

Project Deliverable F: **Prototype I and Customer Feedback**

**University Of Ottawa**

Engineering Design 1103

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## 1. Introduction

The purpose of this deliverable is to evaluate our first prototype and use feedback to construct our final product. We incorporated client feedback to improve the overall prototype and expand off their questions, concerns and ideas to outline our project. Additionally, this deliverable goes over the main concepts and highlights in detail the components that went into our prototype. Specifically, this prototype includes interactive VR, design and performance specifications. While the purpose of this deliverable is to start creating our design, we've also updated the products and timeline for our overall project. Finally, this deliverable will mainly capture the functionality and purpose of this project.

## 2. Technical Analysis

**User Experience:** The addition of collision detection significantly improved the realism of the environment, preventing users from passing through solid objects. This enhancement positively impacted the user experience, fostering a greater sense of immersion and engagement.

**Interactivity:** Implementing interaction properties for smaller objects allowed users to engage with the environment on a deeper level, fostering exploration and experimentation. This feature contributes to the overall appeal and replay ability of the prototype.

**Performance:** The prototype demonstrated satisfactory performance within the VR environment, with smooth camera movement and responsive interaction mechanics. This indicates that the Unity project so far is well-optimized for VR functionality.

### 2.1 Storyline and message

Our story begins with the character in his bedroom. He is in his room. We have many critical visual components that will be implemented to highlight the fact that this character is living in a world that has been affected by killer robots.

- Wooden bars on the windows

- Shelf stocked with food and containers to highlight the fact that regular activities like grocery shopping is not possible

- The sound and lighting will be dark and suspenseful to highlight the distress of the characters life.

The second part of the consists of the TV scene. This scene is an important asset as it moves along the story and explains the experience. It will be a recording of a witness, describing a previous attack outside of her building the day before. This recording has for goal to incite emotion in our target audience and give power to our message. It will also give a clear description of the main scene, the alleyway.

The alleyway directly shows the impact that killer robots have had on what was once a regular society. We will be showing the aftermath of an attack on a neighborhood, as well as all the small changes that had been done to it to adapt to their new lives, which hopes to get our message across. This visual

component is critical in pushing our message through. The main highlights of our visual that will highlight our message will be, the deserted alleyway where garbage has been piling up, the tarps put up over buildings to camouflage from the killer robots. The explosion beside the house that has damaged a few things in the process and more.

## 2.2 Audio

Audio inputs are a critical component of our project because of their ability to smoothen the flow of the storyline and to add to the overall emotional impact of our project. There will be an audio recording indirectly narrating parts of the experience to clarify what is happening in various parts. To make this possible, we will either record our own voice and add effects or get an ai voiceover of a script we have written. These components will be mainly used in the TV scene, where the witness is talking about her experience in the alleyway.

We will add sound effects to interactive actions, like door tv turning on and off, or movement. We will need to program those sounds to be interactive and activate when certain actions are made.

Background sounds like music, environmental sounds and more will be added to add to the overall mood of the story.

## 2.3 Technical components and animation

Critical component	Purpose	Method
Mesh renderer	For objects to appear solid and avoid transparency.	Mesh renderers can be accessed in the unity store. They take the geometry from the Mesh Filter and renders it at the position defined by the GameObject's Transform component
XR interaction tool kit	It is critical for our VR to be interactive so that the user can interact with different components of our environment. In the first scene, we plan on having our character grab a remote. We want to be able to turn on our Tv with this remote, which can be done using the XR interaction tool kit.	With our scene already built we will create an XR rig game object. XR controller interaction components will be added to each controller. We will need to set up our interactive objects. We will need to add scripts to our objects to define their behaviours when interacted with.
Lighting and view	Different light sources and camera views will change the perspective of the environment.	The camera game objects in unity will be used to set up our main views. We can adjust the camera properties to change the lighting depending on the tone and mood intended for each scene. In the room, few natural lights will go through. We will ensure this is obvious with darker/gloomier camera properties.

