



## [PROJECT PLAN]

Version 4.1

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## I. Revision Signatures

By signing this document, the team member is acknowledging that he/she has read through this document thoroughly and certifies that the information within this document is accurate and satisfies all requirements.

<b><u>Name</u></b>	<b><u>Signature</u></b>	<b><u>Date Signed</u></b>
Trenton Bishop		
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Thales Lessa		
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## II. Revision History

<u>Version</u>	<u>Changes</u>	<u>Edited</u>
v0.1	Initial Documentation Draft	10 October 2013
v1.0	First Draft	10 October 2013
v1.0.1	Improved iterations, team roles	10 October 2013
v1.0.2	Improved formatting	11 October 2013
v1.0.3	Updated logo and project name	29 October 2013
v1.0.4	Additional Refinements	05 November 2013
v1.0.5	Further Refinements + Updated Logo	18 November 2013
v1.1	Changes based on Dr. Payne's input	03 December 2013
v1.2	Additional Refinements to Iterations	14 January 2014
v2.0	Iteration 2	30 January 2014
v3.0	Iteration 3	28 February 2014
v4.0	Iteration 4	25 March 2014
v4.1	Final Draft	23 April 2014

## 1 Introduction

### 1.1 Purpose

The purpose of this document is to provide an overview of the planning for project TouchCU. This plan will cover the project overview, identify resources, set milestones, and set team member roles/responsibilities. The document will also describe the project management methods used.

### 1.2 Overview

This document includes the following four sections.

**Section 2 - Project Overview:** Outlines the scope and objectives of our project while also giving a background on the system that is being developed.

**Section 3 - Resource Specification:** Specifies the software, hardware, and individuals involved in the development of the system.

**Section 4 - Project Management:** Identifies the project schedule, roles and responsibilities of the team members, weekly meetings/corresponding times, along with risk analysis and planning.

**Section 5 - Glossary of Terms:** Includes a list of abbreviations, technical terms and their associated definitions.

## 2 Project Overview

### 2.1 Scope and Objectives

The massive growth of touch technology has created an increased demand for new and innovative ways for users to interact with their devices. TouchCU, a 2013-2014 capstone project, consists of a standalone application that turns any flat surface into a multi-touchscreen utilizing the Microsoft Kinect for Windows, a standard projector, and a Windows 8 PC. Research teams at Intel Labs and Ubi-Interactive have created similar products, with one of them supported by Microsoft and available commercially. TouchCU, while similar in concept, allows for a greater operating range and implements voice interaction.

### 2.2 Project Background

In the early days of touch technology, cell phones gave up their buttons for touchscreens. As touch technology continues to improve it is simultaneously incorporated into almost everything around us. We see touch technology in everything from our refrigerators, to the media controllers in our cars. But more important than touch technology itself is the users' increased demand for new and innovative ways to interact with their devices. With that in mind, the concept of making any surface "touch-friendly" gave birth to the TouchCU project.

The Microsoft Kinect, a key component of the project, is a motion sensing device for both the Xbox 360 gaming console and Windows PC's. The Kinect features an RGB camera and a depth sensor that allows the capturing of body movements. When used with a projector and proper screen calibration, this allows body movements or "gestures" to be interpreted by the Windows 8 OS as input.

Ubi is a current product on the market that functions similarly to TouchCU. This product is made available by Ubi-Interactive and uses the same concept and hardware (Kinect, Projector, a flat surface, Windows 8 computer) to register touch input and gestures with the Windows 8 OS.

## 3 Resource Specification

### 3.1 Software

- **Development Tools**
  - Visual Studio Pro 2012
  - Kinect Studio for Windows v1.8.0
  - Kinect Developer Toolkit SDK
- **Supporting Tools**
  - Core FTP Lite 1.3c
  - Tortoise SVN 1.8.2
  - GroupMe
- **General Utilities**
  - Adobe Photoshop CS 6
  - Microsoft Office 2010
  - Microsoft Visio 2013
  - Google Drive
  - Camtasia 8
  - Handbrake Video Converter 0.9.9
  - iMovie
- **Operating Systems**
  - Microsoft Windows 8 x64 Professional
  - Microsoft Windows 7 x64 Enterprise
  - Mac OSX 10.8.5

### 3.2 Hardware

- PC running Windows 8 x64
  - AMD Athlon II X4 605e @ 2.3 GHz
  - 4GB RAM
- Kinect for Windows Model 1517
- NEC NP901w Projector
- TCU Brazos Web Server
  - Internet Information Services (IIS) hosting senior design website
  - Subversion
- Vertical non-reflective surface for projected image
  - Diagonal Screen size of 1 meter – 4 meters

### 3.3 Contacts

- TCU Faculty Advisor
  - Dr. Donnell Payne – [d.payne@tcu.edu](mailto:d.payne@tcu.edu)
- Team TouchCU
  - Trenton Bishop
  - Yizhou Hu
  - Blake LaFleur
  - Thales Lessa
  - Matthew Spector

