurance Portability and Accountability Act of 1996, it protects health insurance coverage for workers and their families when they change or lose their jobs.

Microsoft Surface – A multi-touch tabletop computing device that uses gesture recognition to allow users interact with the machine

Neuromuscular – Neuromuscular refers to the ability of the brain to control the body's muscles through the nervous system. Neuromuscular therapy is exercising the brain's ability to do this after it has been damaged, most likely through some sort of injury.

Open/Current – A TheraTouch user can only have one open or current session. These words can be used interchangeably to describe a user's active session.

Session – A set of pre-determined activities on the Surface that will be used during patient therapy. A session is defined for a user by the TheraLink web application. A TheraTouch user can only have one "current"/"open" session. All "previous" sessions are "closed" sessions.

Staff – A category that contains clinicians and managers.

TheraID – An auto-generated number assigned to each user by the TheraLink web application.

TheraLink – The clinician web application that is used to control the TheraTouch framework.

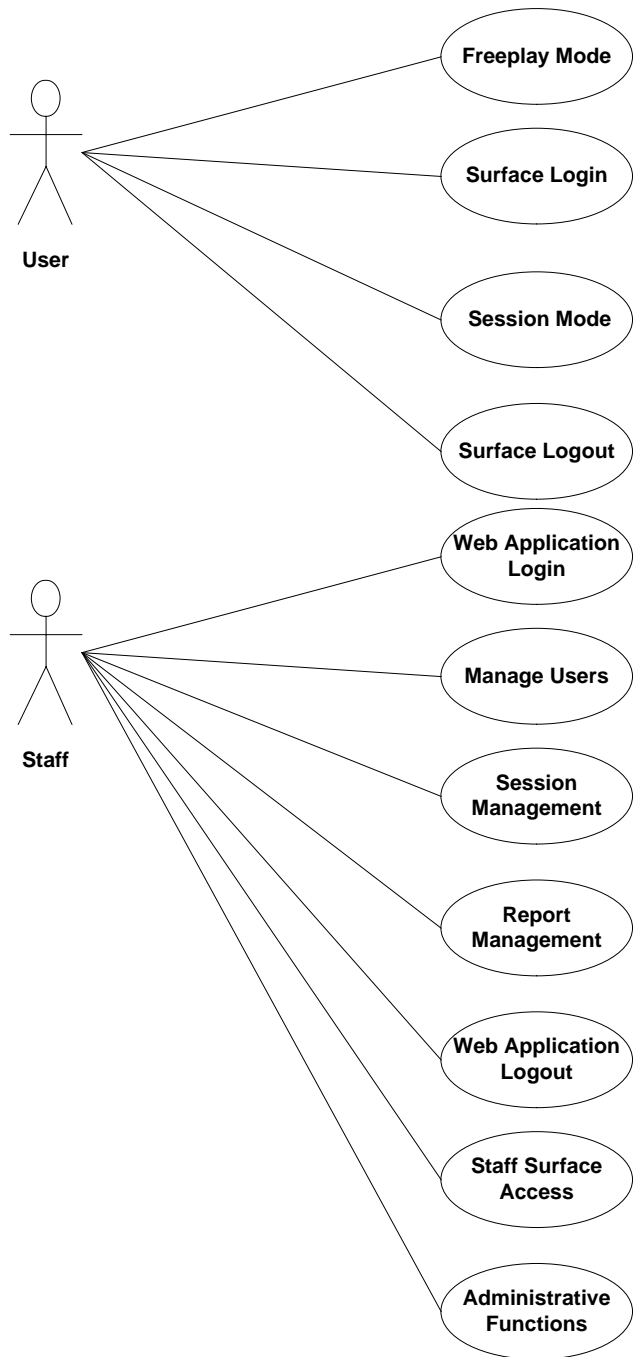
TheraTouch – The TCU Computer Science 2012 Senior Design Project and framework.

TheraTouch ID Card – A card printed for each staff/user set up in TheraLink. The card displays basic information as well as the byte code tag needed to login to the Surface.

THR – Texas Health Resources, the client for this project.

User – The actor that will be on the Surface, completing activities.