		Asset: Lamps can be added to add lights to different part of the environment
Scripts and instructions	<p>The VR needs to be clear and easy to follow. Instructions and visual cues will be added to allow the user to easily walk through the experience.</p> <p>Example: when our character first spawns, a script indicating to grab the remote next to him will appear. This remote can be highlighter to add clarity. Then an instruction for turning on the Tv can appear.</p>	We will need to create a canvas, which will have a written text instruction containing instruction. When programming our VR, we will create a script and attach the script to our canvas. We will implement interaction handling which will trigger text change when specific actions have taken place.
Smooth and easy transition into alleyway scene	In Our VR, we move from one scene (bedroom) to a completely different one (the alleyway). This transition would be difficult to guide a user through with the VR experience. For this reason. We will add an interaction, which makes it so at the appropriate time, the scene will fade out completely and our character will be spawned in that environment.	Implement a fade-out effect to gradually darken the screen before transitioning to the next scene. You can achieve this by overlaying a black UI canvas that fades in over time. We will need to load our next scene and implement character spawning with our program.

### 3. Prototype

Our team developed a prototype using Unity in conjunction with VR capabilities to simulate a virtual environment. The objective of the prototype is to create an interactive experience for users within a simulated room setting, with specific features such as collision detection and object interaction.

Initially this prototype begins in the first scene where it displays subtle beginning to our overall story line. The VR walkthrough will begin at the edge of the bed in scene 1 the VR player will be able to functionally interact with the TV remote. The player needs to locate the TV remote which we have highlighted indicating its importance to the progression of the story. The Tv will turn on once the remote has reached the players hand and will display a news cast. The VR player will still currently have free realm to explore and navigate the room before turning on the TV. Once the Tv has been turned on the full screen will navigate to the television where an audio broadcast will be displayed indicating the progression and impact autonomous weaponry has had on this community. The audio recording will be recorded, and a voice over will be used to mask the "Citizen's identity". Finally, this scene ends with the transition to the second scene in the news cast.

The transition between scenes 1 and 2 will happen as the news cast goes from the audio recording to the scene of the conflict created by autonomous weaponry. The beginning of scene two starts in this ally way spoken about in the broadcast that seems to have been damaged due to last night events. The VR has free movement in this area though important indicators will be implemented to direct the player in continuing the story line. The user will begin to walk through this damaged area witnessing all the objects, buildings and efforts put in to create this new society. The disaster from the night before will demonstrate the impact autonomous weaponry has had on this society. Shoes, clothing and garbage will be left behind to exemplify the rush and fear during these situations. The character will walkthrough the full scene and eventually the scene will occur black turning into our third transition.

The Third scene begins as the character turns off the news broadcast and the VR set will return to the bedroom. The VR character will be indicated to turn off the TV Via remote. Once that has occurred the character will notice the bed has become a glowing colour indicating returning to bed where the final actions will occur, and the rest of the story will be done through one camera where the player lays down and sighs to indicate his frustration about the impact autonomous weaponry has. Overall, this scene will be used to transition out of the walkthrough and capture the feelings of those effected.

### 3.1 Prototype Components

**Environment Setup:** The Unity project was imported onto a suitable laptop capable of running VR. This ensured that the prototype could be tested under realistic conditions.

**Function Integration:** Various functions were imported to incorporate VR camera functionality into the environment. This allowed us to assess the prototype's compatibility and performance within a VR setting.

**Initial Observations:** Upon initial testing, it was observed that certain objects within the environment, such as the bed and walls, lacked collision boxes. This allowed users to pass through these objects, compromising the realism and user experience.

**Issue Resolution:** To address this issue, collision detection properties were added to the objects within the Unity environment. This modification ensured that users would interact with objects realistically, enhancing the immersion and overall experience.

**Object Interaction:** Additional testing focused on implementing interaction properties for smaller objects, such as canned food items. By enabling users to pick up and manipulate these objects within the virtual environment, we aimed to enhance the interactivity and engagement of the prototype.

