Deliverable H Prototype III and Customer Feedback

Team F13

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Abstract

In Prototype III, the virtual reality experience has been improved and is now ready for demonstration. All scenes have been designed with their various assets, interactions, animations, and audio elements. All scenes were also clipped together with appropriate transitions to further enhance the storyboard for the experience. Testing of Prototype III included testing the audio outputs, transitions between scenes, animations, interactive features, and testing the experience in its entirety to ensure no glitches are present. Other aspects that were tested were the area required to complete the experience and how emotional the experience is.

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1. Introduction

In Prototype III, the design of the virtual reality experience has been finalized. The main scenes: office, house, and graveyard have been completed with their respective storyboard, environment, and user interface. Animations have been incorporated, and the scenes have been cut together with transitions between each scene. Improvements have also been made to the start, pause, and end menus. The experience has been tested by the designers and by experts to gain feedback and make improvements throughout the design process.

2. Prototype III

2.1 Storyboard

In this experience, the user begins in their office where they can see that today is an important day to them. The user hears a radio segment that informs them that autonomous robots are now being utilized as a policing measure in their city. They pick up a gift and car keys and are transported home, where a birthday party for their child is ongoing. Their child and the child's friends are running around and playing with a water gun. A drone flying overhead identifies the water gun as a threat and calls in for a ground robot to control the situation. When the robot approaches, the user's child is shot and killed. A week later, the user is at the grave of their child and places a bouquet of flowers on the grave. A second radio segment is heard where the user hears that multiple deaths and injuries have occurred due to the autonomous robots and that the robots are now out of service and under review.

2.2 Environment

The environment in each scene has been finalized, various assets were incorporated in each scene to create a realistic experience.

When starting the game, the user begins in the middle of a city where they can access the main menu. This environment is meant to depict a general city where the user works. The generic look of the city ensures the user does not feel that they are in an unfamiliar environment so they can picture themselves in the scenario.

When the start button is pressed, the user enters the office scene. The office environment again represents a generic office that most users would be able to recognize and connect to as a space they have seen in real life. The office is set up with a reception desk, a conference room, and multiple cubicles. One cubicle has been set up as the user's desk with their computer, a calendar on the wall showing that there is an important event today. The office chair, present, and car keys in the space are all interactable elements. There is also audio playing during this scene of a radio broadcast that informs the user that autonomous robots have been rolled out across the city and are now being used as a policing tool.



Figure 1: Office Scene Environment

After the office scene, the user is placed at home in their front yard. In this scene there are party decorations displayed and children running around the front yard showing that this is a birthday party for the user's child. A drone appears in the sky above the house and scans the area, and after a few seconds a robot rolls up to the front yard.



Figure 2: House Scene Environment

In the final scene, the user is placed in a graveyard environment, where they can see the tombstone for their child and a bouquet of flowers that can be placed on the grave. A second radio segment is playing that informs the user that multiple injuries and deaths have occurred due to the autonomous robots. The user learns that the robots are currently out of commission and are under review by experts to identify the source of the errors.



Figure 3: Graveyard Scene Environment

2.3 User Interface

As part of Prototype III, a French version was developed which is accessible when opening the Menu scene.

Additionally, in each scene prompts were incorporated to guide the user through the scene and indicate where they should navigate or if there are any elements they should be interacting with. The text prompts are designed to follow the headset so they are always visible to the user.

2.4 Animations

In Prototype III, all animations were finalized and inserted into the experience. We decided to make changes to our character movement to allow them to follow a set number of points in a particular order rather than move at random through various points. This allowed us to make the movement much more predictable and make our scenes more precise. We also integrated this movement into both our drone and autonomous weapon paired with various scripts that tell them when to move and when to play their designated audio.

On the drone, we decided to add a spotlight feature which will scan the child holding the water gun. The spotlight scans the neighborhood as it moves to its waypoint. Once the drone reaches its waypoint, the spotlight will lock onto the child and track him while playing an audio file requesting for backup as it has identified a threat. The autonomous weapon is programmed to begin moving towards its waypoint set in front of the house after the drone has reached its waypoint. When the autonomous weapon reaches its waypoint, the drone audio will be shut off and the autonomous weapon audio will take over.

Finally, a water gun was mounted to the child's hand using inverted kinematics and setting the water gun as a child of the right hand. This allowed the water gun to stay fixed to the child's hand while they ran around.

3. Bill of Materials

An updated bill of materials can be found in Table 3.1 The bill of materials has been updated from Deliverable G to include audio elements, additional assets for the birthday party at the house, and a water gun for the child.