Appendix A: Use Case Models



Web Application Log In

Web Application Log In	
Actors	<p>Staff:</p> <ul style="list-style-type: none"> • Manager • Clinician
General Goals	To authenticate the staff member's login credentials. This will allow access to the staff web application.
Pre-Conditions	The user is not logged in, but has network connectivity to the server for the web application.
Triggers	The user attempts to view any page within the web application when they are not already logged in, or they navigate directly to the login screen.
Course of Events	<ol style="list-style-type: none"> 1. The login page is displayed to the user. 2. The user enters their username and password. 3. The web application verifies the login information with the database. <ol style="list-style-type: none"> a. If the login information is valid, the requested web page is displayed to the user. If the requested web page is the login screen, the default web application page is displayed to the user. b. If the login information is not valid, an error message is displayed to the user. The user remains at the login screen.
Alternate Paths	If the server can't connect to the database, an error message is displayed.
Post Conditions	The requested page within the web application is displayed to the user. If the requested page was the login page, then the default web page is loaded.

Manage Users

Manage Users	
Actors	Staff: <ul style="list-style-type: none"> • Manager • Clinician
General Goals	To add and view user information as well as print identification tags.
Pre-Conditions	A valid database connection must be present. The staff member must be logged into the web application with the appropriate permissions.
Triggers	The staff member selects the User Management option from the navigation menu.
Course of Events	A set of options is displayed to the user including an Add New User button and a View User button. If the Add New User button is pressed: <ol style="list-style-type: none"> 1. Add User page is loaded. 2. The staff member shall enter demographic information, initial scores, and assessments. 3. The staff member shall press the print tag button to generate a new identification tag. 4. Appropriate user information will be saved to the database. 5. The staff member shall choose to Save & Return. If the user's tag was not printed, a warning message is displayed to the staff member with the option to print the tag. Otherwise, the staff member is returned to the Manage Users screen. If the View User button is pressed: <ol style="list-style-type: none"> 1. View User page is loaded. 2. The staff member enters a TheraID corresponding to the user they wish to view. 3. Demographic information about the user is displayed

Alternate Paths	If the user presses the cancel button from the Add User page, they are returned to the Manage Users page. All modified information is discarded.
Post Conditions	The database will be updated accordingly with any information that the staff member saved.

Session Management

Session Management	
Actors	<p>Staff:</p> <ul style="list-style-type: none"> • Manager • Clinician
General Goals	To add sessions, edit sessions, and view session data.
Pre-Conditions	<p>The staff member must be logged in to the web application and have valid credentials for session management.</p> <p>A valid database connection must be present.</p>
Triggers	The Session Management option is selected from the navigation menu.
Course of Events	<p>If the Add Session button is pressed:</p> <ol style="list-style-type: none"> 1. The Add Session page shall be loaded. 2. The staff can add activities and select options for the activities. 3. Configure session options such as locking the order of activities. <p>If the View Session button is pressed</p> <ol style="list-style-type: none"> 1. The View Session page shall be loaded and information displayed about that session. 2. If the Edit button is pressed, the displayed information can be edited such as modifying or removing activities, adjusting the activity order, or configuring Session options.
Alternate Paths	<p>The Add Session option will not be visible if the user already had a Current Session defined.</p> <p>Editing of non-current sessions is disabled, these can only be viewed.</p>
Post Conditions	The database will be updated accordingly with any information that the staff member saved.

Report Management

Report Management	
Actors	<p>Staff:</p> <ul style="list-style-type: none"> • Manager • Clinician
General Goals	Report Management allows staff members run reports to view information collected from sessions in TheraTouch.
Pre-Conditions	A valid database connection must be present.
Triggers	Manage Reports is selected from the navigation menu in the <i>TheraLink</i> web application.
Course of Events	The Report Management page is loaded which displays the reports that can be generated.
Alternate Paths	No alternate paths exist.
Post Conditions	No post conditions exist.

Web Application Log Out

Web Application Log Out	
Actors	Staff: <ul style="list-style-type: none"> • Manager • Clinician
General Goals	To log off a staff member from the web application.
Pre-Conditions	A staff member must first be logged in to the web application.
Triggers	The staff member shall press the “Logout” button.
Course of Events	The web application shall return to the Login screen.
Alternate Paths	No alternative paths exist.
Post Conditions	The web application shall show the Log In page. If the staff member wishes to access a page within the web application, they must login again.

