Software Requirement Specification of Virtual Sets for Virtual Production Film

Third Version

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GRP Team 10

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By signing below, I acknowledge that I have read, understood, and agree to the contents of this document.

_____

By signing below, I confirm that Team 10 has completed all work described herein.

_____

Date

_____ / _____ / _____

Amendment 1

17/2/2025

Purpose

This document will outline and explain the changes that were made to the original Software Requirements Specification (SRS) for another Virtual Asset.

Scope

After the meeting on 23 January 2025, the original second asset, the Monitor Room, will not be used in the movie. The team should pause to develop this asset. The team needs to build another Virtual Asset. Thus, there will be a total of two Virtual Assets to be made at the time of delivery. Additionally, an OER will be created to be used for future Virtual Production projects.

Amendments

Deletion

3.1.1 First asset: Corridor

Addition

3.1.3 Third asset: Hospital Room

- **Scene description:** This asset is a scene of a hospital room. Inside the room, there should be space for medical beds, and real beds will be set. There should be some details beside the beds, such as medical devices, plugs, switches, and all things hanging on the walls in the hospital. It should also include a window on the wall of the room. The room should resemble a hospital room, but this time, there need to be three virtual beds in the space. In the second room, a window is still required, but this time the window is closed, and nothing can be seen.
- **Style setting:** The style follows a realistic modern theme. It should not be too new.
- **VFX setting:** This asset does not include VFX.

Amendment 2

26/3/2025

Purpose

This amendment will outline and explain the changes that were made to the original Software Requirements Specification (SRS) for Virtual Asset.

Scope

After the meeting on 28 February 2025, the stakeholders confirmed that, based on the script of the film, the original first asset, the corridor, will not be used during the shooting. Thus, the team should focus on the only asset, which is the Hospital Room asset.

Amendments

Modification

- All references to “two assets” in the document are changed to ”one asset”.
- The link in the appendix is changed to provide more stakeholder meeting minutes.
- The milestone in section 1.4 is changed based on the schedule.
- The license in section 4.4 is changed based on the format of the deliverables.

3.1.3 Third asset: Hospital Room

- **Scene description:** This asset represents a hospital room scene. The layout should accommodate three beds: one physical bed positioned on the left side of the room and two virtual beds occupying the remaining spaces. Curtains should be installed between the beds, designed to alternate between the retracted and closed states. Additional details must include medical equipment, electrical outlets, switches, and various wall-mounted elements typical of a hospital environment. The room should also feature two windows, one on each side of the wall. These windows will overlook 5 similar rooms each side arranged in a row, reinforcing an atmosphere of limited privacy.
- **Style setting:** The style follows a realistic modern theme. It should not be too new. The purpose of the style is to provide an atmosphere of low privacy.

Deletion

2.1.2 Unreal Engine Version

The specification is deleted because the document needs a more accurate specification to better describe the requirement.

3.1.2 Second asset: monitor room

The specification is deleted because the stakeholders are no longer need this asset anymore.

3.3 Model Specifications

The specification of model and LOD (Level of Detail) is deleted because the performance of the asset is good enough to use directly without the usage of LOD. Furthermore, LOD technology is automatically deployed in unreal engine, which does not need to be specified in the document.

Addition

2.1.2 User Interface

- The asset should be provided as an Unreal Engine project, with all files and resources to support it to run fluently in all computers that stakeholders required. The v ersion of Unreal Engine used in the project should be 5.3.

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Glossaries

3D Model / Virtual Asset A digital representation of a three-dimensional object or environment created and edited by 3D modeling software. 6, 7, 10

LED (Light Emitting Diode) A screen that is made by diodes that emits colours. A LED package contains of three RBG diodes. 8

LOD (Level of Detail) A technique used in computer graphics that helps to manage rendering workload by decreasing the complexity of a 3D model representation as it moves away from the viewer or according to other metrics. 4

OER (Open Educational Resource) These are freely accessible openly licensed documents and media that are useful for teaching, learning, educational, assessment, and research purposes. 2, 5, 7, 8, 10

SRS (Software Requirements Specification) A comprehensive description of the intended purpose and environment for software under development. The SRS fully describes what the software will do and how it is expected to perform. 7

VFX (Visual Effects) The integration of visual effects created and manipulated digitally to enhance or create environments and elements. 5, 8, 9

VP (Virtual Production) This technique integrates computer graphics and live-action footage in real-time, allowing filmmakers to visualize complex scenes as they capture them. 7

VS (Virtual Set) A digital scene made from various 3D Models that simulates the real-world, to allow the film-crew rehearse and execute simulated shots that mirror reality as fully as possible. 7, 8

1 Introduction

1.1 Purpose

The purpose of this document is to outline the requirements for creating a Virtual Set (VS) to be used in film production, including its design, technical specifications, and integration requirements. This document is intended for the 3D artists, technical directors, and production team members involved in the creation and use of the asset.

1.2 Scope

One VS will be created for the Virtual Production (VP) film. After creating the virtual asset, an OER will be created to be used for future Virtual Production projects.

1.3 References

- Stakeholder meeting minutes

1.4 Milestones

- 2024/12/9 -Start making 3D Model to put into the Unreal Engine.
- 2025/2/20 -Finish both virtual asset.
- 2025/2/21 -Start testing virtual asset in studio, and make amendments accordingly
- 2025/3/28 -Stakeholders confirm virtual asset is done and sign the SRS, signifies the ending of the project.

