Deliverable H: Prototype III & Customer Feedback

University of Ottawa

GNG1103: Engineering Design

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Group 14

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Abstract

This report details the culmination of Group 14's project, "Echoes of Tomorrow," a VR experience designed to highlight the dangers of autonomous weapons. Throughout the third prototype development phase, the team has navigated challenges in animation, sound design, and user interaction to create an immersive narrative that effectively communicates the project's core message in regard to feedback given to the group regarding previous prototypes. Key accomplishments include the successful integration of user feedback, technical refinements, and innovative solutions to enhance the VR environment. This document provides an overview of the project's objectives, methodologies, and outcomes, alongside a comprehensive analysis of prototyping efforts and the strategies employed to ensure the project's feasibility and impact. As we approach the design showcase, "Echoes of Tomorrow" stands as a testament to the team's dedication to creating a meaningful and engaging VR experience.

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Introduction

In the last 2 weeks, team 14 has made considerable progress with our project, Echoes of Tomorrow, regarding what we have accomplished for prototype 3.
During this time frame, our group has had the privilege and opportunity to present the current status of our project to the class, in order to gain feedback on both our presentation skills and the general direction of our prototype. However, the feedback from our classmates is yet to be released as there are still a few groups needed dot still present, and therefore, criticisms can not be drawn yet and analyzed for the following deliverable.

Likewise, the class schedule had not given us the opportunity to meet our clients and to receive feedback from them regarding our second prototype. Therefore, for the following deliverable, all of the corrections we have made from our prototype are in accordance to user feedback that we have gathered in our own time. Nevertheless, the group strongly believes that the feedback given to us was appropriate and extremely beneficial, as the third and final prototype of our team's project exceeded the expectations that we have set for it.

In the following Deliverable, Team 14 presents to whomever it may concern the final prototype with pride.

In the following deliverable, our group will go over:

- User feedback

Compared to the previous 2 deliverables, our group did not have the opportunity to receive feedback from our clients directly. Therefore, this section will include a brief overview of all the feedback given to the group by our third-party users, which is then followed by an analysis in relation to how it affects our project's effectiveness, how it meets our criteria, and possible constraints it puts on our group. With all these points analyzed, our group will conclude a brief set of improvements that we have enacted for the second prototype, and a set of other improvements for future work that we are realistically able to fit within our time frame.

- Prototype 3

This includes an in-depth overview in what objectives the group aimed to accomplish for the second prototype using feedback gathered from Deliverable G, along with a brief overview of what has been accomplished thus far by our group regarding prototype 3. This comprises of objectives that we have set and achieved for this third prototype, images, C# scripts, and videos of how the project is looking thus far.

- Prototype Analysis

This section analyzes the components and subsystems within the prototype, along with the identified risks and potential failures that may arise in the development and presentation in our game and a set of stopping criteria and assessing system fidelity/feasibility.

- User feedback

This includes an overview of all feedback given to our third prototype from many parties, including our classmates (regarding our presentation earlier in the week regarding our first prototype) and third-party users. This section comprises of all useful points that had been pointed out by these users, and steps that the group will take to implement these criticisms in our next design.

- Final Design test plan

This portion includes the test plan for the final stage of the iterative phase of prototype and testing for the final design. Using all the feedback that had been outline thus far in the deliverable, from user feedback, our group have devised a detailed plan as to how we will tackle and improve upon our current model for the final design.

- Task plans for the final concept

This section of the deliverable showcases the responsibilities of each group member for prototype three, and encompasses other responsibilities that the group had identified during development. The group will use this table to keep trach of who does what task up until the final design.

Intro Summary

Firstly, our group will analyze the feedback given to us by users we have out clients and conclude what the necessary steps will be to effectively implement their comments into the final design of our project, along with the objectives we have set to complete from the second prototype. Then, our group will showcase the third prototype that we have developed thus far regarding the design criteria we had conceptualized in deliverable D and C, and with the feedback given to us in the second client meeting. Then, all components and aspects of our project will be re-evaluated in order to better understand their purposes in resonating with our clients demands, and to determine the importance to our story and message within our small timeframe. Finally, our group will update the task list for the criteria necessary to complete the final project, which allocates responsibility and a team member to each specific task that has currently been identified thus far.

Related Work

Group 14 has already completed the previous deliverables, which is key to understanding before continuing in reading the content of the following deliverable.

In Deliverable B, which can be accessed through the hyperlink, outlined all the needs described by the clients that had to be taken into account when designing a conceptual design, with the needs being neatly organized into categories such as Accessibility, Storytelling, Communication, Logistics.

In Deliverable C, which can be accessed through the hyperlink, all of the identified needs were subsequently divided into a list of functional requirements, non-functional requirements, and constraints. In part A) all needs are listed and organized into a chart that separates all requirements, then in part B), all of the groups findings in regards to these criteria were benchmarked with other groups project's and other public VR simulations. This helped the group to better understand where to focus and how to change our list of criteria, as well as to set target specifications for the optimization of our design.

In Deliverable D, which can be accessed through the hyperlink, the group had brainstormed several different conceptual ideas in regards to the needs, requirements (functional, non-functional), and constraints identified from the previous deliverables, and merged ideas in order to create a global concept that best fit the client's expectations. The global concept chosen in the referenced deliverable is the one the group will continue to refer to for the duration of this Deliverable.

In Deliverable E, which can be accessed through the hyperlink, the group reinforced what needed to be employed to complete the project by deadline day, which encompassed: when each task must be done, what must be acquired, and how much money can be spent to fit under budget while meeting the expectations of achieving an A+ grade and meeting the deadline. In addition, the final design was conceptualized and from that point forward the first prototype started development.

In Deliverable F, which can be accessed through the hyperlink, demonstrates the first part of the iterative prototype and testing stage of engineering design process. In this document, Group 14 has emphasized the risks of autonomous robots. Deliverable F details the development process, incorporating client and user feedback and project planning. From initial objectives set after client feedback, the prototype was refined to convey the story and integrate characters within a one-minute duration. Feedback highlighted the need for emotional engagement, the challenge of animation reliance, and avoiding gender stereotypes, prompting narrative and design changes. The report plans for a second prototype with enhanced animation and interactivity, and future accessibility features. This demonstrates the team's ability to adapt, manage resources, and plan strategically, meeting objectives within budget and time constraints.

In Deliverable G, which can be accessed through the hyperlink, demonstrates the continuation of the iterative prototype and testing stage of engineering design process. Deliverable G details the development process, incorporating client and user feedback and project planning for the second prototype of the project. The prototype was refined to make the atmosphere scarier and more ominous, and to add rudimentary animation. The given feedback highlighted the need for character dialogue, animations acting on a timeline, and background music/ambient sounds.

In Deliverable J, our group had created a presentation to the class regarding the status of our project. By the time of our presentation date, which was March 22nd, we were only eligible to showcase the contents of Prototype II. The goal of this deliverable was to practice the group's presentation skills for Design Day, as we will need to effectively pitch a 3-minute presentation to our judges to convince our audience why our project is so effective in communicating the message of the clients. Using the feedback received from this presentation, which is discussed and reflected upon in the later portions of the deliverable, our group can ensure our presentation for Design Day will be amazing.

All the previous deliverables build off each other, and with a key understanding in the needs of our client, all requirements to turn our conceptualized design into a finalized game, a proper system of task-sharing and task allocation, a budget, a task plan, and a global concept, the group can finally create the first prototype of our VR environment, "Echoes of Tomorrow".

Customer Feedback

Written Recordings of Feedback

On March 22nd, our group presented the status of our project to the class for feedback. During our presentation, everybody within the classroom was tasked to evaluate our project and presentation through a Brightspace quiz, however, as not everyone in the classroom has finished presenting their respective prototypes, we have yet to receive the feedback we were given.

Nevertheless, our group understood this constraint and therefore we interviewed people, including our professor, after our presentation to gather their thoughts regarding the prototype. The feedback that our group had received from was very basic, rudimentary, and aspects of our prototype that our group had planned to resolve. Nevertheless, the following points were said:

- "Environment matches the tone of your story, but it is too dark to see. There is a considerable bias within the audiences that you interview which makes you disregard the perception of older audiences. For instance, and older audience will not be able to see the contents in your project, especially during a bright setting like design day."

- "The snowfall outside appears on the screen when inside the house, fix it as it isn't realistic and can clutter the screen."

- "There is absolutely no audio within your prototype. The overall engagement of your experience could be greatly enhanced if there was dialogue implemented between the characters, ambient sounds, sounds that respond to actions (like creaking floorboards), and especially background music."

