

Project Deliverable G: Prototype II and customer feedback
GNG 1103 – Engineering Design
University of Ottawa

Group-5

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1 Introduction (Rosie)

The objective of this deliverable is to create the second prototype using the results from the testing done on our first prototype as well as the feedback we received from our client pitch

presentation. The second prototype will focus on implementing animation and interaction as well as building the audio track and ensuring all scenes are compatible with the VR experience. We will build off our previous prototype plan.

1.1 Analytical (Jay, Kareem)

In the development of our second prototype for the GNG 1103 course, we meticulously integrated feedback and insights from previous stages to craft an immersive virtual reality (VR) experience. This endeavor aimed to illuminate the complex societal impacts of autonomous weapons through a deeply engaging narrative. By emphasizing realism and immersion, crafting a narrative with significant emotional impact, ensuring technical accessibility, incorporating iterative design feedback, and adhering to educational and advocacy goals within the constraints of budget and resource management, we sought to create a VR experience that not only educates but also resonates deeply with its audience. This multifaceted approach underscores our commitment to leveraging VR technology not just for technological advancement but as a medium for critical reflection and discourse on pressing ethical issues in contemporary society.

Realism and Immersion: Based on feedback from previous prototypes and deliverables, we emphasized creating a realistic and immersive environment. The inclusion of detailed scenes like the alleyway after an attack (from Deliverable F) and interactive components (such as using a remote to turn on a TV) enhances the user's engagement with the VR experience. The use of collision detection and object interaction properties ensures that users can interact with the environment in a meaningful way, adding depth to the virtual world and making the narrative more compelling.

Narrative and Emotional Impact: The storyline was crafted to evoke emotional responses and provoke thought about the implications of autonomous weapons on society. This includes visual cues like barred windows, stocked shelves indicating a lack of access to groceries, and deserted streets to convey a world deeply affected by autonomous weapons. The audio elements, including voiceovers describing attacks and eerie background music, further immerse the user in the story, making it more impactful.

Technical Components and Accessibility: Implementing the XR interaction toolkit and ensuring smooth transitions between scenes were critical technical choices to make the VR experience as accessible and navigable as possible. By allowing users to interact with the environment (e.g., picking up a remote to activate a sequence), we provide a more

engaging and user-friendly experience. Adjustments made to lighting and camera angles were also vital for setting the mood and aiding user understanding of the environment and storyline.

Feedback Incorporation and Iterative Design: Customer feedback was integral to refining the prototype. By addressing comments on clarity and user direction, we added visual and audio cues to guide users more effectively through the experience. This iterative approach to design ensured the prototype evolved to meet user needs and project goals more accurately.

Educational and Advocacy Goals: The VR experience is designed not just as a piece of technology but as an educational tool and advocacy platform. It aims to raise awareness about the consequences of autonomous weapons, promoting a discussion on ethical, legal, and societal issues. By presenting a compelling narrative and realistic scenarios, the project seeks to influence the audience's perspective on autonomous weaponry, fostering a deeper understanding of its potential impacts.

Budget and Resource Management: Given the project's budget constraints, creative solutions were necessary to optimize resource use. The selection of free assets and careful management of the Bill of Materials (BOM) allowed the team to deliver a high-quality VR experience within financial limits. This included selecting cost-effective software and hardware solutions that did not compromise the quality or effectiveness of the prototype.

1.1.2 Numerical Analysis

Description	Values	Purpose
Ambiant lighting	<ul style="list-style-type: none">Intensity levels: 0.5Lights per scene: 4Light colors: White, Yellow, Blue.Shadows: Hard Shadows	<ul style="list-style-type: none">Low intensity to for dark moodKeeping lighting to a minimal too much lighting can affect framesAvoid warm tones to Create eerie effectsHard shadows, more realistic View
VR Object Properties	<ul style="list-style-type: none">Gravity: 9.8m/s²Weight: (depends on object)Mesh Colliders: ONGlowing intensity: 2	<ul style="list-style-type: none">Apply earth gravity for realismApply accurate weight to interactable objects so it looks accurate to how it would be in real lifeImplement mesh colliders so objects cannot go through each otherHighlighting on interactable objects to show what can be used

VR Camera	<ul style="list-style-type: none"> • Eye level: about 5'10" off the ground level • Clarity: Full • Blinking: OFF 	<ul style="list-style-type: none"> • Eye level will be standard to the character the camera will see through that • Full clarity so project can be seen to full rendering • No blinking distracts the user
VR Character	<ul style="list-style-type: none"> • Body: hands and features are implemented • Controls: Standard XR control panel 	<ul style="list-style-type: none"> • Hand for storytelling and realistic features • Controls will be standard so new users can get a feel
Audio	<ul style="list-style-type: none"> • Game Audio: Steps ON • Voice over: Full audio levels • Music: Half (50%) 	<ul style="list-style-type: none"> • Steps on so you can hear the movement • Voice audio should be full to adjust to all users • Underlying music shouldn't take away from other audio
Rendering quality	<ul style="list-style-type: none"> • View: 0.75 (extra 25% field of view) • Quality: 4K UHD • Focus type: Play focused • Gizmos: HIDDEN 	<ul style="list-style-type: none"> • Add extra view just so more of the scene is captured • Quality is upped so further distance is seen • Focus type play focused is able to let the character look at specific objects • Gizmos hidden hides light symbols while playing

1.1.3 Experimental model (Rachael, Rosie, Maxine)

The following images are updated models of our scenes and overall prototype with additional features implemented from last time.



