

Project: Realistic 3D and Virtual Reality Modeling Product Requirements

VRCraft

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Document History

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1 Objective

The objective of this document is to document the requirements of our project, Realistic 3D and Virtual Reality Modeling, as sponsored by the University of Idaho Computer Science department and professor Dr. Daniel Conte de Leon.

2 Scope

The scope of this document is to define the requirements of how we will accomplish our goals to finish the desired product.

3 References

3.1 Cited Documents

<https://enterprise.vive.com/us/>

<https://www.vive.com/us/setup/>

https://support.steampowered.com/kb_article.php?ref=7770-WRUP-5951

https://en.wikipedia.org/wiki/Comparison_of_virtual_reality_headsets

<https://medium.com/@notiontheory/inside-of-a-vive-controller-7c9de18ac9d3>

http://energyusecalculator.com/electricity_computer.htm

<https://www.minetest.org/>

https://rubenwardy.com/minetest_modding_book/en/index.html

<https://www.amazon.com/ask/questions/Tx4M6N8HN4Z2JJ>

3.2 Acronyms

VR – Virtual Reality

UI – University of Idaho

MT - Minetest

Vive – HTC Vive Pro Enterprise

Mod – [a piece of software that performs] modification [of a game]

4 Functional Requirements

4.1 User Interface Requirements

The user interface will be primarily accomplished through the software of the modification of the game Minetest, as discussed later in this document.

4.2 What it should do

The product will ideally be a correctly modeled simulation of networks within the game. We will also be attempting to integrate VR into the game from scratch.

5 Mechanical Requirements

5.1 Strength Requirements

If VR is incorporated, the user will need to be able to carry the Vive headset and the Vive controllers. See below for weight specifications. The product itself will not need to carry anything.

5.2 Spatial Requirements

For VR incorporation, room scale VR will have a minimum requirement of 2 meters by 1.5 meters of free space. For standstill VR incorporation, there is no minimum requirement of space other than standing in one place. For no VR incorporation, there is no spatial requirement as everything will be inside a computer game.

5.3 Weight/Mass Requirements

The Vive headset weighs approximately 470g or 1.03lbs. Each controller weighs about 309g or .68lbs. There will be no weight requirements if VR is not incorporated.

5.4 Mounting / Interface Requirements

Mounting of the base camera stations for the Vive will be done with the instructions that are provided with the Vive when purchased. A direct link to Vive's setup page is also included in the cited documents above.

5.5 Appearance Requirements

The final product will be an area larger than 2 meters by 1.5 meters of free space with the base station cameras no further than 16 feet apart if VR is incorporated. The user will be able to play the game, VR or not, and see a visual representation of networks inside the game (e.g. packets sending from one computer to another).

5.6 Durability Requirements

The product would ideally not have any durability requirements – it should be able to be ran indefinitely. However, due to the nature of how updates work within games, there is a chance an update could be pushed from the creators of the game that would temporarily break our product if we were to update to the most recent version.

5.7 Reliability Requirements

The game simulation shall have a very high reliability rate, ideally 95% or higher. In order to be an accurate simulation to be used for educational purposes, the representations must be accurate and reliable.

6 Electrical Requirements

6.1 Operational Voltage

The game will be running on a computer, and each computer will have a different power requirement. The average desktop computer uses between 60 and 300 watts an hour, but this can still vary greatly.

If VR is incorporated, the approximate wattage will be present:

Base Stations (On): 4.7W

Base Stations (Hibernating): 1W

Vive (On): 5.9W

Vive (Off But Plugged In): 3.6W

Vive (Off, USB & HDMI Unplugged): 2.6W

6.2 Operational Power Capability

The computer will give out and take in various energy levels depending on the specific computer. The Vive and its controllers run off the computer. The base stations will need to be plugged into a typical surge protector to be powered.

6.3 Energy Storage Capacity

The Vive controllers have an approximately battery capacity of 960mAh each. However, the battery comes pre-installed with the purchase of the Vive, and can be charged using a USB port on a computer. If VR is not incorporated, no energy storage will be present.

7 Software Requirements

7.1 Functionality

We will be incorporating many different new blocks into the game through our to-be-created mod. These blocks may include things such as computers, network cards, network cables, and many others. We will be implementing some sort of TCP/IP network to be used for educational purposes.

7.2 User Interface

Our mod will be implemented into the user interface that MT has already established. The blocks will be added and will be interacting with each other in a proper and reliable fashion for the simulation. The blocks will be able to be seen in a menu to be properly dispensed by the user as needed. The blocks will also have semi-realistic textures in order to have the simulation be as life-like as possible and be easily identified.

8 Environmental Requirements

8.1 Temperature

Computers are recommended to be used in a room temperature varying from 5 to 40 degrees Celsius, or 41 to 104 degrees Fahrenheit.

9 Regulatory Requirements

9.1 Shipping Requirements

The product will not need to be shipped, and as such, will have no shipping requirements.

10 Cost Requirements

10.1 Prototype Cost

The Vive Enterprise costs \$1,399 from enterprise.vive.com/us/. However, UI already owns one and will not be required to be purchased for this project. Minetest is open-source, free software available online. As such, our overall budget will be \$0.

10.2 Production Requirements

Once the mod is created, distribution will be free-of-charge and will be able to be distributed on popular mod-sharing websites, or within internal channels only. We will also likely be using GitHub as a method of distribution if we deem it beneficial.

11 Schedule Requirements

- Approval of Requirements - Sept. 26, 2019
- Design Validation Plan - Oct. 24, 2019
- Project Value Proposition - Oct. 31, 2019
- Concept Design Review - Nov. 22, 2019
- Project roughly 50% completed - Dec. 31, 2019
- Engineering Release Review - Feb. 21, 2020
- Team Portfolio - Mar. 10, 2020
- Complete Prototype build - Apr. 5, 2020
- UI Design EXPO - May 1, 2020
- Final Report / Drawings - May 5, 2020