

# EmbarkVR: Outdoor Virtual Reality Experience

## CS Senior Capstone

### Design Document

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#### **Abstract**

Abstract Goes Here

## CONTENTS

## **1 OVERVIEW**

### **1.1 Scope**

We want to create an outdoor virtual reality experience for customers at a Columbia retail store. The application will consist mainly of visual, audio, and tactile experiences to create an outdoor world in which the user can navigate. The main activity available will involve fly fishing in one of the rivers within the environment. Users will also have the ability to interact with virtual Columbia products while in the experience and gain specific product information.

### **1.2 Purpose**

The main goal of the project is to make customers feel more inclined to purchase Columbia gear through the use of an immersive, outdoor Virtual Reality experience. This document exists both for development of the project and to provide a detailed description of the design plans.

### **1.3 Intended Audience**

The intended audience of this design document are the student developers involved (EmbarkVR), project sponsors, and Capstone teachers. The development team will be using this report as a guide and will provide structure for the development process. The sponsors can use this document to understand the vision of the developers and to will give a platform to discuss design ideas. The teachers can benefit from this document by learning about the project as a whole.

## **2 DEFINITIONS**

- Virtual Reality (VR): Artificial environment that is created with software
- HTC Vive: A virtual reality headset produced by HTC
- Base Stations: These allow the Vive to track the movement and location of the wands and headset.
- Wands: Controllers that are used with the HTC headset.
- Unity Game Engine: The Unity Game Engine, developed by Unity Technologies is used in this project to develop the virtual reality simulation.
- GitHub: Web-based Git repository hosting service
- Git: version control system used for software development

## **3 PROJECT CONTEXT**

### **3.1 Hardware**

- Laptop Computers with the following specifications:
  - Processor: Intel Core i5-4590 or AMD FX 8350, or better

- Graphics: NVIDIA GeForce GTX 1060 or AMD Radeon RX480, or better
- Memory: 4GB RAM or better
- Operating system: Windows 7 SP1 or better
- HTC Vive Headset: Used to track head movements and display application to users.
- HTC Wands (x2): Used to track the users hand movements and to give the user the ability to interact with virtual objects within the application.
- HTC Base Stations (x2): Used to track location of headset and wands. This information is then sent back to the computer in real time.

### **3.2 Software**

- Unity Gaming Engine: Used to develop the application.
- Unity Asset Store: Used to find objects which can be imported into the application.
- GitHub: Used by developers to collaborate and share files.

## **4 DESIGN DESCRIPTION**

### **4.1 SDD identification**

### **4.2 Design stakeholders**

#### *4.2.1 Intel*

Intel is working with Columbia to help them meet their needs when it comes to this Outdoor Simulation Project. Intel has graciously provided all necessary hardware to our team to allow us to create a successful application.

#### *4.2.2 Columbia(PFG?)*

One aspect of Columbia is their fishing apparel. They hope to use the application we are developing in a retail store to showcase this fishing apparel in a new medium. The goal is inspire customers to try new outdoor activities with Columbia gear.

### **4.3 Design views**

#### *4.3.1 Users*

Immersive and overall engagement aspect of the using the end product..

#### *4.3.2 Intel Sponsor (Mike Premi)*

Customer engagement with columbia products aspect of the project..

#### *4.3.3 Columbia Sponsor (Tim Devlin)*

TEchnical side of the project..

## 4.4 Design viewpoints

### 4.4.1 Context viewpoint

This context is related to user interaction with the application in its environment. It provides a “black box” view of the project which can be useful from the perspective of developers.

- Design Concern: The main concern will come from users of the VR application. Users will only be able to see the outside of the application and their ability to interact seamlessly is essential. Users do not want to experience performance lag or errors in functionality.
- Analytical Methods: The design will be evaluated during user testing on the basis on immersion, enjoyment, and possibly influence over customers decisions. After users test the application we will ask for feedback related their experience.
- Rationale: We included this viewpoint due to the importance of user immersion. The user experience in Virtual Reality applications is very sensitive and there are a lot of factors that can influence it.

### 4.4.2 Composition viewpoint

\*[Composition viewpoint describes the way the design subject is (recursively) structured into constituent parts and establishes the roles of those parts.]\*

- Design Concern:
- Analytical Methods
- Rationale

### 4.4.3 Dependency viewpoint

\*[The Dependency viewpoint specifies the relationships of interconnection and access among entities. These relationships include shared information, order of execution, or parameterization of interfaces.]\*

- Design Concern:
- Analytical Methods
- Rationale

### 4.4.4 Interface viewpoint

\*[Interface viewpoint provides information designers, programmers, and testers the means to know how to correctly use the services provided by a design subject. This description includes the details of external and internal interfaces not provided in the SRS.]\*

- Design Concern:
- Analytical Methods
- Rationale

## **5 APPROACH**

### **5.1 Static Environment**

(terrain, static objects, fishing rod, Columbia gear assets)

### **5.2 Improve Realism and Animate Environment**

One of the main goals of our project is to make it as realistic as possible without compromising performance. Realism can come from a number of different techniques. The first we will be focusing on is environment animation. A majority of our application will take place in a river so we will need to make this river as animated as possible. We will need to add an animation of the water moving passed the users. This can be done using one of the open-source animated water shadings. A similar technique can be used to create movement of clouds in the sky. The next step to improving realism is adding audio. Audio is crucial when it comes to immersion so not only will we need to add water noises but also noises related to wind and a wide range of animals. In Unity, sounds originate from Audio Source attached to objects. Those sounds and audio clips can be found in any open-source audio library and easily imported into Unity. The last technique we will be focusing to improve realism is lighting and shadowing. This can be achieved using the built-in directional lighting tools within Unity.

### **5.3 Tactile User Interaction**

(user interaction with gear, Columbia gear info)

### **5.4 Rod mechanics**

(user interaction with rod, physics involved)