Software Specification Design Document

Group 61: iCreate - Generative Design in Virtual Reality

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Abstract

The iCreate Generative Design in Virtual Reality is a software program that allows the user to create complex architectural structures using a series of spawned objects. As precision in movements and gestures are important, the UI has been designed in such a way that the user is unhindered and experiences a limited learning curve when using the software for the first time.

PARTICIPANTS

The ICreate - Generative Design in Virtual Reality senior software engineering project consists of the following team members:

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The following persons are guidance mentors as a part of the senior software engineering project course for the students:

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Contents

CONTRIBUTIONS

The members of the design team have contributed to the following sections as listed:

Hannah Solorzano:

- Base formatting of LaTeXdocument
- Section 1: Introduction (Includes all subsections)
- Section 2:
  - 2.0, 2.1.2 , 2.1.4
  - 2.1.1 (Co-authored with Nabeel)
- Section 3:
  - 3.1
  - 3.2 (Co-authored with Nabeel)
- Figures 1 and 2

Nabeel Shariff:

- Section 2.1.1 (Co-authored with Hannah)
- Section 3.2 (Co-authored with Hannah)

Rhea Mae Edwards:

- Participants Section

1 INTRODUCTION

1.1 Scope

The software application described in this design document is to be utilized as a tool for the generative design of architectural structures. The goal of this software is not only to be used as a resource for the building of said structures, but also to be a tool for learning more about the limits of a standing structure.

1.2 Purpose

The purpose of this Software Specification Document (SSD) is to provide a detailed description of the interface for the iCreate software. Included is the layout and functionality of the user interface.

1.3 Intended Audience

This document is intended for the stakeholders and architectural designers who intend to use this software. In addition, this SSD will be used as a reference for the stakeholders and Capstone professors in the case of a differing opinion in regards to the requirements of the design and performance.

1.4 Definitions and Acronyms

- **VR** - An abbreviation of Virtual Reality which is described as, "the computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors." [1]
- **Virtual Space** - A 3D area in VR in which the user can maneuver around in and interact with objects.
- **Generative Design** - A form finding process that can mimic nature's evolutionary approach to design. [2]
- **GUI** - The graphical user interface allows the user to interact with the program via buttons or other types of graphical icons.
- **Primitive** - General 3D shape.
- **Diegetic** - Interface that is included in the game world – i.e., it can be seen and heard by the game characters.[3]

2 SYSTEM ARCHITECTURE OVERVIEW

The iCreate software program is a developmental tool that can create architectural structure designs using the generative design process. As the user will be working with delicate structures, the GUI of the iCreate software must be laid out in a way that is intuitive, efficient, and neat.

2.1 Design Viewpoints

2.1.1 Concerns of Design Stakeholders

In regards to the developers, this software program should be simple and easily maintainable. The goal is to implement libraries and APIs that provide the functionality in this program to reduce the complexity of the overall codebase.

Users will be concerned about the overall look and feel of the software. The program's interface must be polished, neat, and intuitive, allowing for a seamless and comfortable experience. The goal is for the user to be able to comfortably and successfully design projects with minimal interruptions.

2.1.2 Context

While developing the components of the iCreate software, the main consideration the developers had was the ease of use. As this program is meant for people with different types of technological backgrounds, the GUI must be easy to navigate.

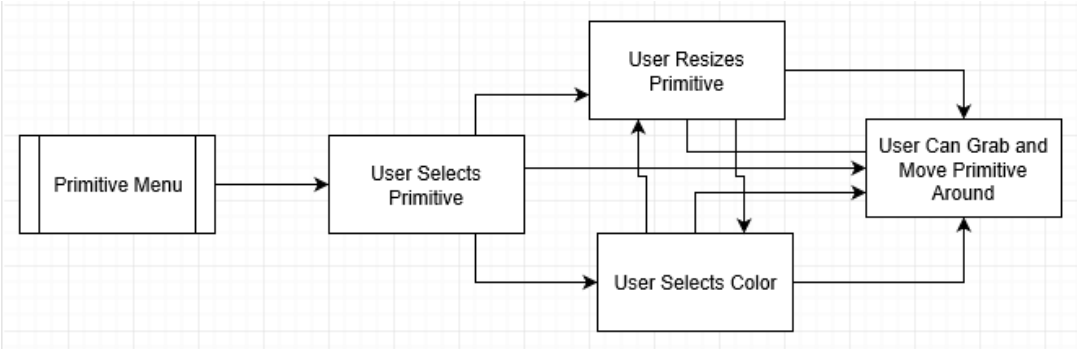

Figure 1. The flow of using the UI menu to spawn a shape.

2.1.3 Interface

Since iCreate's user interface is meant for an intuitive experience, the developers have chosen to implement a design for the menu that is neat and robust at the same time, as well as comfortable for the user in terms of hand and eye strain.

2.1.4 Structure

Each of the components are separate objects which means that each primitive is able to have its own physics and settings. This makes manipulation of several primitives easier, and the learning curve smaller.

3 COMPONENT DESIGN

3.1 Scene

The scene for this software is an empty grey room. It was decided that an empty room would be best as it would reduce obstruction and distractions.

3.2 User Interface

The interface for iCreate will mostly be based on Diegetic and spatial UI. Diegetic UI will be used for accessing tools and options from a menu attached to the recessive hand's controller. For all other menus and uses, spatial UI will be used to relay relevant navigation information to the user. The dominant hand will either be used to select options from the menus presented to them, or draw within the virtual Environment.

Figure 2. The UI menu that features the primitive and color options as well as the size slider. This menu will hover over the controller as a diegetic UI component

There are three sections to the menu which can be seen in Figure 2. The first section has four primitives available to use: a square, circle, pyramid, and hexagon. The second part is a slider which can be used to adjust the size of the primitive spawned. Lastly, there are four color options for the primitives. As each primitive are separate objects, it is possible to have different combinations of sizes, colors, and shapes.

List of Figures

REFERENCES

[1] M. Webster (2018). *Definition of Virtual Reality* . [Online]. Available: https://www.merriam-webster.com/dictionary/virtual%20reality

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[3] Gamasutra (2018). *Game UI Discoveries: What Gamers Want* . [Online]. Available: https://www.gamasutra.com/view/feature/4286/game_ui_discoveries_what_players_.php?print=1