Staff Surface Access

Staff Surface Access	
Actors	<p>Staff:</p> <ul style="list-style-type: none"> • Manager • Clinician
General Goals	The staff member has the ability to control certain actions during a session, such as pause an activity, or stop an activity without saving data.
Pre-Conditions	<p>A User shall be logged into a session.</p> <p>A staff member shall have an identification tag and sufficient credentials.</p>
Triggers	A Staff member places a tag on the Surface unit.
Course of Events	<ol style="list-style-type: none"> 1. Staff member places an identification tag on the Surface. 2. If an activity is in progress it will pause. 3. A menu screen will appear. <p>If a user is in an activity, the staff member can resume or quit the activity.</p>
Alternate Paths	There are no alternate paths.
Post Conditions	<p>If stop activity is selected, the Surface will return to the session menu screen.</p> <p>If resume activity is selected, the Surface will resume the current activity.</p>

Administrative Functions

Administrative Functions	
Actors	Staff: <ul style="list-style-type: none"> • Manager
General Goals	The Manager shall be able to add, edit, and remove other staff member accounts.
Pre-Conditions	The Manager must be logged into the web application.
Triggers	The Manager selects the Administrative Functions option from the navigation menu.
Course of Events	<p>A list of current staff is displayed, along with options to Add Staff, Edit Staff, and Remove Staff.</p> <p>If the Manager wishes to add a staff member:</p> <ol style="list-style-type: none"> 1. The Manager selects the Add Staff option. 2. The Add Staff page will be displayed. The Manager fills out the username, full name, password, and staff access level (Clinician or Manager). 3. The Manager selects the Save & Return option. The created staff member is added to the database, and the Manager is returned to the Administrative Functions page. <p>If the Manager wishes to edit a staff member:</p> <ol style="list-style-type: none"> 1. The Manager selects a staff member from the Administrative Functions page. 2. The Manager clicks the Edit Staff option. 3. A page is displayed with the current information for the selected staff member, along with the ability to edit the staff member's role. <p>If the Manager wishes to remove a staff member:</p> <ol style="list-style-type: none"> 1. The Manager selects a staff member from the Administrative Functions page. 2. The Manager selects the Remove Staff option. 3. A confirmation page is displayed to the Manager with the option to Confirm Deletion. If they choose Confirm Deletion, the Manager is returned to the Administrative Functions page and the staff member is removed from the database.

	<p>If the Staff Member wishes to Reprint Tags:</p> <ol style="list-style-type: none">1. The staff member selects the user (by TheraID) that they wish to reprint tags for.2. The staff member is taken to a page similar to the Add User page where they add the appropriate information, and then print the tag.
Alternate Paths	<p>A Manager cannot remove their own. If they try, then an error message will be displayed.</p> <p>A Manager can press the cancel button while adding staff, editing staff, or deleting staff, which will return the manager to the Administrative Functions page. All modified data will be discarded.</p>
Post Conditions	<p>There is no post condition.</p>

Surface Login

Surface Login	
Actors	User
General Goals	To authenticate a user's ID tag and verify they have a session available.
Pre-Conditions	The user must be set to active in the database, have a valid identification tag, and have a current open session defined. The Surface must be at the main menu screen.
Triggers	A user identification tag shall be placed on the Surface at the main menu screen.
Course of Events	Surface validates identification tag and checks to see if a valid session exists for the user.
Alternate Paths	If there is no network connection to the database, an error message is displayed. If the identification tag is not valid, an error message is displayed. If no session is defined, an error message is displayed.
Post Conditions	The session home screen is loaded for the user.

Session Mode

Session Mode	
Actors	User
General Goals	Present a pre-defined set of activities to the user for the purposes of evaluating their performance. Information gathered from playing the activities is saved to the database.
Pre-Conditions	The user is logged in and at the session menu screen.
Triggers	A valid Surface Login is the trigger to start the session.
Course of Events	<p>The session menu screen is displayed to the user. It contains the set of activities predefined for the session. The user can choose to play an activity from the session, practice an activity from the session, or logout of the session.</p> <p>If the user wishes to practice an activity:</p> <ol style="list-style-type: none"> 1. The user selects an activity from the displayed set of activities. Only the current activity is selectable if the staff member has specified that the activity order be locked. 2. The user presses the Practice button. 3. The activity is launched in practice mode. The options in this mode are identical to the options that have been specified for this activity by the staff. 4. After the activity has completed, or the user chooses to quit the activity, they are returned to the session menu screen. <p>If the user wishes to play an activity:</p> <ol style="list-style-type: none"> 1. The user selects an activity from the displayed set of activities. Only the current activity is selectable if the staff member has specified that the activity order be locked. 2. The user presses the Launch button. 3. The activity is launched in Session Mode. Session Mode collects user's activity results. 4. After the activity is completed, information gathered from Session Mode is saved to the database. 5. The user is returned to the session menu screen. The activity that was just played is disabled so that the user can no longer play that activity. <p>If the user wishes to logout:</p> <ol style="list-style-type: none"> 1. The user presses the logout button. 2. The framework is returned to the main menu screen.