### 3.2 Prototype Test Plan

Test ID	Test Objective (why?)	Description of prototype used and of Basic Test Method (what?)	Description of Result to be Recorded and how these results will be used (how?)	Estimated Test duration and planned start date (when?)
1	Paper-based drawing and sketches used to check low-fidelity prototypes	Layout and design ideas and experiment workflow usability issues and design interaction.	Test the flow between our ideas and specifications, insure design	Can be started now should take till the end of the project to ensure all new editions flow well within our project
2	Check visual distractions and ensure the walkthrough is visible to those who need this accommodation.	Visual distractions and attentive perspective throughout the presentation. Additionally use these results to create a walkthrough that appeals to everyone. (equity)	Ensure the walkthrough never surpasses the light frequency levels. Test the visual scenery by checking the notability of the instructions and the overall understanding of what is at task.	Can be started once the scenery is finished 2-3weeks and the test will only take a few days.
3	Ensure audio passes DMCA copy right act, to keep the legality of the project	Check that all music, sound effects are copy right free to avoid plagiarism.	Research DMCA audios and check the recording numbers and the list of copy right free sounds.	Can be started within the next week and should only take a few hours to implement.
4	High-Fidelity prototype testing to check functionality of design	Overall design specifications are met, and values, proposition and components are met.	Check requirements for the project. propose changes strategies and additions to improve the functionality of the protype. Ensure all required additions are functional and check off.	This can be done during a group discussion just to ensure no missing requirements this will be started as of March 5 <sup>th</sup> .
5	Feasibility prototype. Check all software and coding is running smoothly.	All design and functional attributes will have to be checked so the final project is presented smoothly. All functional and in motion objects code needs to be run.	Check environment and frames when running these tasks. Make sure the required connection and objects function in desired time.	Beginning Saturday March 2 testing VR (Virtual Reality) movement within the environments.
6	Colour scheme overall mood	Test the experience of the user and interfaces	Take a census and ask for their feedback and opinions on our	Testing will begin until prototype scenes have been

	and message to be portrayed.	rendering of the overall design.	message and how they perceived the walkthrough.	completed (2weeks)
7	Trigger warnings safety and usage of all ages	Test that the only includes age-appropriate factors.	Research what can be used as alternatives to usually dark ideas and what makes a prototype PG.	Testing is currently underway making sure only applicable resources are added.
8	Rendering and environment testing to ensure smooth VR experience	Test that all rendering and frames are properly loading the details make sure the environment can be handled with minimal lag.	Use different Users and applications to run the project and make sure this can be loaded the same every time.	Testing will be taking place when all prototypes are complete and ready to be put together.
9	Visual sizing and scaling of all details are legible and up to the requirement.	Microcopy prototype testing, implement proper scaling to all vital details.	Make sure all fonts and sizing of details are visible and can accommodate visual impairments. Check required sizing.	Testing will begin now and research for this will begin now.
10	Volume testing, checking that all aspects are audible and do not interfere.	We do not want the audio to take away from the message of the prototype it is important to check that the audio levels are not too loud and create our overall story.	Check that the prototype never passes over 80 decibels this can be harmful to the human ear even for short periods of time.	Testing can begin one the video aspect of the prototype is finished. 3-4 weeks
11	Scenario Building, make sure if malfunctions occur the scenario can be fixed.	All aspects are recoverable, and we have the knowledge to answer and fix the requirements depending on the issues.	Propose difficulties and test the way the program will run regardless of the situation (sustainability).	Testing will occur in the scenery this week.
12	Timing and remaining under the 1-minute walkthrough time	Make sure that the walkthrough is within the given time limit.	Time to make sure the VR environment takes about 1 minute to fully walk through.	Testing will begin during the final stages of the prototype.



### 3.2.1 Feedback

Feedback is an important part of the design process, it provides insight in order to improve the results. With feedback we can improve on meeting the clients needs and find weaknesses and strengths within our prototype as well as refine our ideas to better fit the project outlines and make our final results more user friendly.

While client feedback can be considered the most important due to the timing of the deliverable, we have not yet received it for this prototype. Instead we will rely on feedback from other outlets for this deliverable.