- "The animations of the characters have yet to follow the story, without the explanation of the story the experience does not make sense."

- "The animation of the robot and child isn't fluid. We just see them move from point A to B but there is no 'smooth' animation in between this. For example, we should see the kid move his whole body, not just his feet, while walking to a destination. This should include his arms moving with his legs, his hips swaying, and his eyes blinking as he goes."

Feedback Analysis & Implementation

Importance of Implementing Client Feedback

The importance of client feedback in the refinement of prototypes is pivotal to ensuring that the final product aligns with the expectations and needs of the intended audience. Our project exemplifies a comprehensive approach to incorporating user feedback into the iterative design process, enhancing both the technical and experiential aspects of our VR experience. The critical analysis of feedback will not only underscore the value of external input but can also highlight the strategic adjustments needed by our team to improve the final prototype.

- Feedback regarding the environment being too dark for older audiences emphasizes the necessity of designing inclusively. By adjusting lighting and contrast within the VR environment, our group will ensure that our message reaches a broader demographic, thereby enhancing the educational impact of our project. This adjustment will directly address the accessibility concerns raised and demonstrates our team's commitment to creating an experience that is universally engaging.

- The critique about snowfall appearing unrealistically indoors points to a specific technical flaw that could disrupt immersion—a key component in the effectiveness of VR experiences. As stated in the previous prototype feedback, refer to the Appendix, project functionality was the greatest weakness of our project thus far. Therefore, correcting such errors not only polishes the prototype but also deepens the user's immersion by maintaining a consistent and believable environment, thereby increasing the persuasive power of the narrative our group is crafting.

- The absence of audio within our prototype was identified by many people as a significant drawback to our audience engagement. Implementing ambient sounds, dialogue, and responsive sound effects can transform the VR experience from a purely visual to a multisensory experience. This not only enhances engagement but also aids in storytelling, making the narrative more compelling and impactful for people to listen to. Such improvements show an understanding of the role sensory elements play in immersive experiences and our group's willingness to improve in this department.

- Feedback about the animations not aligning with the story or lacking fluidity points to the critical role of visual storytelling. Refining these animations to be more natural and expressive can significantly improve narrative clarity. It ensures that the story is understood even without explicit narration, which is crucial for conveying the dangers of autonomous weapons effectively within the limited interaction time of a VR experience.

- The detailed feedback about character movement highlights a nuanced understanding of animation's role in creating a believable and engaging experience. By focusing on the fluidity of motion our team can enhance the realism of the characters, which in turn will make the experience more relatable and the message more impactful.

Our group's approach to integrating the feedback given to us is both methodical and reflective. By understanding the concerns that each of the criticisms pose on our effectiveness of our project, as shown above, will pave us a clear path from critique to improvement. By categorizing feedback into actionable items—environmental adjustments, technical corrections, audio enhancements, and animation improvements—our group can determine what we will change to improve the prototype.

Furthermore, the planned improvements for future work indicate a proactive stance towards ongoing development, suggesting that we are not only focused on meeting current expectations but are also looking ahead to potential enhancements.

Changes to our Prototype according to Client & Previous User Feedback

The group is implementing several key changes to the story to ultimately improve upon the interactivity, storytelling, and time-management of the project.

Environment Lighting

- Our group has changed the lighting of prototype III to be lighter, however, we have not abandoned the concept of complete darkness like we had in prototype II. There is a struggle to find the right balance of lighting as on the one hand, our group utilizes the dark environment to create an ominous and scary setting that will instill fear in our audiences. However, at the same time it is difficult for certain audiences to understand what is happening inside our experience due to this dark lighting. Therefore, for prototype III we have kept the lanterns inside the house to maintain the low-lighting (as this still creates a sense of freight according to human psychology – refer to How lighting affects the mood of films in the Appendix) however, we've increased the total brightness of the environment outside to make everything still visible in broad daylight. After testing this in all ranges of bright settings to mimic the lighting on design day, we've overcome this criticism brought to us in the User Feedback.

Bug Fixing

- Our group fixed all bugs that were occurring withing our previous prototype, which included incorrect wall colliders with certain models, snow falling when inside the house, inconsistent Framers-per-Second (FPS), and the robot sinking into the ground.
  To fix each of this, we referred to the following YouTube tutorials for each of the problems and were able to resolve each within our project to create a more seamless and effective experience.

  Mesh Colliders: https://youtu.be/Q88f4u9mKqQ?si=Q-cxWDM8kCes5FMx
  Colliders & Hitboxes: https://youtu.be/mkErt53EEFY?si=-VPusjktbVUCBSsm
  Fixing Missing Particles: https://youtu.be/yvLsGuZodaQ?si=MOJtCaf-zKJuzqI1
  Fixing FPS in Unity: https://youtu.be/DoHPx5RQ7P4?si=OU4DYw5OCsPYeE6U
  Frame Rate Limit: https://youtu.be/P5PQV0SW0pI?si=GivoOOd7HjtxYKU3

Audio

For the third prototype we implemented background music to play in the background music as the experience starts through the radio. Our group aimed for a musical piece that was both simple and realistic enough to be played through a radio, which is also ominous and scary due to its simplicity. Using the following tutorial, our group was able to create an audio source and play the audio at certain time intervals within our experience.

Adding Audio & Sound effects: https://youtu.be/N8whM1GjH4w?si=bl5EB8cJEc-f1LYd

The song we chose to use in our game for the meantime:
https://youtu.be/6ozWxuWtQq4?si=LuPe1qJjH_S7JUB2

We plan to compose our own piano song for the final design, as one of group members is a professional piano player. But we specifically chose for a piano to be played as the background music because it is a very common 'eerie' instrument that is used within horror movies. We understand that the current song has a happy tone, however, we intend to manipulate this in a way that will become eerie. Furthermore, this track is copy-right free, which is why we used it. However, for the sake of being original, we will continue to create our own track.

Additionally, we have recorded our character dialogue, however, we have yet to implement them.

Animation

According to the feedback received, we polished our animations. For instance, we incorporated each limb of each character instead of just the main spine, and we have also incorporated idle animations. Furthermore, we have now matched the animations according to the timeline of our story, which now creates a living environment. Our group no longer has to explain what is going on in the story anymore as they're now able to just turn the game on and understand what is happening through the movements of the characters.

To learn about timeline animations and extensive animations through C# coding in Unity, we followed the following videos:

How to Animate Characters in Unity 3D: https://youtu.be/vApG8aYD5aI?si=ZpFixhpfThgwMA88

Unity Timeline Animation: https://youtu.be/RRMMnwWZH10?si=dclvn5GAcAAHDKNk

Note that none the animations costed money. Any new animations that were used are included in the updated Bill of Materials (BOM), however, all that were used are free thanks to the animations offered in the Mixamo Website.

Application and Timeline

The iterative approach of the testing phase allows for continuous integration of feedback across all parts of the project. This process encompasses a wide range of adjustments, from transforming the narrative and setting to focusing on enhancing emotional engagement through auditory elements and more intuitive visuals as mentioned by the User feedback . With an emphasis on creative utilization of existing resources, it's crucial to weave these enhancements into the project timeline from the start. This strategy enables ongoing evaluation and improvements, ensuring a dynamic development process. Early prioritization of these adjustments paves the way for efficient resource and time management, keeping the project on track to meet its goals and deadlines, while faithfully incorporating client feedback. For this deliverable, we have fully applied all feedback following the detailed strategies we've laid out, and have changed our third prototype accordingly. Please refer to Prototype 3 to see at first-hand how we've implemented the feedback into our project.

Feedback Conclusion

In summary, the people that we sought out for feedback helped us in improving upon our game. Although the feedback was minimal and did not change the trajectory of our entire project much like the feedback for Prototype I, the feedback we received for Prototype II is an assurance that our team is headed in the right direction. From the third prototype until the Final design, our team must continually iterate our design according to feedback we seek out in order to ensure our game is completely polished. We changed the environment in accordance with the user feedback by making the game brighter while sticking with the lamps. The group had also implemented audio, animations, to make the game more immersive as per the client feedback. And finally, we fixed numerous bugs that had appeared previously in our last prototype. Refer to the Appendix for all the links we had used to improve our game.