Alternate Paths	<p>If at any time database connectivity is lost during a session, the session will end, an error message be displayed to the user, and the user will be returned to the main menu screen.</p> <p>While the activity is running in session mode, an authorized staff member may use their tag to interrupt the session. This falls under Staff Surface Access use case.</p>
Post Conditions	<p>After the user is logged out, the user is returned to the main menu screen.</p>

Surface Log Out

Surface Log Out	
Actors	User, Staff Member
General Goals	To log out the user from Session Mode.
Pre-Conditions	A user is logged into Session Mode.
Triggers	<p>There are several possible triggers:</p> <ul style="list-style-type: none"> • All activities in the session have been completed. • The user selects the logout button from the session menu screen. • The network connection is lost during a session.
Course of Events	<p>If all the activities in the session have been completed, the database is updated to reflect that the session is complete, a notification message is displayed, and the user is logged out from the session menu screen, and returned to the main menu screen.</p> <p>If all the activities have not been completed the framework is returned to the main menu screen and no information is sent to the database</p>
Alternate Paths	No alternate paths exist.
Post Conditions	The main menu screen shall be displayed with no user logged in.

Freeplay Mode

Freeplay Mode	
Actors	User
General Goals	To let the user play any activity for an unlimited time or until the activity finishes. No information is stored in the database.
Pre-Conditions	The framework needs to be running on the Surface, and the framework should be at the main menu screen. No database connectivity or login is required.
Triggers	The user selects Freeplay from the main menu screen.
Course of Events	<ol style="list-style-type: none"> 1. A list of all available activities is displayed to the user on the Freeplay menu screen. 2. The user selects an activity from this screen, and then can choose to play that activity. 3. Options for the selected activity can be changed within the application both on the home screen as well as from within the activity's menu screen 4. The activity can be played until the user selects the quit button from within the activity's menu screen. 5. The user is returned to the Freeplay menu screen. They can choose to play another activity, or exit to the main menu screen.
Alternate Paths	There are no alternate paths.

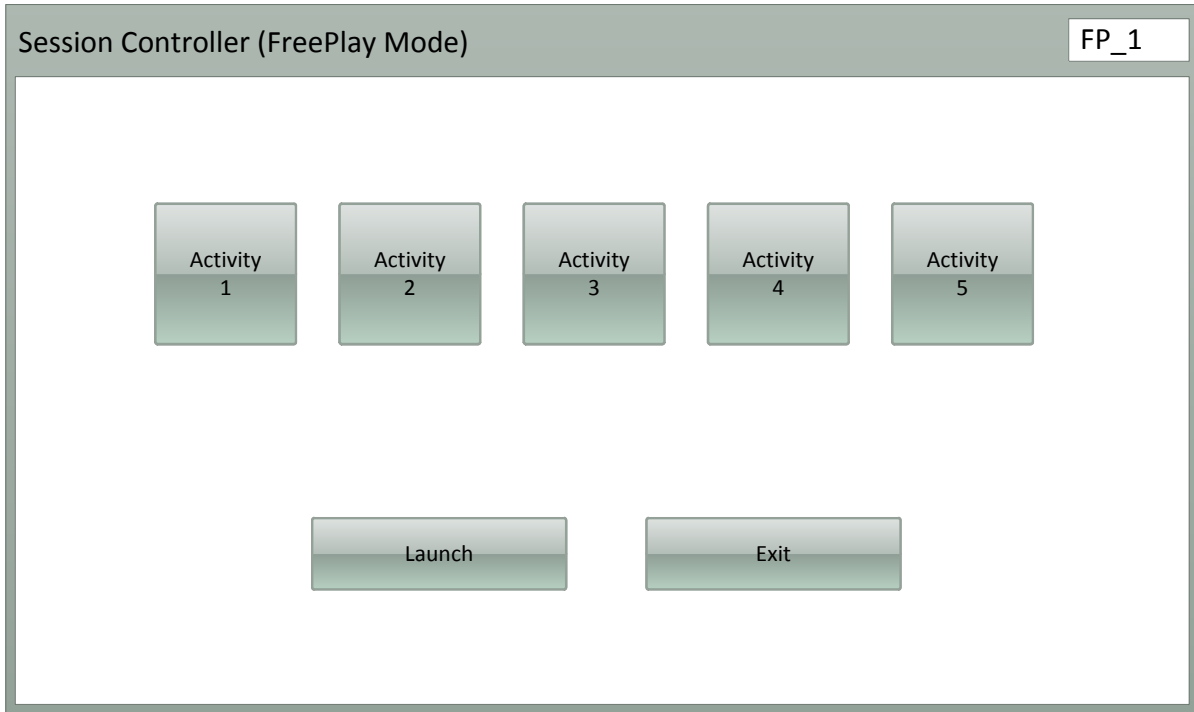
Post Conditions

The Surface will return to the main menu screen. No information is saved to the database.