While the story line has a good foundation, the feedback received from others was to make sure that everything is understood from the viewers point of view. Make sure the viewer understands why garbage is in the alleyway. Is it because of the autonomous weapon attacks, or is it because it's a poorer neighborhood? We can ensure this by making sure there's enough clues within the animations and audio to understand what the effects of the attack are.

Feedback given was also that the viewer needs to understand what they need to do in the VR experience. When the viewer is supposed to pick up the remote it needs to be obvious. This can be done in multiple ways such as adding a glow effect of audio cues.

Further steps based on feedback would be to make sure that the VR experience is fully accessible and understandable for viewers without a deep previous understanding of the topic.

## 4. Target Specifications Updated

Design specification	Value	Units	Description
Video length	60 ± 15	Seconds	- 1 full minute of VR walkthrough
Audio	45 ± 15	Seconds	- 45 seconds
Visuals	50 ± 10	Seconds	- 50 seconds of scenery remaining can be an introduction or conclusion
Field of view	360° (stereoscopic)	Degrees	- 360 degrees of view and 3D visuals
Number of Scenes	4 ± 1	Scenes	- Do not want to over complicate it. Use minimal scenes
Camera movement	First person POV	Visual style	- Method of delivering the video will be in a first-person view
File size	1	GB	- File size will be one GB
Cost	50	Dollars	- Visual backgrounds can be purchased for this project
Visual type	Video	File type	- YouTube compatible

#### 4.1 Updated BOM

Bill of materials			
Item number	Item description	URL/source	Price
1	Unity		0
2	Sound effects	<a href="https://pixabay.com/sound-">https://pixabay.com/sound-</a>	0
3	Broken building	<a href="https://sketchfab.com/3d-models/destroyed-buildings-3fb7160b6d0c4350a0abc80962c47227">https://sketchfab.com/3d-models/destroyed-buildings-3fb7160b6d0c4350a0abc80962c47227</a>	0
4	Room design	On shape	0
5	Road material for alley way	<a href="https://assetstore.unity.com/publishers/40637">https://assetstore.unity.com/publishers/40637</a>	0
6	Garbage and waste	<a href="https://assetstore.unity.com/publishers/21584">https://assetstore.unity.com/publishers/21584</a>	0
7	Alleyway building	<a href="https://assetstore.unity.com/publishers/48757">https://assetstore.unity.com/publishers/48757</a>	0
8	Fencing	Kobra Game <b>Studios</b> <a href="http://minhle99.wixsite.com/kobra-game-studios">minhle99.wixsite.com/kobra-game-studios</a>	0
9	Building in background	<a href="https://assetstore.unity.com/packages/3d/environments/urban/russian-buildings-pack-113375">https://assetstore.unity.com/packages/3d/environments/urban/russian-buildings-pack-113375</a>	0
10	Sky/background	<a href="https://assetstore.unity.com/publishers/19016">https://assetstore.unity.com/publishers/19016</a>	0
11	City material (garbage, signs, barriers wt.)	<a href="https://assetstore.unity.com/account/assets">https://assetstore.unity.com/account/assets</a>	0
12	Wood Flooring	<a href="#">Free Pack Woden Planks   2D Floors   Unity Asset Store</a>	0
13	Tables and Furniture	<a href="#">Furniture FREE   3D Furniture   Unity Asset Store</a>	0
14	Television	<a href="#">TV / arm mount   3D   Unity Asset Store</a>	0
15	Bedframe	<a href="#">Bed PBR   3D Clothing   Unity Asset Store</a>	0
16	Wood Pieces	<a href="#">Wood Set Pieces   3D Props   Unity Asset Store</a>	0
17	Pictures Frames	<a href="#">Picture frames with photos   3D Interior   Unity Asset Store</a>	0