Prototype III

Prototyping Objectives

- Animate the character's limbs in accordance with their bodies.
- Animate the kid and robot according to the entire minute-long timeline.
- Animate the kid so that he opens the door on his own along the hinger pivot axis.
- Animate the robot so that he walks all the way up to the door on his own.
- Fix the shadow of the playable character so that it does not show up as a cylinder.
- Fix the snowfall that occurs within the house.
- Fix collisions between the robot between the walls, the snow, and the terrains so that he does not walk through the house or ground.
- Implement background music.
- Implement character dialogue.
- Implement ambient noises.
- Implement barricade creation interactive element by playable character.

Prototype Images

1.1.1 Figure 1 | Video of Example Animations

Deliverable H.mp4

1.1.2 Figure 2 | Snippet 1 of Video Animation

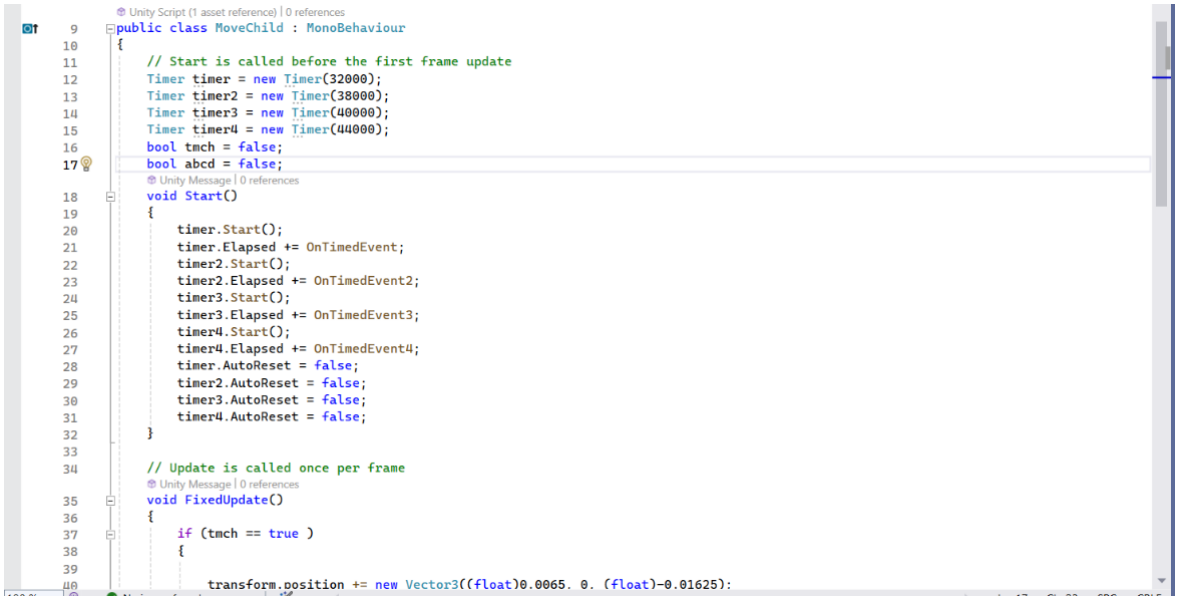
1.1.3 Figure 3 | Snippet 2 of Video Animation

1.1.4 Figure 4 | Landscape of Entire House

1.1.5 Figure 5 | Screenshot of Animation Coding

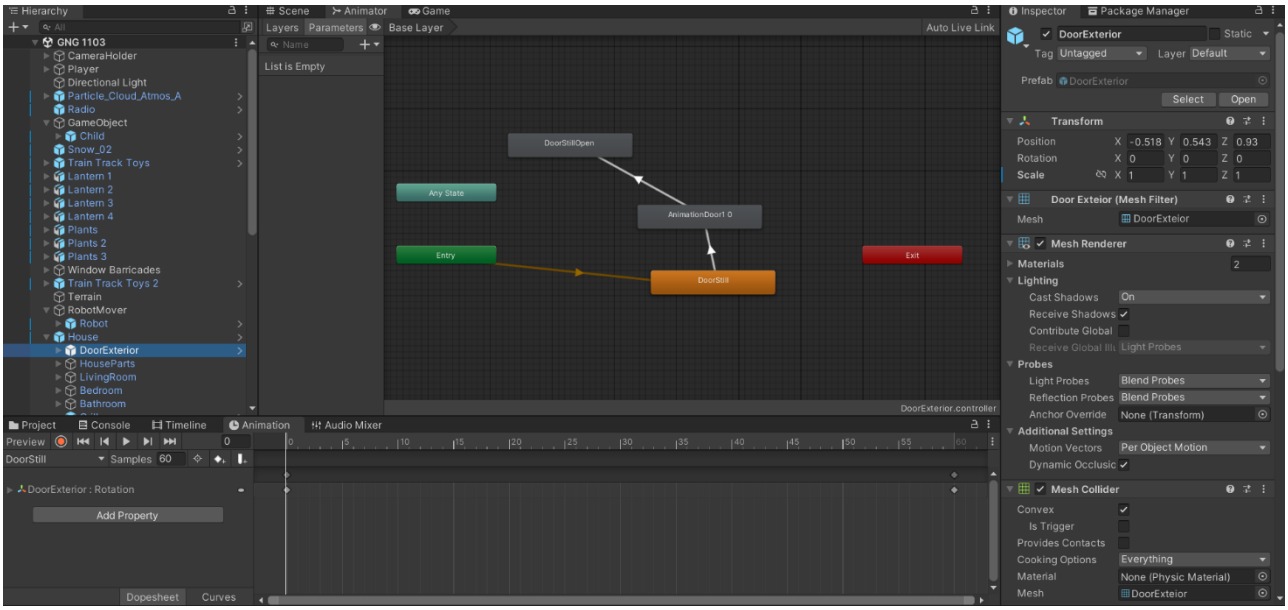
```
35      void FixedUpdate()
36      {
37          if (tmch == true )
38          {
39
40              transform.position += new Vector3((float)0.0065, 0, (float)-0.01625);
41
42          }
43          else if (abcd == true && tmch == false)
44          {
45              transform.position += new Vector3((float)0.01625, 0, (float)0.0065);
46          }
47      }
        1 reference
48      private void OnTimedEvent(object source, System.Timers.ElapsedEventArgs e)
49      {
50          Console.WriteLine("The Elapsed event was raised at {0}", e.SignalTime);
51          tmch = true;
52      }
        1 reference
53      private void OnTimedEvent2(object source, System.Timers.ElapsedEventArgs e)
54      {
55          Console.WriteLine("The Elapsed event was raised at {0}", e.SignalTime);
56          tmch = false;
57      }
        1 reference
58      private void OnTimedEvent3(object source, System.Timers.ElapsedEventArgs e)
59      {
60          Console.WriteLine("The Elapsed event was raised at {0}", e.SignalTime);
61          abcd = true;
62      }
        1 reference
63      private void OnTimedEvent4(object source, System.Timers.ElapsedEventArgs e)
64      {
65          Console.WriteLine("The Elapsed event was raised at {0}", e.SignalTime);
66          abcd = false;
```