Table 3.1

Bill of Materials

Bill of Materials							
ltem Number	Item Description	URL	Quantity	Unit Price (\$)	Extended Price		
1	Steam VR	https://sto		\$-	\$-		
2	Unity	https://un	1	\$-	\$-		
3	HTC Vive (VR Headset)	https://ww	1	\$-	\$-		
4	Computer/Laptop		1	\$-	\$-		
5	Office Background	https://ass	1	\$10.00	\$10.00		
6	Home Background	Stylized Su	1	\$6.99	\$6.99		
7	Cemetary Background	https://ass	1	\$9.90	\$9.90		
8	Patrol Drone	https://ass	1	\$-	\$-		
9	Autonomous Weapon	https://ass	1	\$4.99	\$4.99		
10	Watergun	https://ass	1	\$8.00	\$8.00		
11	Characters and Animations	https://lea	1	\$-	\$-		
12	Animations 2	https://wv	1	\$-	\$-		
13	Robot Voice Audio		1	\$-	\$-		
14	Party Audio		1	\$-	\$-		
15	Drone Voice Audio		1	\$-	\$-		
16	Present Asset	https://ass	1	\$-	\$-		
17	Party pack	https://ass		\$-	\$-		
18	Keychain	https://ass	1	\$4.99	\$4.99		
19	Grass texture	https://ass	1	\$-	\$-		
20	Car	https://ass		\$-	\$-		
21	Flowers	https://ass	1	\$5.00	\$5.00		
22	Forest	https://ass	1	\$-	\$-		
23	Table	https://ass	1	\$-	\$-		
24	Colored Parasols	https://ass	1	\$-	\$-		
25	Beach Chairs	https://ass	1	\$-	\$-		
26	Drone Audio		1	\$- \$-	\$-		
27	Tank Audio		1	\$-	\$-		
28	Radio Segment Audio	https://mu	1	\$-	\$-		
29	Car Audio		1	\$-	\$-		
30	Art Supplies		1	\$13.00	\$13.00		
		-	-	Total	\$62.87		

4. Prototyping Test Plan

4.1 Testing Summary

Tests conducted for Prototype II are explained in Table 4.1.1. Prototype III consisted of testing the character animations, testing improved features of the menus, and testing the emotional aspects of the experience.

Table 4.1.1

Prototype III Test Descriptions

Test ID	Test Objective (Whee)	Description of	Decominition of Deculta	Estimated Test
Test ID	Test Objective (Why)	Description of	Description of Results to be Recorded and	duration and
		Prototype used and of Basic Test Method	how these results will	
				planned start date
1		(What)	be used (How)	(When)
1	Testing Character Animations	Focused Physical	Are the animations functional?	Est. ~ 2 hours
		The character	Do the elements move	March 26 th , 2023
		animations were	when and where they	
		finalized in this	are supposed to?	
		prototype. Characters		
		were given waypoints		
		and a script which		
		tells them where		
		those waypoints are		
		and when to move to		
		them. The script will		
		also tell them what		
		they should do when		
		they get to the		
		waypoint and what		
		they should do when		
		other objects get to		
		their waypoint. We		
		tested this on various		
		characters and both		
		our drone and		
		autonomous weapon.		
		1		
2	Testing Transitions	Focused Physical	Are the transitions	Est. ~ 1 hours
	Between Scenes		functional?	March 26, 2023
		Transitions occur	Is there any lag time	- ,
		between both the	in between scenes?	
		menus and the scenes		
		and between the		
		scenes themselves.		
		The transitions need		
		to be working		
		properly to ensure the		

		user is placed in the		
3	Area Required to Complete the Experience	user is placed in the correct part of the scene relative to the story board of the experience and to ensure no glitches occur that would hinder the playthrough of the experience. Comprehensive Physical Upon cutting all scenes together, the experience is played by multiple test users	What is the area required to complete the experience? Can the user navigate through the experience without moving in real life?	Est. ~ 0.5 hours March 27 th , 2023
		and the area required for the user to complete the experience is measured. An average of the required area to complete the experience is then calculated.		
4	Time Required to Complete the Experience	Comprehensive Physical The prototype is an alpha version of our final product. It includes all the individual scenes from the previous prototypes incorporated together. Additionally, it includes audio and subtitles to increase the immersion of the experience. The test method is to have one of the developers test their time necessary to complete the whole	How long on average does it take to complete the experience?	Est. ~ 0.25 hours March 27 th , 2023