2 Overall Description

2.1 Product Functions

The VS will represent a required scene in the film, projected to the LED screen as the background. They must include detailed textures, and efficient geometry for rendering performance. It must have controllable visual effects (VFX) as the directors and production team required. An Open Educational Resources (OER) is also required for future educational purposes.

2.1.1 Operating System

- Supported Versions: Windows 10 (64-bit), Windows 11 (64-bit).

2.1.2 User Interface

- The asset should be provided as an Unreal Engine project, with all files and resources to support it to run fluently in all computers that stakeholders required. version of Unreal Engine used in the project should be 5.3.

2.2 Assumptions and Dependencies

- Team 10 will be provided with the right to use (at least) 1 workstation with the following specifications:

CPU	Intel i7-14700KF or AMD Ryzen 9 7900X equivalent or higher
GPU	NVIDIA RTX 4070 equivalent or higher
RAM	32GB DDR5 or higher
Storge	1TB NVME SSD or higher

3 Functional Requirements

3.1 Scene Brief

The scene requirements are intended as a reference for general scenery/visual effects (VFX) behaviour as they depict and document the initial design relayed to us by the director/artistic team, based on initial prototypes created by the artistic/director team that were shown to us (Team 10) and are subject to later tailoring based on future direction from the artistic/directors team.

3.1.1 Third Asset: Hospital Room

- **Scene description:** This asset represents a hospital room scene. The layout should accommodate three beds: one physical bed positioned on the left side of the room and two virtual beds occupying the remaining spaces. Curtains should be installed between the beds, designed to alternate between the retracted and closed states. Additional details must include medical equipment, electrical outlets, switches, and various wall-mounted elements typical of a hospital environment. The room should also feature two windows, one on each side of the wall. These windows will overlook 5 similar rooms each side arranged in a row, reinforcing an atmosphere of limited privacy.
- **Style setting:** The style follows a realistic modern theme. It should not be too new. The purpose of the style is to provide an atmosphere of low privacy.
- **VFX setting:** This asset does not include VFX.

3.2 VFX Specifications

- All visual effect in the asset must allow for user-customizable parameters, including but not limited to color, size, intensity, and duration, to ensure the effects can be adapted to a variety of scenes and preferences.

3.3 SFX (Sound Effects) Specifications

- Each sound effect should be capable of being synchronized with the corresponding VFX to ensure seamless integration and performance during playback.

4 Non-Functional Requirements

4.1 Performance

- Target frame rate: The system shall maintain a performance benchmark of at least 50 frames per second under standard operating conditions to ensure a smooth and responsive experience during capture.

4.2 Reliability

- Error-Free: All 3D Models must comply with defined geometry standards including vertex count, polygon size, and the accuracy of the normals, in order to avoid rendering issues. 3D Models should be examined for common geometry errors such as holes, non-manifold edges, and overlapping vertices.
- Stable Performance: Set benchmarks for acceptable performance metrics such as frame rates and loading times, ensuring asset do not negatively impact these criteria.

4.3 Open Educational Resource (OER)

This project shall provide OER for educators and students. The specified requirements for the OER include:

- Comprehensive documentation of all software and plug-ins utilized, as included in the OER.
- Detailed guidelines on model creation and the application of Unreal Engine for virtual environment development.
- Provision of instructions covering installation procedures, fundamental operations, and troubleshooting methods.

4.4 Legal and Compliance

- Intellectual Property: Ensure that all components of the asset comply with intellectual property laws and licensing agreements.
- Copyright: All deliverables produced as part of this project are licensed under the CC BY 4.0 . This ensures the OER and the asset remains free and open source, which provides the rights to use, modify, and distribute the software under the terms of CC BY 4.0.

5 Appendix

5.1 Figures

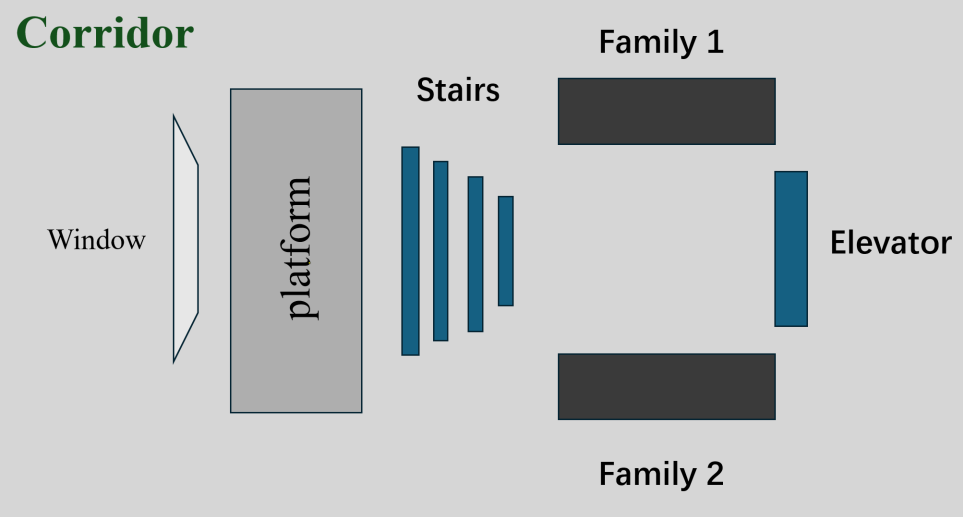

Figure 1: Corridor Scene (Source: First stakeholder meeting presentation slides)

Figure 2: Monitor Room Scene (Source: First stakeholder meeting presentation slides)

5.2 References

- Stakeholder meeting minutes:

  Available at: `https://github.com/gektec/G10/tree/main/Documents`