1.1.6 Figure 6 | Screenshot of Timeline Coding

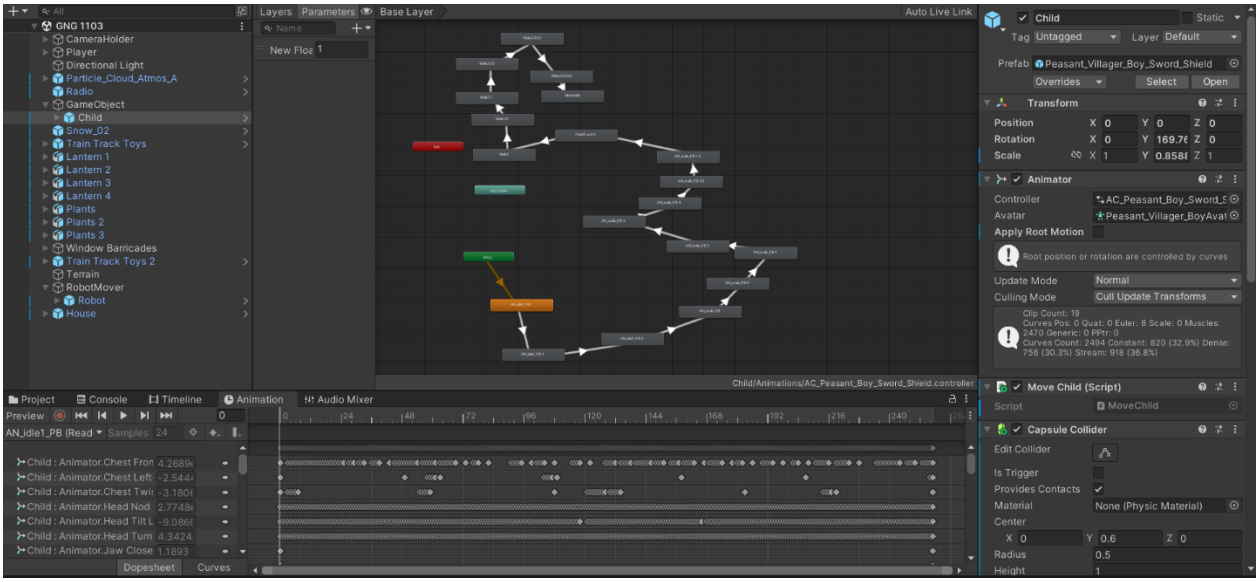


```
Unity Script (1 asset reference) | 0 references
public class MoveChild : MonoBehaviour
{
    // Start is called before the first frame update
    Timer timer = new Timer(32000);
    Timer timer2 = new Timer(38000);
    Timer timer3 = new Timer(40000);
    Timer timer4 = new Timer(44000);
    bool tmch = false;
    bool abcd = false;
    Unity Message | 0 references
    void Start()
    {
        timer.Start();
        timer.Elapsed += OnTimedEvent;
        timer2.Start();
        timer2.Elapsed += OnTimedEvent2;
        timer3.Start();
        timer3.Elapsed += OnTimedEvent3;
        timer4.Start();
        timer4.Elapsed += OnTimedEvent4;
        timer.AutoReset = false;
        timer2.AutoReset = false;
        timer3.AutoReset = false;
        timer4.AutoReset = false;
    }

    // Update is called once per frame
    Unity Message | 0 references
    void FixedUpdate()
    {
        if (tmch == true )
        {

            transform.position += new Vector3((float)0.0065, 0, (float)-0.01625);
```

1.1.7 Figure 7 | Screenshot of Sequential Events Coding



1.1.8 Figure 8 | Screenshot of More Complex Sequential Events Coding



1.1.9 Figure 9 | Video of Character Moving around the Environment

Deliverable H (2).mp4

1.1.10 Figure 10 | Video of Robot Moving around the Environment

Robot Walking.mp4

Evaluating Prototyping Objectives

The following list evaluates whether the objectives for prototype 3 have been met.

- Animate the character's limbs in accordance with their bodies. 
- Animate the kid and robot according to the entire minute-long timeline. 
- Animate the kid so that he opens the door on his own along the hinger pivot axis. 
- Animate the robot so that he walks all the way up to the door on his own. 
- Fix the shadow of the playable character so that it does not show up as a cylinder. 
- Fix the snowfall that occurs within the house. 
- Fix collisions between the robot between the walls, the snow, and the terrains so that he does not walk through the house or the ground. 
- Implement background music. 
- Implement character dialogue. 
- Implement ambient noises. 
- Implement barricade creation interactive element by playable character. 

Our group has successfully completed most of the objectives set for deliverable 3, however, we have yet to complete most of the interactive aspects of our game.

In assessing the progress against our prototyping objectives for Deliverable 3, we observe a pattern of accomplishment and ongoing development. The team has adeptly met several key technical animation targets, such as character limb movement coordination and the autonomous actions of both the kid and the robot, which are integral to the storytelling aspect of the game. These achievements align well with the visual expectations and contribute to the overall immersive experience.

Despite these successes, we recognize that interactive elements—vital to player engagement—remain under development. The integration of character dialogue, responsive ambient noises, and interactive barricade animations are still forthcoming. These features, essential for a rich user experience, are prioritized for completion in the next phase of development.

Regarding the soundscape, the decision to craft an original piano soundtrack demonstrates a thoughtful approach to authenticity and copyright adherence. However, the composition process is ongoing. Until the final piece is ready, a placeholder track maintains the game's atmospheric integrity.

The recorded character dialogue awaits incorporation into the game's timeline, which will synchronize with the animation sequences to enhance the narrative's impact. This synchronization is a delicate process, as it requires precise timing to align with the visual elements effectively.

As we progress towards the final design submission, these unmet objectives will be addressed with a focus on refining the user's interactive experience. Continuous testing remains a priority to ensure that the final product not only meets but exceeds the standards set by both our team and the project's stakeholders. The coming weeks will be a critical period for polishing these components, ensuring that the final iteration is both technically sound and engaging.

Experimental Modelling

The modelling process has gone completely unchanged since the previous prototype. An experimental model in still being used to test the product and this experimental method still includes user feedback testing and developer error testing. Notably since the previous prototype we have received feedback from Professor Jim Sykes regarding the VR experience in which he brought up massive issues with the prototype 2 that we have put extra effort towards fixing in prototype 3. Using the chosen experimental we will continue to test and search for errors to solve right up until design day where our VR experience will be presented at its peak.

Skills Learnt/Improved:

As the group worked on mostly the coding-aspects of this project for this prototype, many new skills were learnt by all the group members. The most notable of which include:

Advanced Animation Techniques

Mastering the animation of character limbs and synchronizing movements with a narrative timeline have enhanced the team's capability in creating lifelike and coherent animations within the VR environment.

Technical Problem Solving

Addressing issues such as fixing shadows and preventing characters from clipping through virtual environments has honed the team's problem-solving skills, particularly in the context of game physics and 3D space.

Sound Design in Unity

Implementing background music, character dialogue, and ambient noises has introduced the team to the complexities of audio design, including the integration and timing of sound for an immersive user experience.

Interactive Element Creation

Developing interactive elements like the barricade creation mechanic has improved understanding of user engagement and the implementation of interactive design principles.

Attention to Detail

The meticulous work required to ensure narrative elements are accurately represented through visual and audio components has heightened the team's attention to detail.

Adaptability and Iterative Development

Responding to feedback from varied sources, including end users and experts like our Professor, Jim Sykes, has reinforced the value of adaptability and the iterative nature of design in achieving a high-fidelity final product.

These skills represent the team’s commitment to creating an engaging and polished VR experience that effectively communicates its narrative.

Prototype Analysis

Analysis of Critical Subsystems

The critical subsystems are the scripts and animations that went behind the door, child and robot. First of all, the animation to open the door at the same time that the child is in front of it which is important as it makes it seem that the child opens the door and also allows the child to exit the house to meet the robot. Second of all, the scripts and animations to get the child to only start walking 32 seconds after the start of the simulation as well as turn and then walk towards the robot are even more important and complex. This is because timers had to be applied to both the code and the animations so certain actions happened at certain times despite the varying fps amounts, and that the child is one of the most important parts of the story of the simulation. The scripts and animations for the robot were as important as those for the child although less complex. The importance of the robot in the story is comparable to that of the child but the movement of the robot is not as varied as it only has to move in one direction, towards the door, until it gets close to it, where it stops and waits.

Table 1 | List of all Critical Components

The following table lists all the critical components and their importance to the project's purpose.

Critical Components	Purpose (What)	Importance (1-3)	Why is this important?
Robot	The purpose of the robot is to be the main source of fear in the simulation.	3	This is important because it draws an element of fear and allows us to express our concern in a way for the user to understand the severity of the issue
Child	The purpose of the child is to be the main source of emotion in the simulation.	3	This is crucial because the child serves as an important asset for fostering an empathetic and emotional response from the viewer. Through the child's innocence and vulnerability, the viewer will sympathise and gain a better understanding of our message.
Door	The purpose is to allow the child to go outside.	2	This is important as the door opening and the child going outside is the catalyst to the emotional event of the simulation, that being the death of the child. The door is the last barrier and it being opened means that there are no more barriers protecting the child from the robot
Lights	The purpose is to brighten up the house.	1	This is important to allow the inside of the house to be more visible while the contrast between the lighting of the inside and outside causes the outside to look darker, causing the only clearly visible part of the robot to be the eyes.

Table 2 | Design/Target Specifications

The following table lists all the prototype's design specifications, including functional requirements, non-functional requirements, and constraints.