Scene 1 Features:

- Remote display
 - Highlighted
 - Interactable remote
 - Interactable buttons
- Television
 - Activated by remote
 - Displays visual and audio
 - VR interactable
- Canned foods
 - VR interactable
 - Highlighted



Scene 2 features

- Broken building
 - Bars on windows
 - Half of building intact
 - Damage and broken bricks on the house (frame showing)
 - Debris on the ground below
 - Exposed roof
- Accessories
 - Dumpster and garbage
 - Tarp over building
 - Fences around the area
- Features
 - Skybox with yellow tint lighting
 - Textured road
 - Light sources to create shadows and angles

2 Changes from last prototype and feedback

You must gather feedback and comments on your ideas and prototype from potential clients/users that you have sought out and identified on your own.

In the design process, it is essential to go back on certain steps when new problems/opinions are brought up. Since our last prototype, we have gone in the

makerspace to test our current work, which helped us identify small aspects that we have since changed. During the testing change, we have noticed we were missing a major specification to make our virtual reality possible. We added rendering to all the objects that we interact with so that they appear solid. We have also noticed the time restraint our project has, and have decided to completely erase the last scene, where the character wakes up in his room once again. With the help of potential targeted audience opinions and our client presentation feedback, we were able to gather main points to work on and to keep. Our storyline is strong, and the message is passed through with efficiency. Though some of our visuals were lacking, especially when it comes to the alleyway. The overall effect wasn't shocking enough. We since, decided to focus our attention on small details like inanimate objects leading to the recent attack. We have worked with lighting and camera angles to add the overall mood and have changed our plan of attack on the broken building, which was meant to be the central piece of the alleyway.

3 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 2-3 weeks and the test will only take a few days.
3	Ensure audio passes DMCA copy right act, to keep the	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

	legality of the project			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 prototype. 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 th .
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 and message to be portrayed.	Test the experience of the user and interfaces rendering of the overall design.	Take a census and ask for their feedback and opinions on our message and how they perceived the walkthrough.	Testing will begin until prototype scenes have been 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	We do not want the audio to take away from the message of the prototype it is important	Check that the prototype never passes over 80 decibels this can be harmful to the human	Testing can begin one the video aspect of the prototype is

	audible and do not interfere.	to check that the audio levels are not too loud and create our overall story.	ear even for short periods of time.	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.

3.1 Analysis

Our 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. 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 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 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. The character will walk through 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 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.

3.1.2 Results & 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. BOM updated

Bill of materials			
Item number	Item description	URL/source	Price
1	Unity		0
2	Sound effects	https://pixabay.com/sound/	0
3	Broken building	https://sketchfab.com/3d-models/destroyed-buildings-3fb7160b6d0c4350a0abc80962c47227	0
4	Room design	On shape	0
5	Road material for alley way	https://assetstore.unity.com/publishers/40637	0
6	Garbage and waste	https://assetstore.unity.com/publishers/21584	0
7	Alleyway building	https://assetstore.unity.com/publishers/48757	0
8	Fencing	minhle99.wixsite.com/kobra-game-studios	0
9	Building in background	https://assetstore.unity.com/packages/3d/environment/urban/russian-buildings-pack-113375	0

10	Sky/background	https://assetstore.unity.com/publishers/19016	0
11	City material (garbage, signs, barriers wt.)	https://assetstore.unity.com/account/assets	0
12	Wood Flooring	Free Pack Woden Planks 2D Floors Unity Asset Store	0
13	Tables and Furniture	Furniture FREE 3D Furniture Unity Asset Store	0
14	Television	TV / arm mount 3D Unity Asset Store	0
15	Bedframe	Bed PBR 3D Clothing Unity Asset Store	0
16	Wood Pieces	Wood Set Pieces 3D Props Unity Asset Store	0
17	Pictures Frames	Picture frames with photos 3D Interior Unity Asset Store	0
18	TV Remote	TV remote 3D Electronics Unity Asset Store	\$4.99 CAD
19	Low Poly Lighting	【Low Poly】 Stair Light (Lite) VFX Shaders Unity Asset Store	0
20	Interior Door Pack	Classic Interior Door Pack 1 3D Interior Unity Asset Store	0
21	School Supplies	School Supplies 3D Unity Asset Store	0
22	Ready Player me Avatar	Ready Player Me Avatar and Character Creator Game Toolkits Unity Asset Store	0

5. 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

6. Trello

The Trello board is organized into four main sections:

- Project Deliverables:** Contains cards for Deliverable G, Deliverable H, Deliverable I, Deliverable J, Alley way design, Room design, Video production, Voice overs, and Audio.
- Progress:** Contains cards for Deliverable A and Deliverable B.
- Done:** Contains cards for Saturday March 2 at 11am Meeting and Trello.
- Meetings:** Contains a card for a group meeting every TUESDAY at 7:30pm.

Each card includes details such as due dates, assignees (RW, JC, KM, MW, RO), and progress indicators.

7. Conclusion

This deliverable was enforced the progression of our project diving into the analytical details of our story. Additionally, it covers the functionality and small details we included to improve the overall design of this

project. Finally, this deliverable demonstrates the functionality and purpose of our additions from last prototype while keeping the clients request in mind.