Deliverable E Project Plan and Cost Estimate

Team F13

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February 19th, 2023

Abstract

The chosen design scenario has been further outlined and developed, with more insight into the storyboard, environments, and user interface. The scenario has been separated into scenes to illustrate the virtual reality experience more clearly. A list of hardware and software necessary for the design and creation of the experience has been generated. This list also calculates the cost of each component to estimate the final cost of designing the virtual reality experience. Finally, the testing protocol has been outlined, including testing phases, goals, test subjects, and stopping criteria. The prototyping outline will be utilized throughout the design phase to streamline the testing process and ensure the tests are conducted effectively and efficiently.

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1. Introduction

In Deliverable D: CONCEPTUAL DESIGN, our team came up with three potential scenarios for the experience and identified Scenario 1 as the best option. In this deliverable, we have expanded the conceptual design into a detailed design, which includes a flowchart to displays how the experience will unfold. This deliverable then lists the equipment that is needed for the realisation of the product, a bill of materials to estimate the cost of our project, and a short discussion of project risks and steps our team will take to mitigate those risks. Finally, a prototyping outline is included to prepare for the next step in the project.

2. Detailed design

As concluded in Deliverable D, scenario 1 has been chosen as the most optimal scenario when considering the needs and constraints of the client. The design is further expanded upon through four subsections: Storyboard, Environment, User interface, and the Flowchart.

2.1. Storyboard

For this subsection, our team has changed some elements of the story to make it more immersive and engaging for the user. The main concept has stayed the same, but some adjustments have been made to minor details. There will still be 4 scenes: the office, the car, the front yard, and the graveyard.

In the office scene (see Figure 2), the player is invited to look around and see the calendar showing that it is their kid's birthday. They are then prompted to pick up a gift, and then after, their car keys. While this is happening, dialogue and subtitles are appearing that tell the player that they should head home. Once the keys are interacted with, a fading transition is made to the next scene.

In the car (see Figure 3), the user can look around. Audio is playing from the radio explaining that that present day is inauguration of the first surveillance security autonomous weapons that will patrol the city. Once this dialogue is finished, the scene will once again fade into darkness and transition to the next.

The next scene will be the culminating point of the experience: The user is set in their front yard at their kid's birthday party (see Figure 4). They are prompted to pick up their gift. The user can see their child running around playing with a water gun. Suddenly, autonomous drones fly (see Figure 1) over the area and identify the child as a threat because of the supposed gun and call-in reinforcements. Not long after, autonomous tanks arrive and kill the child, which the user does not witness (Figure 5). Afterwards, the player can see their child laying on the ground. This leads to the final scene.

The user is put in front of their child's grave and are prompted to place flowers on the grave. After a few moments, the scene fades to black, and the user is asked if they want to restart or leave the experience.



Figure 1 Flying autonomous drone.

2.2. Environment

This subsection will further expand on the environment the story will take place in. The environment changes depending on the current scene. The user will be able to make small interactions with their environment to make it more engaging and immersive.



Figure 2 The office which the user starts in.

In Figure 1, we can see the calendar with the marked date, and the keys that the players interact with.



Figure 3 View of inside the car

For the car scene (see Figure 3), the user will be put in the driver's seat. They may look around the car and outside.



Figure 4 User's perspective of the yard scene

In the yard scene (see Figure 4), we can see the user holding their gift and their kid holding a water gun.



Figure 5 User's perspective after robot attack

In Figure 5, we can see the user holding their gift and the aftermath of the incident. The tank robot and drone robot are visible.



Figure 6 The grave scene

In Figure 6, nothing changed since the previous deliverable. We can see the grave and the prompts to interact with the flowers.

2.3. User interface

This subsection will expand on what the layout of the menus, settings, and interactions will look like to the user.

The main menu will have 3 options, Start, Settings, and Tutorial (see figure 7). There will be a logo for Mines Action Canada.



Figure 7 Main menu

The tutorial menu will have an image of the controller used for the HTC Vive. Beside this will be the basic controls that the user must know before starting the experience (see Figure 8)



Figure 8 Tutorial menu

The Options menu will have 3 options: a slider for the intensity of the audio, the option to switch between French and English, and an option for the menu music to be turned on or off (see Figure 9).



Figure 9 Settings menu

Each interaction will be prompted by a bubble over the object. It will guide the user into interacting with the object (see Figure 10).



Figure 10 Interaction prompt

2.4. Flowchart

The flowchart below shows what the procedure of the experience will be, including interactions between the user and the environment.