Design Specifications	**Relation (=,<,>)**	**Value**	**Units**	**Verification Method**
Functional Requirements				
Player Displacement (Area to Move)	<=	2	m^2(unity measurement)	Code testing in Unity Terrain Space
Robot Behaviour	=	Coded path	N/A	Running game
Child Behaviour	=	Coded path	N/A	Running game
VR Headset	=	HTC Vive	N/A	Continuous testing at Maker Space
Narrative Progression	=	100%	N/A	Audio test throughout VR experience
Language Subtitles	=	English, French	N/A	Consult native French speakers in group
Music (from radio)	<=	100%	N/A	Audio Testing in Unity
Environment Interactivity	<=	20%	NA	Beta testing prototype
Constraints				
Violence	=	None	N/A	Game analysis
Cost	<=	44	Dollars	Estimation and Final Balance
Operating Conditions	=	Restricted Environment	N/A	Interactive analysis
Platform Compatibility	>=	90%	Technology	Compatibility testing

Experience Duration	<=	1	Minute	Estimate analysis
Gender Implications/ Racism	=	None	N/A	Visual/Physical testing
Delivery Time	=	3	Months	Estimate analysis
Non-Functional Requirements				
Performance/Reliability	=	100%	N/A	Consistency testing
Visibility	=	70%	N/A	User Feedback
User Enjoyment	>=	90%	N/A	User Feedback
Realism	=	Yes	N/A	User Feedback
Safety (Safe visual and movement effects)	=	Yes	N/A	Viewer experience testing
Accessibility	=	Yes	N/A	User Feedback

Table 3 | Bill of Materials

The following table includes a list of materials that will be used in the process of developing the VR experience. This table breaks down how the given budget will be used (tax not included). As of this point in the project, no changes have been added to the bill of materials. All animations have been hand-made, and all other aspects of our project have stayed the same.

Item Number	Description	Quantity	Store	Price (CAD)
#1	House Model with Interior	1	Unity Asset Store	$25
#2	Footstep Sound Effects Outside, Inside	2	Unity Asset Store	Free
#3	Smartphone Model	1	TurboSquid	Free
#4	Radio Model	1	Unity Asset Store	Free
#5	Boarded Window Model	1	TurboSquid	Free
#6	Furniture Model Pack	1	TurboSquid	Free
#7	Gunshot Sound Effect	1	Unity Asset Store	Free
#8	Drone Model	1	TurboSquid	Free
#9	Gas Lantern Model	1	Unity Asset Store	Free
#10	Newspaper Model	1	TurboSquid	Free
#11	Book Stack Model	1	TurboSquid	Free
#12	Realistic Young Kid Model	1	Unity Asset Store	$19
#13	Animation Script Walking | Playing | Sitting	3	Mixamo	Free
Total	-	-	-	**$44**

System Integration

The focus of Prototype 1 (Deliverable F) was creating a working environment, and the focus of Prototype 2 (Deliverable G) was implementing story elements along with player and camera movement. Prototype 3 focuses on smoothing out the transitions between story events as well as implementing audio. Animations have been implemented which work in sync with the movements of the character which allows for a less jarring transition between story events since characters now move from place to place rather than simply teleporting. The audio system has also been successfully implemented into the project. Quiet, somber music has been implemented into the background to add emphasis to the emotionality of the story as well as sound effects for the autonomous weapon and radio and even some placeholder voice acting for the characters. Some major issues brought up by user testers have been fixed as well such as the setting being to dim and the snowfall particles appearing inside of the house.

Reducing Risk and Uncertainty

Once again there is largely a lack of risk in this product due to it being a story experience by the user rather than a product that can be physically interacted with. However, although not physical, there are still risks present, including:

- The VR experience has a chance to crash during a presentation.
- The storyline could elicit the wrong emotions from the audience.
- The storyline could send the wrong message to the audience.
- The autonomous weapon could be misinterpreted as not being a weapon system.
- Audience members could be unable to see the experience due to the dim lighting.

The risk of the experience crashing has been reduced by removing several unnecessary assets from the project allowing it to run more smoothly. The risk of eliciting the wrong emotion has been reduced by allowing no direct violence in the experience so that the audience is not upset or disgusted by the child's death. The risk of sending the wrong message has been reduced by showing the autonomous weapons as a danger as unambiguously as possible. The risk of the autonomous weapons not being recognized as such has been reduced by implementing propaganda posters which directly show the robot as a weapon. This feedback was given to us by the professor during our presentation, as outlined in the referenced section, and it raised many valid points regarding our demonstration of autonomous weapons. The risk of audience members being unable to see the experience has been reduced by increasing the brightness of the experience so that it is easy to understand what is happening even in a bright room.

1.1.11 Figure 11 | Prototype Propaganda Poster to Clarify the Robot is a Weapon System

Stopping Criteria

Stopping criteria are predefined conditions used to determine when a prototype or phase in a project is considered complete and ready to transition to the next stage. They serve as measurable benchmarks for functionality, performance, stability, and user satisfaction, ensuring that all critical objectives have been met, feedback has been incorporated, and the product or system is performing as intended without critical issues.

1. All critical functionalities outlined in the prototyping objectives are implemented and work as expected without critical bugs.

2. The storyline is delivered effectively through the VR experience, ensuring the intended message about the dangers of autonomous weapons is clear and impactful.

3. The user experience allows for the intended interactions seamlessly, such as the implementation of the barricade creation interactive element and the user's ability to navigate and control the experience without issues.

4. The VR experience operates without crashes or performance issues that could detract from the user experience, particularly during public presentations or demonstrations.

5. The experience is accessible to a diverse audience, addressing issues like language options, subtitle availability, and adjustable brightness settings to cater to different needs.

6. All identified risks, such as the potential for the VR experience to crash during a presentation or the storyline eliciting the wrong emotions from the audience, have been addressed to a satisfactory level.

7. The visual, audio, and interactive elements of the experience combine to create a cohesive and immersive environment that supports the narrative.

8. All feedback from clients and users that has been agreed upon as essential for the project's success has been integrated into the experience.

9. The project remains within budget and meets the set deadlines for deliverables, including having the final prototype ready for Design Day.

10. All documents, including task plans, risk assessments, and prototype analyses, are completed and aligned with the project's objectives.

These criteria would serve as a comprehensive checklist to ensure the project meets both the technical and narrative goals set out by our team, and once these criteria are met, the project can be considered ready for final presentation and deployment.

Achieving Fidelity

To measure whether the prototype has achieved acceptable fidelity, the following metrics will be used by the group:

User Feedback

Gathering and analyzing user feedback will provide direct insight into the experience's reception and areas needing improvement, and in the following section, our group will gather and analyze User Feedback that we have gathered on our own for the sake of achieving fidelity.

Engagement Metrics

Monitoring how users interact with the prototype will offer valuable data on engagement levels and highlight parts of the experience that may require optimization. This portion has been examined in the User Feedback section as well, specifically with the graph showcasing the effectiveness of the game.

Comparative Analysis

Comparing the current prototype to industry standards and similar VR experiences will help determine where the prototype stands in terms of quality and immersion. This portion of the project has been done in the benchmarking phase of the project in Deliverable C, refer to the Related Work section.

Expert Review

Seeking the opinions of professionals within the field of VR can provide an authoritative perspective on the prototype's fidelity.

Objective Checklist

Using a comprehensive checklist to systematically ensure all aspects of the prototype meet the pre-defined objectives. This has been discussed and evaluated in the previous section, Prototype III.

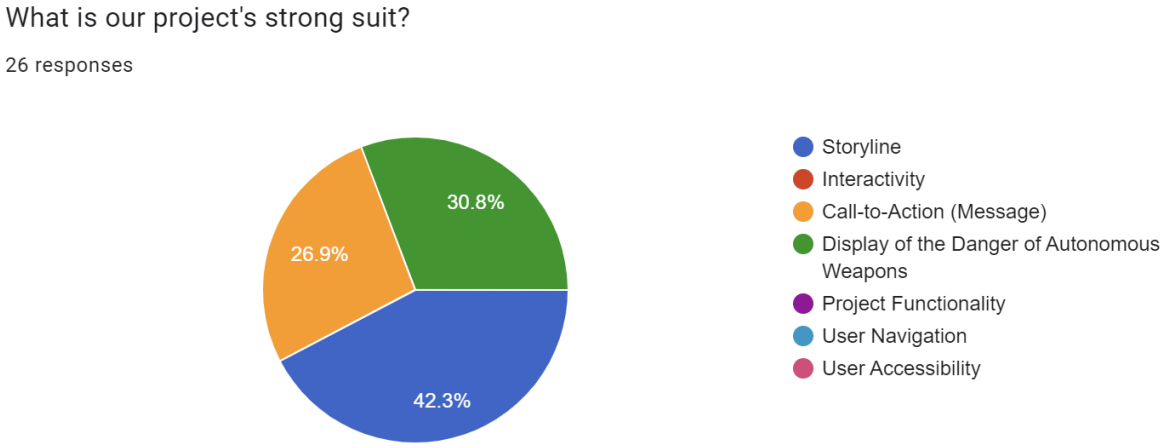
These metrics together will give a well-rounded view of the prototype's fidelity, helping to guide final adjustments and validate that the experience is ready for its Final Design.