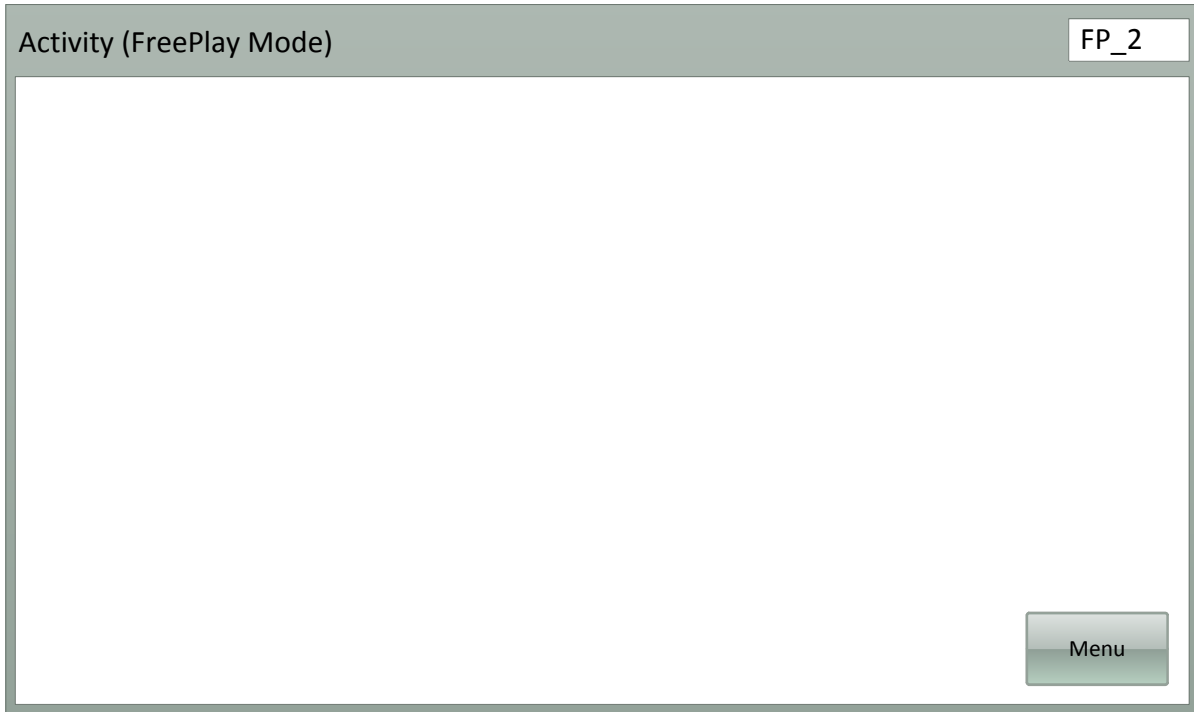
Appendix B: User Interface Prototype – Surface



