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COS 301 Capstone Project 2017

Vulknut Software Engineering

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3D VR Presentations

GitHub Repository: [Vulknut Software Engineering](#)

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1 System Requirements and Design

1.1 Introduction

1.1.1 Purpose

This document serves to outline the overall description and requirements of the system. This document also serves as a guideline to the developers in order to ensure the final product meets these requirements, and indicates to the client what the required technologies are in order to be able to use this system.

1.1.2 Scope

The overall objective of this project is to provide any given user with a toolkit, with which the individual can create a 3D virtual reality presentation with ease. Our goal is to make it simple to use, enabling virtually any user to utilize the power of 3D, without having to build 3D objects completely from scratch. The user would custom build a 3D environment built upon a variety of available templates offered, or by selecting a set of 3D models and skyboxes when choosing to create a project from the ground up, taking user experience to a whole nother level.

1.1.3 Definitions, Acronyms and Abbreviations

MEAN MongoDB, Express.js, AngularJS (or Angular), and Node.js

VR Virtual Reality

MVP Minimum Viable Product

MTBF Mean Time Between Failures

e2e End-To-End

1.2 Design

1.2.1 Software Methodology

We will follow the Agile development methodology. The principles this methodology is based on advocates planning, constantly evolving development, early delivery and continues improvements, and it encourages flexibility as well as maintainability.

The agile development process is built on four main principles:

1. Individual and team interactions over processes and tools.
2. Working software over comprehensive documentation.
3. Customer collaboration over contract negotiation.
4. Responding to change over following a plan.

The Agile development approach allows for frequent opportunities for clients to be involved in. Requirements are then reprioritized according to client specifications and they are elaborated on. The process of Agile development is based on the following actions:

- Short timeboxes of iterative development.
- Early and repeated client/user feedback.

- Reprioritization of work based on the client/user so that emergent requirements can be handled.
- Selecting a specific approach of which there are a variety of options including, Extreme Programming, Scrum, Lean Development, and Feature-Driven Development.

Some of the benefits of using the Agile development include stakeholder engagement, transparency, early and predictable delivery, predictable costs and schedule, allows for change, focus on the client, and ultimately improving the quality of the software.

For the above-mentioned reasons, we had chosen to utilize the Agile Software Methodology as it was the most applicable satisfying our needs as well as our client's.

1.2.2 Development Technique

During our first meeting with EPI-USE they had mentioned that we should make use of a development technique called MVP. A MVP is the most basic version of a product that can still be released. The point of this technique would be that early adopters would see the potential that the final product could offer, and give developers valuable feedback needed to guide them forward.

1.3 System Requirements

1.3.1 Functional Requirements

The following functional requirements will be met:

1. The toolkit will allow users to create 3D environments.
2. Users will be able to add objects to the environment.
3. The toolkit will allow users to select pre-built environments.
4. Users will be able to share content they have created, or integrate content that is publically available, making the project evolve even further through the community.

1.3.2 Non-Functional Requirements

The following non-functional requirements will be met:

1. Usability - key concern is to make this system easy to use.
2. Reliability - the system should not fail, aiming for a high MTBF. A strategy will be in place for error detection.
3. Portability - making use of Unity3D allows our software to be compatible with a large variety of VR devices. A simple installation is all that is required.
4. Modifiability - aiming for a community driven approach we will ensure that software is easily upgraded.
5. Platform constraints - developing in Unity3D caters for the widest VR devices.

1.4 Target Audience Characteristics

Our first focused audience would be targeted at the educational sector. Our initial goal would be to provide a toolkit for an individual to build a basic educational scene.

1.5 Constraints

There are several constraints needed to be taken into consideration.

Platform constraints:

- Mono, an open source development platform based on the .NET Framework. Mono's implementation is based on the ECMA standards for C# and the Common Language Infrastructure.
- For development:
 - Windows 7 SP+1, 8, 10; Mac OS X 10.8+.
- For running Unity applications/games (depending on the complexity of the project):
 - Windows XP SP2+, Mac OS X 10.8+, Ubuntu 12.04+, SteamOS+.

Device hardware constraints:

- Graphics card: DX9 (shader model 3.0) or DX11 with feature level 9.3 capabilities.
- CPU: SSE2 instruction set support.

Video size:

- The exported video should be a realistic size, taking bandwidth and cap into consideration.

Community content needs to be a reasonable size (in community guidelines):

- Contributing to the complexity of a project will increase exported video size.

Community content needs to be relatively optimized (in community guidelines):

- Again, contributing to the complexity of a project will increase exported video size.

Other constraints that will be considered and in which further research will be conducted as implementation progresses include:

- Possible VR device constraints with regards to environment editing.
- Fixed set of templates.
- Unity assets only for community driven content.

1.6 Testing Framework

1.6.1 Introduction

The 3D VR Presentations project presents a unique problem when it comes to testing. Because the primary goals of the project is to create an intuitive and easy to use interface to create presentations, the assessment will be qualitative in nature.

Thus traditional methods of testing such as unit tests and e2e tests will not be useful to determine if we are creating a viable and working product.

However some parts should still be able to be tested in that way. Further research is needed in order to determine a way of implementing unit and e2e tests and which framework will be used for them.

We are planning on utilizing usability testing at the end of each phase in order to determine how viable our current product is at that stage.

We are also looking into Agile UX Design Principles.

1.6.2 Usability Testing

In short, Usability Testing is a way to see how easy to use something is by testing it with real users.

At the end of each sprint we will test our product in its current state with real users and based on their feedback we will plan adjustments to our development. We will be using knowledge that we have gained from IMY310 to that end.

1.6.3 Agile UX Principles

1.7 Technologies

In our first meeting with EPI-USE we had discussed the use of various technologies. They had given us "free will" with regards to what technologies to use. After we had committed ourselves to extensive research we had selected the following, but did not limit ourselves to:

- Creating a 3D environment to design and bring to life a 3D presentation.
- Unity 3D virtual reality system tool kit library.
- HTC Vive virtual reality gear (already available).
- Import external models.
- Using plug and play libraries.
- Possibly include library templates for uses to build on.
- Community driven approach.
- Windows 10 environment.
- Docker.
- TravisCI.

2 Test Reports

2.1 Internal: Testing With Team Members

2.2 Usability Testing

2.3 Examples of Target Audiences

2.3.1 Educational: Eg School Teachers

2.3.2 Corporate: Eg Board Members at a Project Proposal

3 User Manual

3.1 Introduction

3.2 Getting Started

3.3 Quick Start

3.4 Main Scenarios of Use

3.4.1 Features You Can Expect

3.4.2 Examples of Use

3.5 System Requirements

3.5.1 Minimum Requirements

3.5.2 Recommended Requirements

3.6 FAQs