User Feedback

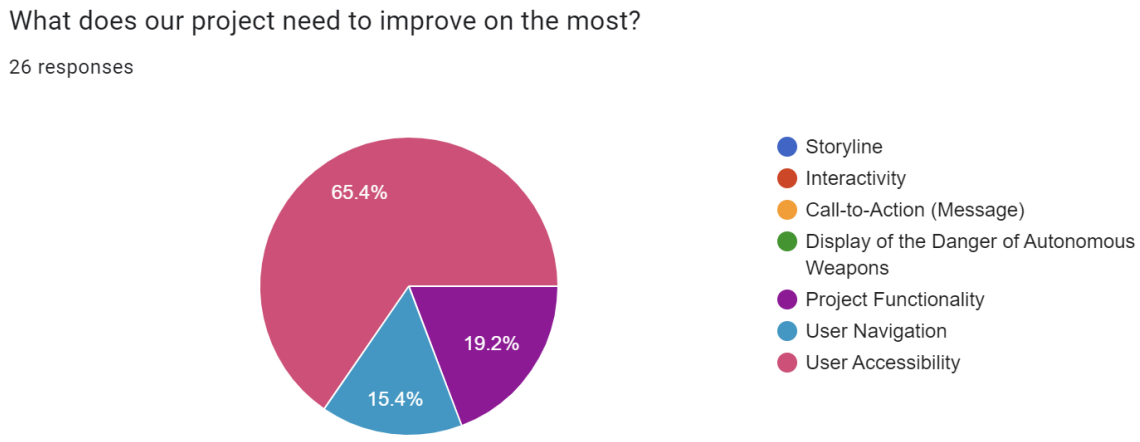
To gather sufficient feedback for our third prototype, our group had conducted an online google survey yet again and sent it to every group member's friend, of which consisted of friends who already have backgrounds in game development/video editing – specifically in Roblox, and TikTok creation.

Link to Google Survey: https://forms.gle/4ZxwuuHMxNRJnvuq6

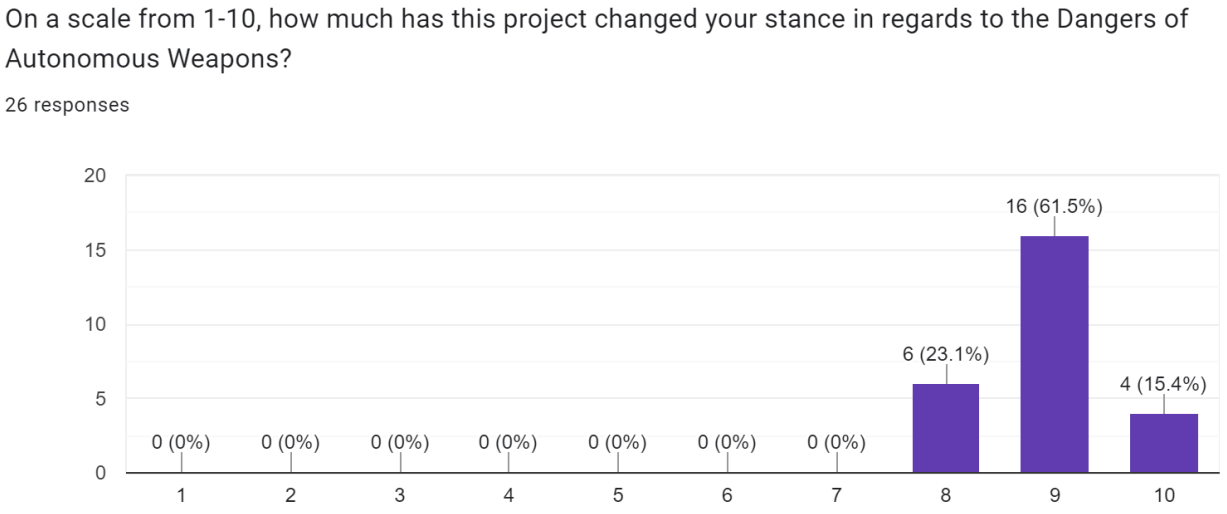
1.1.12 Figure 12 | Positive Feedback regarding Prototype III



1.1.13 Figure 13 | Criticisms regarding Prototype III



1.1.14 Figure 14 | Scale of Message Effectiveness regarding Prototype III



Analysis of Results

According to the results of the survey, which had a total of 26 responses, it is evident that the strong suit of our project still lies in our group's ability to convey our Call-to-Action effectively through our engaging storytelling. This is great feedback to hear because our main mission of capitalizing on our audience's feelings through emotional engagement is still working. This notion was further supported by the comment portion of the survey (which asked the participant to write a comment about criticism about our prototype) have yet to criticize the emotional engagement of the project. Furthermore, we had the good news that we significantly increased our project functionality, as that was the biggest criticism of our second prototype as shown in the previous pie chart in the Appendix. Although there were no votes for that portion to be our strongest suit, with a few votes remaining against it, when asking our users about the concerns regarding project functionality, they stated it was simply due to the lack of character dialogue, ambient noises, and the subtitles. However, now the major concern is simply user accessibility, which is a new concern that our group had not been particularly wary of. After consulting our participants, we discovered that the main concerns were the lack of attention to a large variety of audiences that we would typically see at design day. Some audiences may only speak French, whereas other may only speak English. Some audiences may have difficulty seeing the dim lighting, whereas others may not have any difficulties. Some may have challenges in hearing our game when in a loud setting, while others may not. Due to this survey, it was brought to our attention that we need to be more accessible to a more diverse audience when presenting on design day so that all possible viewers will be able to fully grasp and immerse themselves in our experience.

Therefore, our group has the incentive to resolve this issue, which was voted to be the most major issue of our prototype as per the survey. We will not change the storyline, plot, or major points, rather, we will now focus on implementing the following change:

- Include a settings bar in the game that enables the ability to switch **brightness**, **volume**, **English or French dialogue**, and **English or French subtitles** during the game.

The range of values that all participants voted for regarding how the prototype changed their stance on autonomous weapons has increased from the range of to 6-9 to 8-10, which is a significant increase. This is amazing news to the group as we are practically at the doorstep to achieving our goal of a 10/10, and it assures us that our changes to the storyline and environment that was given to us by the client was implemented properly. We can now do the final finishing touches on our game before submitting it on design day, and our group now has the confidence to proudly present our project to our client with our heads held high.

To see the differences between the feedback for prototype 1 and prototype 2, refer to the Appendix for the results for the last survey. Or, refer to Deliverable F (Prototype 1), and Deliverable G (Prototype 2), in the Related Work section to see how the prototypes differed and evolved.

Table 4 | Feedback from Presentation

The following table lists all the feedback in which we have received for group presentation regarding the status of our project, which at the point was only Prototype II. All the feedback received thus far came from the professor and was regarding the presentation itself, not the project. Therefore, this feedback concerns Deliverable J rather than the specific contents of our game and teaches the group on how to better present for when Design Day approaches.

Viewers (Numbered for each comment)	What aspect Does the feedback touch on?	Feedback Description	How will we adapt to this feedback?
1	Presentation Font	The font used in the presentation was not easily readable, particularly from a distance.	We'll select a larger and clearer font for all text in our presentation to ensure better visibility for the audience.
2	Voice speed	Presenters spoke too quickly during the presentation, making it difficult for the audience to follow along. Conversely, this made the presenters slur their speeches.	We'll practice speaking at a moderate pace, ensuring that each point is conveyed clearly and comprehensively.
3	Text and Visual Sizing	The slides contained too much text and lacked visual elements, diminishing audience engagement.	We'll redesign our slides to include concise text and emphasize larger visuals. We will add the most important parts such as images and charts that resonate with our speech but making sure it does not draw away engagement or comprehension of our presentation.
4	Time Management	The presentation was rushed and completed with a large portion of time remaining.	We'll create a detailed schedule for our next presentation, rehearse numerous times to ensure we adhere to the time frame effectively. Noting that we rushed our speeches, we can also work on talking slower with more confidence.
5	Volume	The presenter's volume was quiet, making it challenging for some audience members to hear clearly.	We'll practice projecting our voices more effectively and ensure that everyone in the room can hear us clearly throughout the presentation.

Final Design Test Plan

Table 6 | Prototype 3 Test Plan

The following table describes the test plan for prototype 3, which is going to be completed March 24th.