## 4 Project Management

### 4.1 Milestones and deliverables

Project Plan v1.0	17 Oct, 2013
Skeleton Website	25 Oct, 2013
Requirements Documentation v1.0	07 Nov, 2013
Design Documentation v1.0	05 Dec, 2013
Iteration 1	12 Dec, 2013
<ul style="list-style-type: none"> <li>• Test constraints on the Kinect’s ability to capture the hands (i.e. time, location, left vs. right).</li> <li>• Read both hand locations from Kinect.</li> <li>• Define basic gestures: Single hand, Two hand, and Air.</li> <li>• Design 2 screen calibration methods: Depth stream (Automated) &amp; 4 points (Manual).</li> <li>• Interface the Kinect with the OS.</li> <li>• Begin implementing manual screen calibration.</li> <li>• Functional implementation of “Drag” gesture to OS.</li> </ul>	
Iteration 2	30 Jan, 2014
<ul style="list-style-type: none"> <li>• Optimize manual calibration.</li> <li>• Define voice commands.</li> <li>• Implement system tray icon and right-click menu.</li> <li>• Implement application settings menu.</li> <li>• Implement debugging overlay.</li> </ul>	
TCU Faculty Presentation	04 Feb, 2014
Iteration 3	28 Feb, 2014
<ul style="list-style-type: none"> <li>• Implement all single hand movements from Kinect to Windows.</li> <li>• Implement touch-specific gestures.</li> <li>• Implement voice commands.</li> </ul>	
SRS Abstract Submission	20 Mar, 2014
NTASC Abstract Submission	24 Mar, 2014



User Manual	25 Mar, 2014
Developer Guide	25 Mar, 2014
Iteration 4	01 Apr, 2014
<ul style="list-style-type: none"> <li>• Implement air gestures.</li> <li>• Investigate integration with Windows 7.</li> <li>• Final system testing and User Acceptance testing.</li> <li>• Bug fixing.</li> </ul>	
SRS Poster Submission	03 Apr, 2014
NTASC	05 Apr, 2014
SRS	11 Apr, 2014
Final Presentation	01 May, 2014
Complete All Documents	02 May, 2014
Final Product DVD	05 May, 2014

## 4.2 Team Members Role and Responsibilities

- Trenton Bishop: Documentation Lead
- Yizhou Hu: Algorithm Design Lead
- Blake LaFleur: Technical Lead
- Thales Lessa: Testing Lead
- Matthew Spector: Project Lead

## 4.3 Monitoring and Reporting Mechanisms

### 4.3.1 Meetings

Meetings take place weekly at 6:00pm on Tuesdays. In addition to this time slot, Team TouchCU also meets on Tuesdays and Thursday at 2:00pm in Tucker Technology when time allows. These times are subject to change based on the availability of the team members.

### 4.3.2 Communication

The primary means of communication for the group is through the mobile app GroupMe. It allows the entire group to communicate in a “group chat” instantly. All documents related to the project will be stored and shared on Google Drive so that the team can access them at any point. Email and phone calls are also available to the team if they are needed.

Documentation and code is also constantly uploaded and synced with SVN. This allows for version control as well as allowing any member of the team to easily access any part of the project.

#### 4.3.3 Requirements Control

TouchCU shall be developed according to the Requirements Document. The system will be tested to ensure requirements are being met at the end of each iteration. If the project requirements require a change, the changes must be agreed upon by all stakeholders before it is accepted.

#### 4.3.4 Weekly Activity Reports

Weekly reports will be completed by each group member before EOD Monday. Reports will be brought to the weekly meeting and recorded. These reports describe everything that was accomplished for the previous week. The next week's goals and tasks will be discussed and assigned for the upcoming week during the Tuesday meeting, and posted to the Team website.

#### 4.3.5 Walk-throughs

- 11/12/13 – Requirements walk-through with Dr. Payne
- 11/18/13 – Initial presentation walk-through
- 11/21/13 – Code walk-through
- 11/25/13 – Diagrams for Design Doc walk-through
- 01/21/14 – Schedule revision walk-through

### 4.4 Risk Management

<u>Contingency</u>	<u>Probability</u>	<u>Severity</u>	<u>Mitigation Strategy</u>
Project not finished	Low	Critical	Work efficiently and in a timely manner
Group member unavailable at critical time	Moderate	Moderate	Make sure everyone in the group knows what and how everyone else is doing
Kinect Sensitivity Issues	Moderate	High	Perform testing early on
Kinect + Windows 8 touch input integration	Moderate	High	Perform testing early on
Interfacing with Windows 8 touch API	Low	High	Research early, have backup plan

## 5 Glossary of Terms

- **Audio Stream** – Data stream from the Kinect that allows for high-quality audio capture that can be used for voice commands.
- **Color Stream** – Data stream from the Kinect that acts as an RGB web camera.
- **Depth Stream** – Data stream from the Kinect that creates a depth map from the distance of the sensor to the object.
- **EOD** - End of Day.
- **HDMI** - High-Definition Multimedia Interface.
- **IDE** - Integrated Development Environment.
- **Kinect** - A motion sensing input device by Microsoft for the Xbox 360 video game console and 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 recognizes 20 joints on the human body at a capture rate of 30 Hz.
- **Kinect Studio** - Debugging tool for the Kinect sensor that allows the depth and color streams to be viewed in real time.
- **NTASC** - North Texas Area Student Conference.
- **Rich Interaction** – Supports multi-touch.
- **SDK** - Software Development Kit.
- **Skeletal Stream** – Data stream from the Kinect that tracks up to 20 joints on the human body.
- **SRS** - Student Research Symposium.
- **TBD** - To Be Determined.
- **TCU** - Texas Christian University.
- **TouchCU** - The team and project name for the 2013-2014 senior design team.
- **USB** - Universal Serial Bus.