Figure 11 Flowchart of the experience

3. Equipment

To create this virtual reality experience and bring it to life, many different types of equipment are needed. The table below breaks down the equipment needed and categorizes them by type.

| Type of Equipment | Equipment |
|-------------------|---|
| Software | - Steam VR - Unity |
| Hardware | HTC Vive (VR headset)Computer/laptop |

Table 3.1 Equipment Categorized by Type

| Background Assets | - Office |
|-------------------|---|
| | - City |
| | - House with a yard |
| Character Assets | - NPCs |
| | - Autonomous Weapon |
| | - Drone |
| Animation Assets | - Character Movements (walking, running, jumping, etc.) |
| | |
| Audio Assets | - Car Engine |
| | - News Cast |
| | - Footsteps |
| | - Party Sounds |
| | - Screaming |

4. Bill of Materials

A list of materials and their associated costs is shown in Table 4.1.

| Bill of Materials | | | | | | | | | |
|-------------------|-----------------------------|-------------|----------|-----------------|----------------|--|--|--|--|
| Item Number | Item Description | URL | Quantity | Unit Price (\$) | Extended Price | | | | |
| 1 | Steam VR | https://sto | 1 | \$- | \$- | | | | |
| 2 | Unity | https://uni | 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 | https://ass | 1 | \$5.00 | \$5.00 | | | | |
| 7 | City Background | | 1 | \$- | \$- | | | | |
| 8 | NPC Characters | https://ww | 1 | \$- | \$- | | | | |
| 9 | Patrol Drone | https://ass | 1 | \$- | \$- | | | | |
| 10 | Autonomous Weapon | https://ass | 1 | \$4.99 | \$4.99 | | | | |
| 11 | First-Person View Character | | 1 | \$- | \$- | | | | |
| 12 | Character Animations | | N/A | \$- | \$- | | | | |
| 13 | Screaming Audio | | 1 | \$- | \$- | | | | |
| 14 | Party Audio | | 1 | \$- | \$- | | | | |
| 15 | Machine Gun Audio | | 1 | \$- | \$- | | | | |
| 16 | Car | https://ass | 1 | \$- | \$- | | | | |
| 17 | Miscellaneous Expenses | | 1 | \$20.00 | \$20.00 | | | | |
| | \$39.99 | | | | | | | | |

Table 4.1 Bill of Materials

5. Project Risks

The biggest risk linked with this project is the constraint of time. With the development of the experience and everything linked to it, it will take time to make sure every criterion is met. There is a risk that we might not be able to incorporate every idea into the experience simply because of the time constraint before Design Day.

To mitigate this risk, all work will be equally distributed between team members to ensure efficient completion of tasks. Every team member will be responsible for finishing their specific tasks before or during the final group meeting on Saturdays.

Another risk is that there will be development problems during the prototyping. There is always a possibility that we encounter bugs and code that does not work. These problems will take time to resolve. For example, coding the user's interactions with their environment is crucial for the experience and if any problems are linked with the interactions, it will become a priority to resolve these issues.

6. Prototyping Outline

To obtain feedback regarding the experience, a series of testing run-throughs will be conducted by both the project team and outside test subjects. Tests conducted by the project team will occur frequently throughout the design phase to ensure each interactive function, camera movement, and audio is working properly. Stopping criteria for each test will be upon the completion of the scene or experience, or upon encountering a major issue that prevents the user from completing the scene or experience.

6.1. Phase 1

For the first phase, we will start by prototyping the interactive elements and animations. Our first prototype will be a success if we are able to program the user's interactions with the objects around them (keys, flowers); the menus, such as: main menu, settings menu, tutorial menu; and the animations for the objects surrounding the user (robots, children). Each element will be tested by the project team at intermediate periods. Tests will be scheduled regularly until the elements are designed to their entirety and no issues are identified. If some of the elements are not completed in time, they will be completed in the next phase.

6.2. Phase 2

For the second prototyping phase, our team will work to create the environments and audio for the scenes. Prototype 2 will be complete if we are able to complete all the environments and audio segments for the story. The French version of the menus and audio will be created in the phase. Before submission, members will share their feedback with the team once every member has completed a test run of the prototype. The team will come to consensus on any adjustments to make to the experience. If some of the elements are not completed in time, they will be completed in the next phase.

6.3. Phase 3

Phase 3 will be the final prototyping phase and is the phase where we combine all the elements from phase 1 and 2. This phase will primarily focus on the integration of each element and fixing bugs. In this phase, we will ask users for feedback on the prototype. This phase will be complete when the complete experience is created and is ready for review.

7. Conclusion

With the completion of the detailed project plan, we can move onto the next deliverable, PROTOTYPING 1. Using the feedback from Client Meeting 2, we can move forward and start creating the first prototype, which will be a rough concept of the final version. The first item of focus for Prototype 1 will be familiarizing the team with the animation tools in Unity, and creating rough outlines of the scenes and the main menu. The prototype will be tested according to the outline above.