Test ID	Test Objective (Why)	Description of Prototype used and of Basic Test method (What)	Description of Results to be Recorded and how to use them (How)	Estimation of Time needed for Testing
1	User Interactions	Add all code for accessibility and settings options and every group member must individually evaluate these additions by going into the game and conduct trials by using the settings and check the responses and reactions	The results will either be a success or a failure. The settings option is a separate pop-up window which will take some coding and there will definitely be errors. Once all errors including any type of glitches are ruled out, the trials will be marked as a success. Any type of problem will lead to the part being a failure	Around 1 hour
2	Character Actions	Add all code and move characters around the environment to check reactions and functions. Evaluations can be done by all group members and will be discussed in the group meetings.	Results will be success or failure depending upon successful movement of the character which includes moving in any direction and jumping. If the movement is seamless and viewing the environment is easy for the user, this part will be marked as a success. Any glitches and issues will be considered a failure	Around 1 hour
3	Character design	Add character design along with voice lines and conduct evaluations by running the story multiple times	Successful character functions and role enactment will be considered a success. Any glitches or issues with how the characters interact with each other hindering with the success of the story will be considered a failure	Around 2 hours
4	Test autonomous weapon functioning. I.e. the code for the targeting system	Multiple scenarios will be introduced using user testing to test whether the autonomous weapon can differentiate between humans and any other being	If weapons can target humans specifically no matter the form or shape, it will be a success. If it targets objects and animals, it is a failure. The goal is to make it target humans only	40 minutes

5	Environment interactability	Determine if all elements in the environment interact perfectly with characters and follow events in the story like trees getting destroyed etc.	If the code added for the environment functions properly (for example, when the robot shoots a little kid and the ball the kid is holding drops to the ground), the tests will be considered a success. Any unintended anomalies will lead to the tests being marked a failure	1 hour
6	Test audio functions with the radios, characters, and environment	Determine function by adding all files to the game and test functions by playing the game. All players will evaluate the usability individually and will discuss about the results during the meetings	If intractability works as intended, the tests will be considered a success and if the tests reveal any problems with the code, some of the tests will be considered a failure. Since evaluations will be done, the whole test will not be considered a failure	1 hour

Table 5 | Final Design Test Plan

The following table describes the test plan for prototype 3, which is going to be completed by Design Day.

Test ID	Test Objective (Why)	Description of Prototype used and of Basic Test method (What)	Description of Results to be Recorded and how to use them (How)	Estimation of Time needed for Testing
1	Test autonomous weapon functioning. I.e. the code for the targeting system	Multiple scenarios will be introduced using user testing to test whether the autonomous weapon can differentiate between humans and any other being	If weapons can target humans specifically no matter the form or shape, it will be a success. If it targets objects and animals, it is a failure. The goal is to make it target humans only	40 minutes
2	Environment interactability	Determine if all elements in the environment interact perfectly with characters and follow events in the story like trees getting destroyed etc.	If the code added for the environment functions properly (for example, when the robot shoots a little kid and the ball the kid is holding drops to the ground), the tests will be considered a success. Any unintended anomalies will lead to the tests being marked a failure	1 hour
3	Test audio functions with the radios, characters, and environment	Determine function by adding all files to the game and test functions by playing the game. All players will evaluate the usability individually and will discuss about the results during the meetings	If interactability works as intended, the tests will be considered a success and if the tests reveal any problems with the code, some of the tests will be considered a failure. Since evaluations will be done, the whole test will not be considered a failure	1 hour
4	Test UI and function of game's main/home screen	Determine usability by giving individual feedback after interacting and playing around with the functions	If all features work as planned, tests will be considered successful. If bugs affect one or more features, further improvements will be needed and tests will be considered failures until perfect function is achieved	1 hour
5	Test functioning of subtitles	Determine functioning by playing the game and checking whether the timing of the subtitles matches to the speed and timing of the voicelines	If perfect timing is achieved, the test(s) will be considered a success. Any other result will be considered a failure	30 mins

Why these test objectives?

Why the group chose these specific test objectives:

Since the group has finished most of the work and testing, the last set of tests mentioned above will be conducted to test the occurrence of any potential bugs and to test the perfect functionality of the completed project once all the individual elements have blended in and are working at the same time.

Why these tests should be done by the end of final design.

The tests planned for the final design will determine if all the core aspects of the planned experience will function perfectly with seamless transitions and adapt to different situations and users.

How has the group planned to reach completion?

Current timeline

Some of the tests that had to be completed by the end of prototype 3 are being added to the final design. This was because of delays and changes to the environment in the main setting. Along with the remaining tests, the last set of tests such as overall functionality and tests concerning the main menu and some additional quality of life features for users while considering different scenarios such as disabilities and vision problems.

How will delays affect the timeline and contingency plans?

Due to delays at the end of prototype 3, the group followed a tighter schedule where most of the main components of the storyline were finished. The work that needs to be finished includes a couple improvements to animations, NPC movement, the addition of the main screen along with options for users to choose their preferred settings to view the experience. The main contingency plan that the group has agreed upon is to reset priorities. Currently, some group members focusing on the working of the experience whereas others are focusing on the submission of assignments. Priority will be given to the function of the experience by all group members to finish work faster. Meetings will also be conducted more frequently to discuss progress and further hurdles to save time and work efficiently.

Objectives for the Final design and next steps

Our goal for our Final Design:

The main goal is to finish the game with the home screen, storyline with voice lines for characters and subtitles, addition of the interactable radio and an ending screen.

Objectives to add according to our User Feedback for Prototype 3:

- Improvements to navigation (better menu usability)
- Improvements to project functions such as seamless movement
- Increase brightness.
- Add sounds for characters and settings.
- Add a guiding system for users to follow the storyline.

Final Design

Objectives to add for the Final Design:

- Add voice lines and subtitles.
- Add main menu and settings option to change settings according to user accessibility. For instance, English or French dialogue and the option to change brightness.

Importance of the objective's layout

Voice lines and subtitles are the second most important addition since the interactivity aspect of the project relies on the character interacting with each other and the most efficient way was to use voice lines. Lastly, an improvement considered by the team was the addition of a main lobby where the users could change settings and could view the instructions of the game. This addition would improve ease of use and would also act as an introduction to the expectations of the game and the plot.

Project Plan

Table 7| Task List

The following table includes the tasks and allocated responsibilities that the team has identified from the first prototype to be accomplished by design day to be more organized with game-specific task-needs. As the project is continued, the task list will expand, and update completed objectives. Everything that is highlighted includes the new changes to the task list compared to Prototype II.

Status	Estimated Task Duration	Task	Task Details	Member Working on Task
Asset Modelling				
Complete	2 hours	Snowy Trees	Place snow on the trees to match snowy climate	Marc Kalen
Complete	2 hours	House roof	Edit the roof of the house to be run-down	David
Complete	1.5 hours	Addition of autonomous weapons design	Insert the robot asset into the proper places around the map	Kalen
Background				
Complete	5 minutes	Gloomy sky	Find and insert a proper sky that matches the atmosphere	Kalen
Complete Fixed	1.5 hours	Snow Particles	Add falling snow from the sky to create fog and decrease visibility. This will produce a scarier setting.	Kalen
Complete	10 minutes	Land aesthetics (assets to make the ground)	Improve quality of the outside background by adding bushes, trees, and other assets.	David
Audio				
Complete	2 hours	Child Voice Acting	Write and record dialogue for the child and implement it into the game.	Rishabh
Complete	2.5 hours	Soundtrack	Find an appropriate song and implement it into the game.	Rishabh
Incomplete	45 minutes	Ambient Noise Insertion	Find appropriate sounds and implement them into the game according to trigger events.	Rishabh
Incomplete	30 minutes	Autonomous weapons sounds	Find appropriate sounds and implement them into the game according to how the robot moves.	Rishabh
Coding				

Complete	2.5 hours	Child Animations	Insert the code for the child animations into the game and change them according to trigger events.	Marc
Complete	1 hour	Camera Movement	Implement the 360-degree camera, and program it to be controlled by the user.	Marc
Complete	1 hour	User perspective movement (movement of the character being used by the user)	Implement proper user navigation controls that are easy for the user to learn and control. These should include solely walking and grabbing controls.	Marc
Complete	2 –3 hours	Autonomous weapons tracking system	Code the robot so that it tracks the people inside the house, and the son once he goes outside.	Marc
Setting Development				
Complete	1 hour	Arrangement of Furniture	Add furniture and adjust placement to appropriate rooms.	Kalen
Complete	20 Minutes	Addition of radio	Add radio to the appropriate place	Kalen David
Complete	30 Minutes	Addition of props such as kitchen appliances etc.	Add kitchen appliances to appropriate rooms.	Kalen

Verifying Feasibility

The feasibility verification for "Echoes of Tomorrow" involves assessing technical execution, narrative integration, user interaction, and project management against our capabilities and constraints. In doing so, our group will be able to confirm that:

- All technical elements, including animations and interactive features, are achievable and effectively implemented.
- The storyline is coherent and compellingly delivered through the VR headset.
- User interactions are intuitive, ensuring an engaging and seamless experience.
- Project timelines and resources are managed efficiently, keeping the development on track.