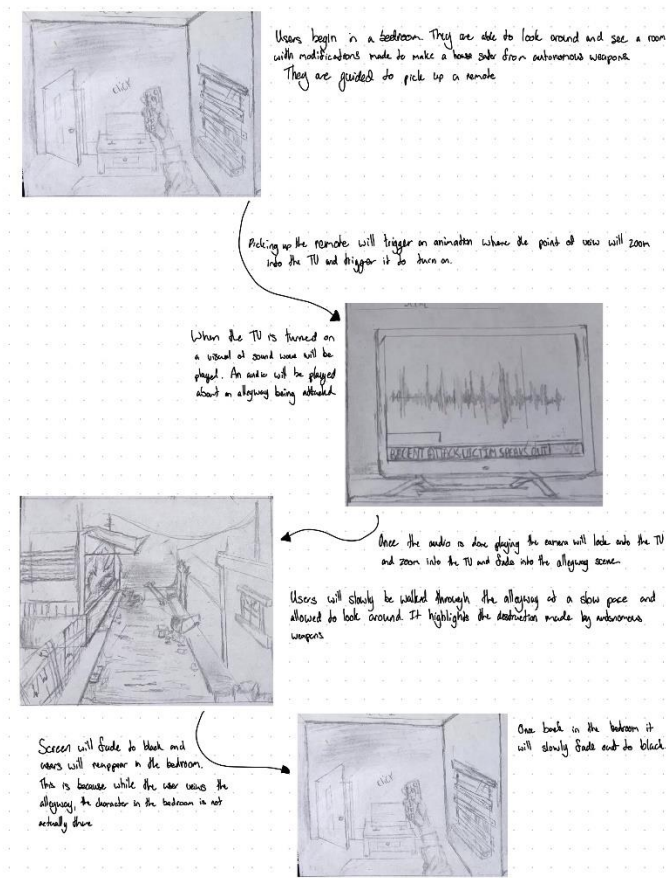
## 5. Conclusion

The prototype testing process in the Maker's Lab provided valuable insights into the functionality and performance of our virtual environment simulation. By addressing issues such as collision detection and enhancing object interaction, we have significantly improved the user experience and realism of the prototype. Moving forward, these insights will inform further iterations and refinements as we strive to develop a compelling and immersive virtual experience for our target audience.

## 6. Flow Chart

Flow chart added that was missing from a previous deliverable to help outline how the run through of the VR experience should go.

GN16103 Group 5 Flow Chart



## 7. Trello Board

An updated photo of our Trello board.

Group Locker - Project Team 5 - GNG1103(1)E - Eng... | Deliverable F.docx - Microsoft Word Online | Untitled document - Google Docs | GNG 1103 Group 5 Project | Trello

Trello Workspaces | Recent | Starred | Templates | Create | Search | GNG 1103 Group 5 Project | Trello

Trello Workspace | GNG 1103 Group 5 Project | Workspace visible | Board | Power-Ups | Automation | Filters | MW SW | KM | Share

Your boards | GNG 1103 Group 5 Project

**GNG 1103 Project Deliverables**

- Deliverable F: Mar 3
- Deliverable G: Mar 10
- Deliverable H: Mar 24
- Deliverable I: Apr 4
- Deliverable J: Apr 10
- Deliverable K: Apr 10

**GNG 1103 Progress**

- Ailey way design: Apr 10 (2/12)
- Room design: Apr 10 (3/7)
- Video production: Apr 10 (0/2)
- Voice overs: Apr 10 (0/3)
- Audio: Apr 10 (1/7)
- Animation in scene 1: Apr 10 (0/3)
- Animation in scene 2: Apr 10

**Done**

- Saturday March 2 at 11am Meeting with TA to discuss and work on VR Implementation: Jan 24 (3/3)
- Trello: Jan 24 (3/3)
- Deliverable A: Jan 21
- Deliverable B: Jan 28
- Deliverable C: Feb 4
- Deliverable D: Feb 11

**Meetings**

- Reminder We have a group Meeting EVERY TUESDAY at 7:30pm to discuss the deliverable: 4/5

You are a guest in this Workspace. To see other boards and members in this Workspace, an admin must add you as a Workspace member. Request to join

## 8. Bibliography

Prototype testing: A step by step guide 2024. (2024). Retrieved from <https://qualaroo.com/blog/step-by-step-testing-your-prototype/>