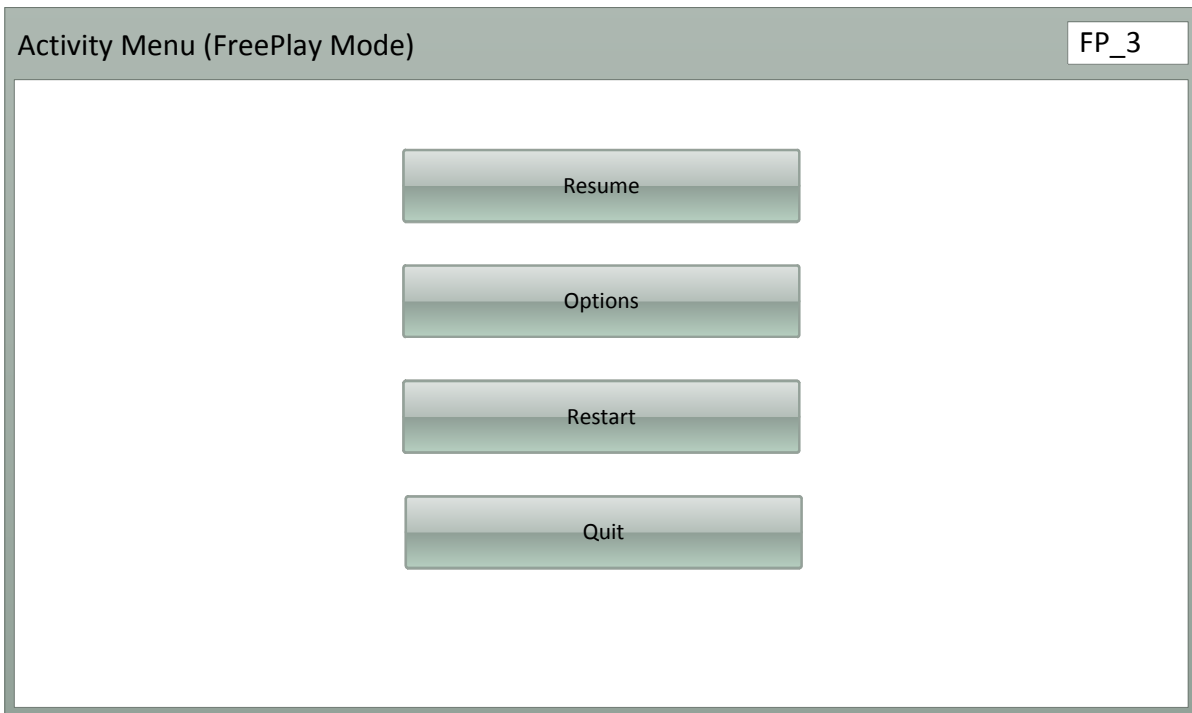
- FreePlay Button → FP_1
- Valid User/Patient Surface Tag = Login → S_1



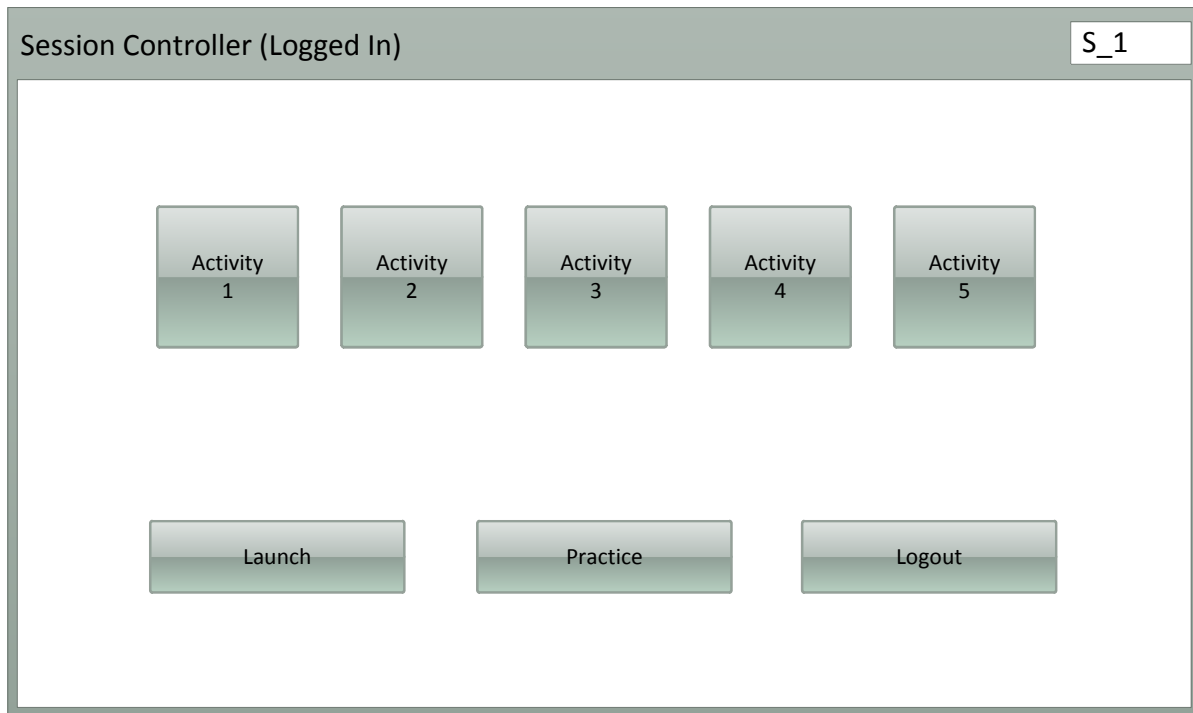
- Select Activity → Press Launch Button
- Launch Button → FP_2
- Exit Button → MM_1