This comprehensive yet realistic evaluation will ensure that our that our project will be ready for the final showcase.

Conclusion

Concluding "Echoes of Tomorrow's" third prototype, our group has adeptly transformed challenges into opportunities for growth, enhancing our technical proficiencies in animation, audio integration, and interactivity within VR. The incorporation of the user and expert feedback outline in both the User Feedback, Customer Feedback, and Presentation Feedback sections has been instrumental, driving our project toward a level of fidelity that deeply resonates with the narrative we set out to achieve. As we pivot towards the final design the lessons learned are invaluable in creating our next steps forward; they do not only reflect our team's enhanced capabilities but also shape our readiness to finalize a VR experience that is immersive, accessible, and ultimately transformative. This journey underscores the essence of iterative design—where each prototype is not just a milestone but a steppingstone to excellence.

Future Work

In the next deliverable (Deliverable I), the goal is to effectively present our team's final prototype at Design Day. This presentation aims to clearly articulate the problem our project addresses, its relevance to potential users, the unique advantages of our solution, and its immediate significance. We will be preparing a 3-minute pitch and a product demonstration, engaging with an audience of peers, professors, and potential users.

Trello Links

Group Tasks:
https://trello.com/invite/b/BVQUyzOo/ATTIffa561593f1eb68dd5f7bae366d91099C0403DE3/gng1103-group-14

Group Deliverable Progress:
https://trello.com/invite/b/nBKqHlud/ATTIedb77cf20bf59f8d9431a337a519c81e59084991/gng1103-project

Appendix

Figure 15 | Prototype 2 Survey Results – Positive Feedback

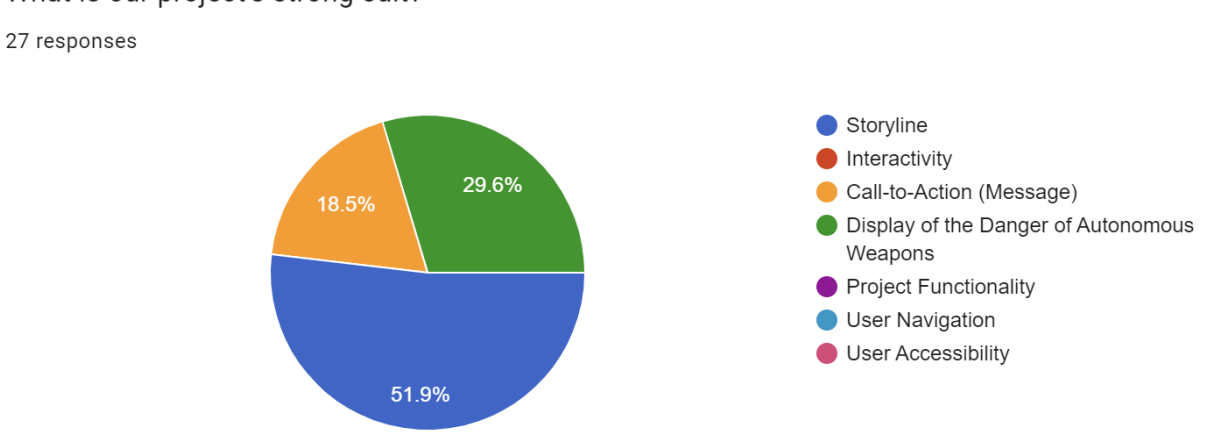


Figure 16 | Prototype 2 Survey Results - Criticisms

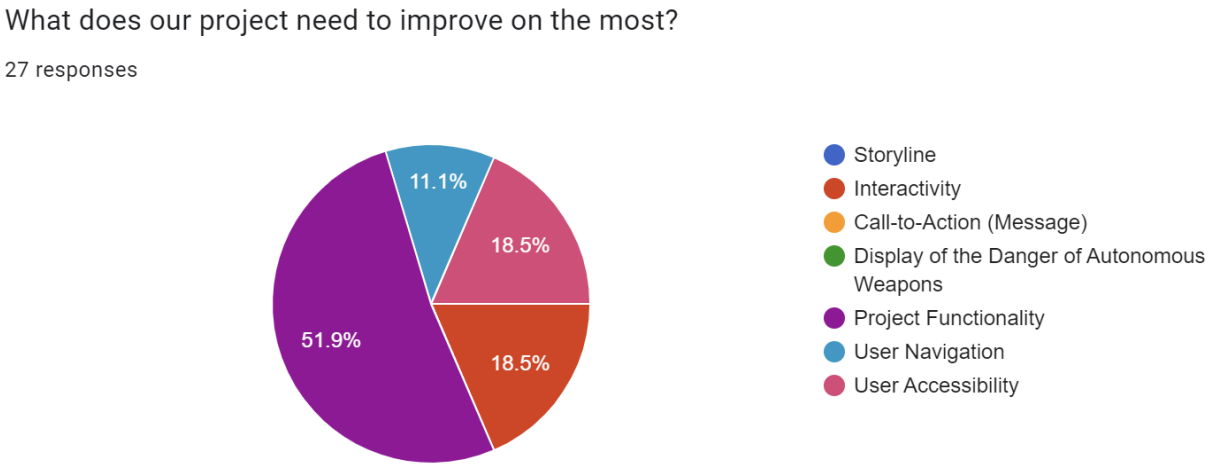
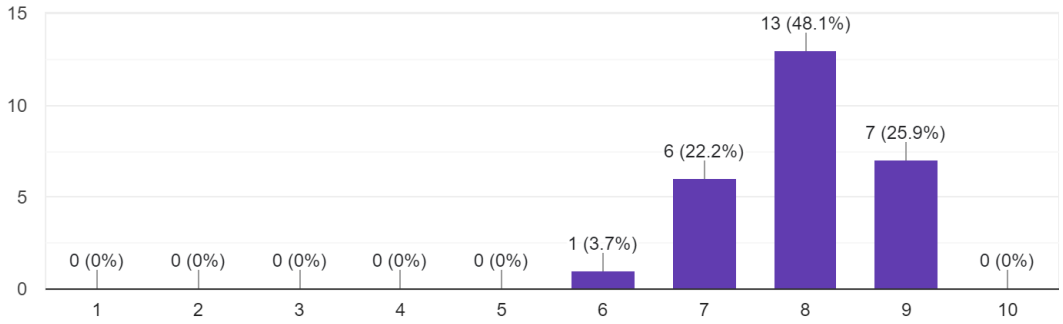


Figure 17 | Prototype 2 Survey Results - Impact

On a scale from 1-10, how much has this project changed your stance in regards to the Dangers of Autonomous Weapons.

27 responses



References

The following links are all tutorials or references that our group had used to finish the third prototype of our project:

Mesh Colliders: https://youtu.be/Q88f4u9mKqQ?si=Q-cxWDM8kCes5FMx

Colliders & Hitboxes: https://youtu.be/mkErt53EEFY?si=-VPusjktbVUCBSsm

Fixing Missing Particles: https://youtu.be/yvLsGuZodaQ?si=MOJtCaf-zKJuzqI1

Fixing FPS in Unity: https://youtu.be/DoHPx5RQ7P4?si=OU4DYw5OCsPYeE6U

Frame Rate Limit: https://youtu.be/P5PQV0SW0pI?si=GivoOOd7HjtxYKU3

Adding Audio & Sound effects: https://youtu.be/N8whM1GjH4w?si=bl5EB8cJEc-f1LYd

The song we chose to use in our game for Prototype III:
https://youtu.be/6ozWxuWtQq4?si=LuPe1qJjH_S7JUB2

How to Animate Characters in Unity 3D: https://youtu.be/vApG8aYD5aI?si=ZpFixhpfThgwMA88

Unity Timeline Animation: https://youtu.be/RRMMnwWZH10?si=dclvn5GAcAAHDKNk