# 5.0 Software Requirements Specification

## 5.1 Introduction

*Vizualize R* is a 3D musical Virtual Reality Experience. Users will experience music in a completely different way, where they will be immersed in the sound. Based on how sound waves are interpreted, visuals will show up on screen that will react as the music plays.

## 5.2 CSCI Component Breakdown

*Vizualize R* is composed of the following Computer System Configurations:

5.2.1 Execution CSC -- Many parts to the program-execution pipeline

5.2.1.1 Graphics Rendering CSU -- graphics rendering pipeline

5.2.1.1.1 DirectX 11 Rendering module -- Graphics will be handled on DirectX 11 platform

5.2.1.3 Audio Handling CSU -- Audio manipulation process

5.2.1.3.1 Windows audio decoder libraries -- Decodes audio files

5.2.1.3.2 Audio Handler Script -- Handles the interpretation of the audio

5.2.1.3.3 Audio Display Script -- Handles taking the interpreted audio and producing a visual display.

5.2.1.4 Asset Manipulation CSU -- Handles storage and delivery of Assets

5.2.1.4.1 Windows File System -- Stores Assets on Client’s machine

5.2.1.4.2 Unity Game Backend -- Retrieves Assets from File System

## 5.3 Functional Requirements

*Vizualize R*

5.3.1 The graphics rendering pipeline shall represent the visual state to the user.

5.3.2 The input handling pipeline shall interpret inputs given by the user for the experience through the VR headset.

5.3.3 The audio management system shall represent the current state to the user.

5.3.4 The asset manipulation system shall manage assets for the virtual experience.

5.3.5 The management software shall:

5.3.5.1 control the state of the virtual experience.

5.3.5.2 trigger asset utilization.

5.3.5.3 trigger audio playback.

5.3.5.4 trigger visual response to audio

5.3.6 The Unity Game Backend should manage unintended failures.

5.3.7 The opening screen shall display the settings which can configure the experience.

5.3.8 The opening screen shall display the “Play” button which allows the player to run the software.

## 5.4 Performance Requirements

*Vizualize R* should also perform like most other virtual reality applications are exptected to. Given a recommended set of hardware and software specifications necessary for a virtual reality experience, the application should run smoothly without lagging behind the music. Processes like rendering graphics and audio outputs should be handled quickly so that the experience feels seamless without disconnect between visuals and audio. Note that all of these performance requirements will be met only if the application is run with the specified hardware and software needed to run it.

5.4.1 The graphics rendering pipeline shall always display the visuals at 30 frames per second or more.

5.4.2 The input handling pipeline shall interpret inputs given by the user within 1 second given.

5.4.3 The audio management system shall output audio within 1 second of being triggered.

5.4.4 The asset manipulation system shall retrieve assets within 10 seconds.

5.4.5 The game management software shall utilize specific assets given the correct state within 1 second.

5.4.6 The software shall trigger audio playback given the correct state within 1 second.

5.4.8 The software should load the state from the previously saved state within 1 second.

## 5.5 Project Environment Requirements

### 5.5.1 Development Environment Requirements

Following are the hardware requirements for development of *Vizualize R*:

|  |  |
| --- | --- |
| **Category** | **Requirement** |
| Processor | Intel Core i3, 2.30 GHz or Better |
| Hard Drive Space | 2 Gb |
| RAM | 4 Gb or better |
| Display | 800x600 or better |

The large 2Gb hard drive space requirement is necessary for the storage of all the assets used. The application uses a dynamic graphics rendering system that allows display sizes less than 800x600 to be used as well as irregular screen aspect ratios. It is recommended that the user run the application at the native resolution of their computer or at 800x600 at a minimum to prevent screen distortions. Sound cards are built-in systems into modern motherboards so it is expected that the user will have a functioning sound card already.

Following are the software requirements for developing *Vizualize R*:

|  |  |
| --- | --- |
| **Category** | **Requirement** |
| Operating System | Windows 10 |
| Graphics Rendering System | DirectX 11 or Newer |
| Input Handling | Keyboard and Mouse Drivers |
| Audio Playback and Decoding | Audio Drivers |
| 3D Asset Design | Maya Studio |
| Compiler | Microsoft Visual C# |

Computers using a previous version of DirectX will not be able to run *Vizualize R* whatsoever. Although the application has not been tested on older operating systems, it should still be compatible with Windows 7 and 8.

### 5.5.2 Execution Environment Requirements

The hardware requirements for executing *Vizualize R* are equivalent to those for developing *Vizualize R*. The same hardware clarifications apply as well.

Following are the software requirements for executing *Vizualize R*:

|  |  |
| --- | --- |
| **Category** | **Requirement** |
| Operating System | Windows 10 |
| Graphics Rendering System | DirectX 11 or Newer |
| Input Handling | Keyboard and Mouse Drivers |
| Audio Playback and Decoding | Audio Drivers |

The properties specified above regarding older versions of Windows and DirectX still apply when executing *Vizualize R*.