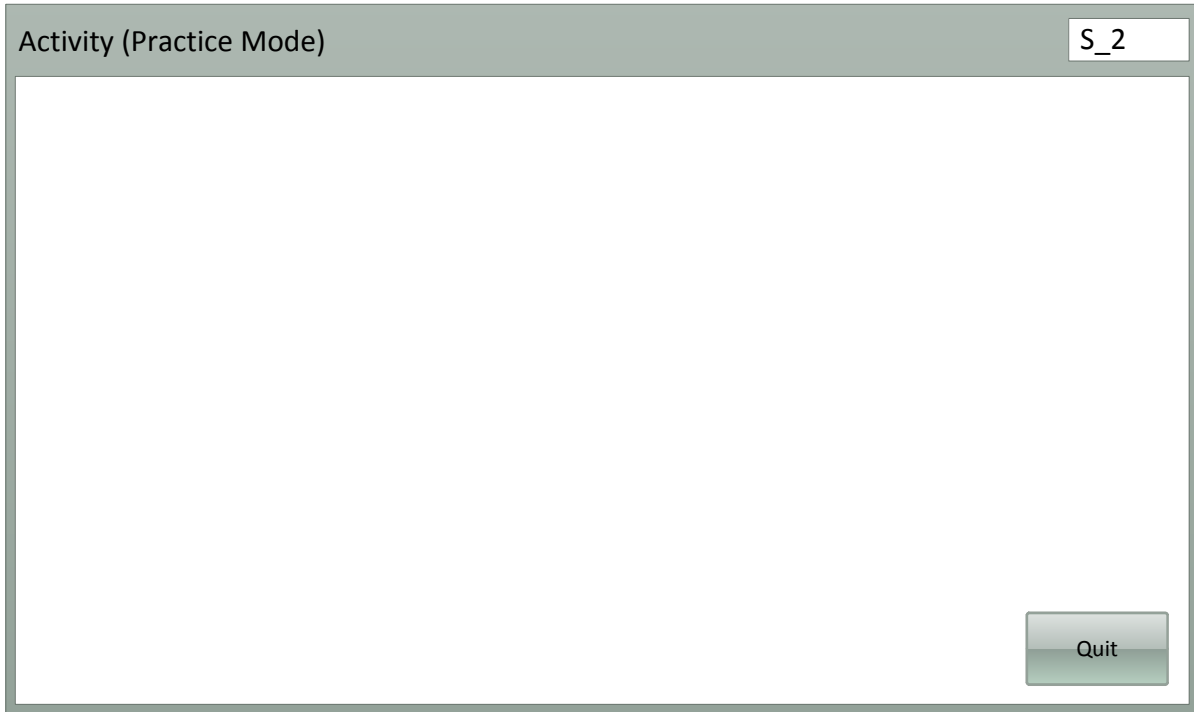
- Activity Finishes → FP_1
- Menu Button → Pauses activity and menu appears → FP_3



- Resume Button → Starts activity from point when Menu button pressed
- Options Button → Allows the user to change the current options; disables resume
- Restart Button → Restarts the current activity
- Quit Button → FP_1