		11		
		experience, as well as		
		have an independent		
		user test how long it		
		takes for them to		
		finish the experience.		
5	Incorporating an	Focused Physical,	Is the experience	
	Emotional Element		emotional?	Est. ~ 0.5 hours
		The scene in the	Does the user feel	March 27 th , 2023
		graveyard	sad/angry/happy upon	
		environment is	completion of the	
		designed to enhance	experience?	
		the emotional	1	
		response of the user		
		upon the death of the		
		child in the		
		experience. The		
		graveyard		
		environment is		
		notably more realistic		
		looking and more		
		"grim" which creates		
		a contrast with the		
		office and home		
		scenes where the		
		environment is more		
		cartoon-like and		
		artificial.		
6	Minimizing the Level	Comprehensive	What is the level of	Est. ~ 0.25 hours
	of Violence & Gore	Physical	violence of the	March 27 th , 2023
			experience?	
		The level of violence		
		is required to be at a		
		low level as per the		
		design criteria. The		
		level of violence was		
		minimized by not		
		showing the death of		
		the child itself. The		
		user is aware of the		
		child being shot when		
		the child is identified		
		as a target and with		
		the gunshot audio		
		that plays.		

4.2 Summary of Prototyping and Testing

A summary of tests conducted for Prototypes I, II, and III is seen in Table 4.2.1.

Table 4.2.1

Summary of Prototype I and II Testing

Prot	totype				Tests		
#	Туре	Objective	Fidelity	Feedback	Objective	Result	Time
1	Focused Physical	Interactive Elements (User Interface)	Low	No client/user involved	Picking up Objects	Yes	2 hours March 5, 2023
1	Focused Physical	Menus (User Interface)	High	No client/user involved	Pushing Buttons, Scene Transition	Yes	2 hours March 12, 2023
1	Focused Physical	Required Area	Low	No client/user involved	Area Required	1m2	1 hours March 5, 2023
2	Focused Physical	Character Animations	Low	No client/user involved	Animating Character Movements	Yes	2.5 hours March 11, 2023
2	Focused Physical	Improve the Menus (User Interface)	High	No client/user involved	Add pause and end menus, use a laser to push buttons	Yes	3 hours March 12, 2023
2	Focused Physical	Add Emotional Elements	Low	No client/user feedback	Incorporate Emotional Elements	Needs Improvement	0.5 hours March 11, 2023
3	Focused Physical	Character Animations	Medium	No client/user feedback	Animated Character Movements	Yes	2 hours March 26, 2023
3	Focused Physical	Transitions Between Scenes	Medium	No client/user feedback	Transition Between Scenes	Yes	1 hour March 27, 2023
3	Comprehensive Physical	Area Required to Complete Experience	High	No client/user feedback	Area Required	4m ²	1 hour March 27, 2023
3	Comprehensive Physical	Time Required to Complete Experience	High	No client/user feedback	Length of Experience	10 minutes	0.25 hours March 27, 2023
3	Comprehensive Physical	Emotional Impact of Experience	High	User Feedback	Emotional Impact	7/10	0.25 hours March 27, 2023

3	Comprehensive Physical	Violence/Gore Level	High	User Feedback	Violence Level	2/10	0.25 hours March 27, 2023
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4.3 Testing Results & Comments

A summary of results obtained during testing can be found in Table 4.3.1.

Table 4.3.1

Testing Results

Functional Requirement	Measured Value	Target Value	Comment
Character Animations	Yes	Yes	Animations are
			Functioning as
			Required
Transitions Between Scenes	Yes	Yes	Transitions are
			Functioning as
			Required
Menus are Functional	Yes	Yes	
Non-Functional			
Requirement			
Emotional Impact	7/10	>=7/10	Meets target value
Level of Violence	2/10	<4/10	Virtually no violence
			is shown
French Language	No	Yes	Needs improvement
Constraint			
Length of Experience	10 minutes	<10 min	Needs improvement
Area Required	$2m^2$	$4m^2$	Measured Value is
			Acceptable

User 1 Feedback:

- Instruction text is illegible. The colour and location of the text should be adjusted.
- When entering the graveyard scene, they were not facing the correct gravestone so there was confusion about what they were looking at.
- There is confusion regarding who the woman is in the graveyard scene.

User 2 Feedback:

- The experience seems to be calibrated incorrectly; the user feels very short compared to the surroundings.
- There is a long lag time between scenes where the user is taken into the loading area for the headset.
- You are only able to navigate with the right controller, so objects have to be picked up with the left controller. This wasn't clear so there was confusion with how to complete some tasks.

5. Conclusion

With the completion of Prototype III, the virtual reality experience is complete and is now ready for demonstration. The scenes in the experience have been designed with their various assets, audio elements, interactions, and animations. Animations of the office workers, children at the party, drone, and robot were improved upon. The experience was tested to gain feedback and results regarding the playthrough of the experience – to ensure no glitches occurred – as well as the length of the experience, the area required, and the emotional and violence levels of the experience. Results and feedback obtained during testing were taken into consideration and some adjustments were made to improve the usability and reception of the experience. Overall, the experience received positive feedback.