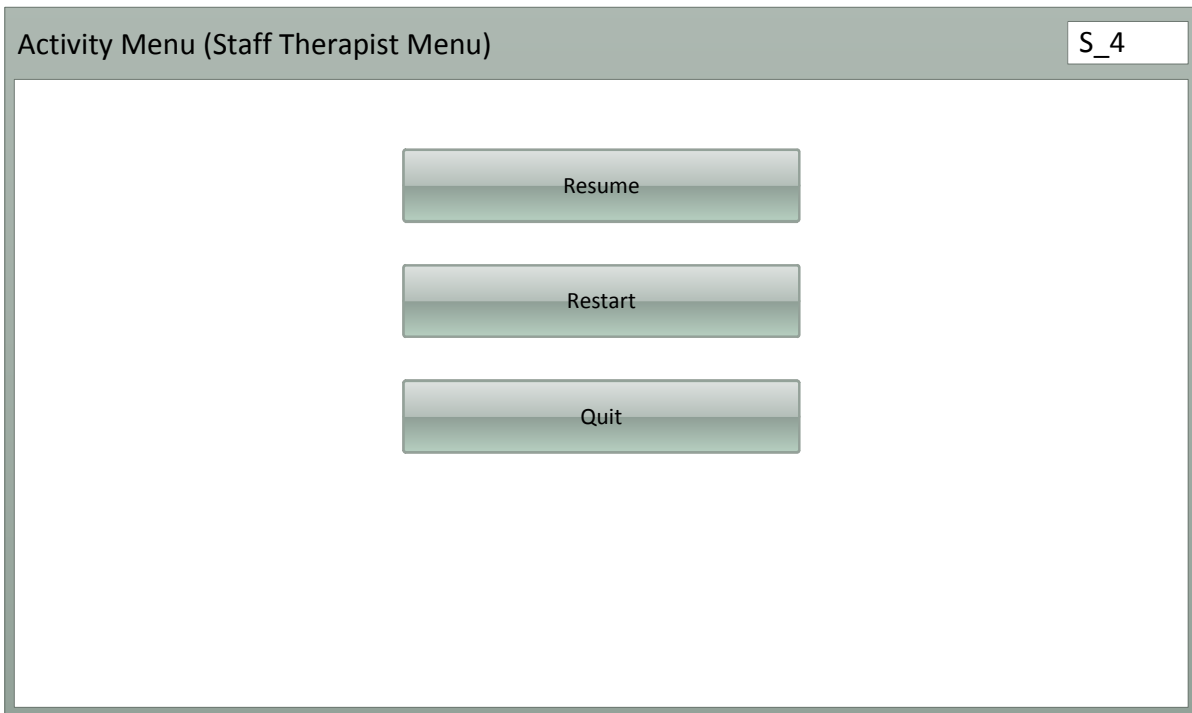
- Select Activity → Press Practice Button or Launch Button
 - Only certain activity will be selectable if session has been setup as "Locked"
- Launch Button → S_3
- Practice Button → S_2
- Logout Button → MM_1



- No data stored in database during practice mode
- Quit Button → S_1



- Data stored in database once activity completes
- Staff Therapist Surface Tag → Pauses activity and menu appears → S_4



- Resume → Starts activity from point when Menu button pressed (S_3)
- Restart → Restarts the current activity (wipes collected data for that specific instance of activity to start fresh)
- Quit → S_1

Appendix C: UI Prototype – Workstation

Login Screen

- Clinician logs into application
- Two different roles
 - Manager
 - Clinician



On successful log in, go to application home screen ([Home Page](#))

Home Screen

- Navigate application
 - Manage users (patients)
 - Manage sessions
 - Admin tools

Log out of application (automatic logout after timeout to protect user data?)



To manage users, begin at [User Screen 1](#).
To manage sessions, begin at [Session Screen 1](#).
For Admin tools, go to [Admin Screen](#).

Add User

- Add new user
 - Insert any necessary demographic information (medical record number and tag ID will be only personal information stored in DB)
 - Print card with tag, medical record number, name, birthdate

Save or cancel to return to Home Screen ([Home Page](#)).



Once user has been added, authorized staff can edit/update users ([User Screen 2](#))

Edit Users Screen

- Make user inactive/change user status

Save or cancel to return to Home Screen
([Home Page](#)).



Authorized staff can also view user data
([User Screen 3](#)).

View User Data

- User specific data
 - By user
 - Cumulative
 - By activity

Save or cancel to return to Home Screen
([Home Page](#)).



Add Session

- Select activities
- Configure session options

Save or cancel to return to Home Screen ([Home Page](#)).



Once activities selected, clinician can configure each activity ([Session Screen 2](#)).

Add Session (cont.)

- Configure activities

Save or cancel to return to Home Screen
([Home Page](#)).



Clinicians can edit sessions that have not
been completed ([Session Screen 3](#)).

Edit Session

- Add/Remove activities
- Adjust activity options
- Re-order activities

Save or cancel to return to Home Screen ([Home Page](#)).



Once a session/activity is complete, authorized staff can view data ([Session Screen 4](#)).

View Session Data

- Session/activity specific data
- By user
- Cumulative

Save or cancel to return to Home Screen
([Home Page](#)).



Administrative Functions

- Manage logins/roles
- Reprint tags (since the tags will be maintained along with the patients paper file, tag reprints will likely require assignment of a new ID and deactivation of the “old” id, or some other measures based on what protocol is involved concerning PHI)

Save or cancel to return to Home Screen
([Home Page](#)).

