**Project Deliverable E: Project Schedule and Cost**

**GNG 1103 – Engineering Design**

**University of Ottawa**

**Group-5**

Rachael Wilson

Rosie Ouellet

Maxine Wagner

Jay Chen

 Kareem Matouk

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# 1 Introduction

This document focuses on the in dept planning of all projects related task required to complete all requirements by the respected due dates. A detailed design development, based off the idea built in deliverable D, as well as the feedback from our client meeting will be unfolded. All other specifics needed to be planned out including a project plan and schedule a list of equipment followed by the budget and other specifics will be presented and developed.

# 2 Detailed designs

In deliverable D, multiple design Ideas had been presented. After the client meeting, our focus was shifted towards one main idea that will now be developed and improved considering all the needs and constraints of our client. A storyboard describing the main events and their reasoning will be described followed by the visual specifications as well as the audio specifications.

## 2.1 The concept of autonomous weapons

First, it's crucial to outline how autonomous weapons will manifest in our virtual reality. Research into these weapons have allowed us to conceptualize the “robots” into our VR environment. There are some current “autonomous weapons” used by the military and these are divided into three types. The human-in-the-loop weapons, which are robots that can only deliver force with a human command. The human-on-the-loop weapons, which have an override option if case of emergency. Lastly the human-out-of-the-loop weapons, which are weapons capable of selecting targets and making decisions without any human input or interactions. While fully autonomous weapons don't exist yet, development is moving in that direction. (Army University Press, n.d.)

In our future world, these weapons have become dominant, largely due to AI technology's inconsistencies and potential vulnerabilities to hacking. Originally under military control, these weapons have experienced malfunctions, due to human error during programming and testing. This is realistic as any small mistakes could completely alter the weapons functioning, and even with precautions, malfunctions when it comes to A.I technology is very common. These weapons, highly efficient and difficult to disable, have caused widespread destruction and civilian casualties. Society has been forced into lockdown, with people taking extreme precautions to avoid becoming targets. This is mainly due to targeting errors, equipment malfunctions and more. To add, some of the human human-on-the-loop weapons, which were created to allow human control to have been hacked and used with malignant intent. Efforts to halt the spread of these weapons have intensified, but attacks continue to increase in frequency.

## 2.2 Storyboard

In this subsection, our team has changed some elements of the story in order to highlight the effect of autonomous weapons. Our story presented in deliverable D, has the emotional and visual aspects well planned out but seemed to be missing details and informative aspects that would make the video much more personalized for our client. The overall concepts have stayed the same though slight edits have been made. The project will be separated into 4 main scenes.

### 2.2.1 Scene 1

The first scene takes place in the morning, the camera view is used to give the first-person experience of our main character, Richard who wakes up in his room. As mentioned below, this character lives in a world where many adaptations have been made to assure his safety. The first scene is essential for building the tone of the story. We have opted for a foggy darker atmosphere to build suspense and questioning. This slower beginning hopes to capture the viewers' attention as they are trying to figure out what is happening.

|  |  |
| --- | --- |
| **Visuals**  | **Audio**  |
| When he first wakes up, his will slowly be opening his eyes. This is in order to add to the overall tone and suspense.This is how we will represent him opening his eyes.  | There will be ringing sound which will slowly fade out over time. This will add to the visual and highlight that the character is waking up. This sound will be taken off <https://pixabay.com/sound-effects/search/ringing/> which offers fee sound effects to download. This is the sound: [ear-ringing-sound-effect-26746.mp3](https://1drv.ms/u/s%21AiFNUh6SgmcogrAZuf-RUlQOkhoShA?e=bsKgzZ) |
| Once he has opened his eyes, the room will be dark, with the only light coming from a window which has been covered with wooden planks. This is because the character had needed to cover up anything that would allow robots to detect movement. No lights are on because light could attract the weapons. Richard will reach for his remote and turn the tv on. He will look around his room and see a shelf in the left side corner filled with nonperishables and water to highlight that bulk groceries are needed to avoid outings as much as possible. A drawing of a room  Description automatically generated How to Stock an Apocalypse Pantry With Nutritious Food That Never Expires |  Lifehacker | The room will be very quiet, there will be no sounds like cars and people talking coming from outside as the streets have been deserted.When Richard first turns on the tv, it will only be heard as slight muffled background noise. Tv button sound: [old-tv-button-102956.mp3](https://1drv.ms/u/s%21AiFNUh6SgmcogrAepc--Z5W1mTA7IQ?e=UxsvaB)Towards the end of the scene the TV will slowly become louder and louder until a clear voice can be heardThe room itself will be designed on shape and the materials added on unity. |

### 2.2.2 Scene 2

The second scene is where things start making sense. The TV is the main event of this scene. A zoom into the tv will present a voice testimony of a woman. She will explain that there has been an attack outside of her building. In this society, regular upkeeping tasks still need to be done. Tasks like bringing the garbage out. This family had a system where tarps had been put up in an alleyway in order to hide any movement. The lady will explain that that previous night, the husband was taking the garbage out, taking all the regular precautions and how all the precautions (making sure no drones were around, moving slowly and avoiding abrupt movements etc.) His precautions did not work as she will describe as he unfortunately was a victim of an attack. Then she will give an insight on how the emergency system works in this futuristic world. She will talk about how first aid was not able to be sent right away due to protocols regarding the amount of time after an attack where it is safe to send out help. She will describe how the virtual doctors tried their best to walk her through the medical process to save her husband, but he unfortunately did not survive. This testimony will be very dramatic and emotional, while

informative.



|  |  |
| --- | --- |
| **Visuals**  | **Audio(script)** |
| The ladies face will be hidden, as online anonymousness is essential in this society where hacking and the leak of personal information could be weaponized. At the bottom of the tv, a description stating “Recent attack, victim’s wife speaks out” will be written, as well as “news” so that it is obvious that this is a current news report.A drawing of a computer screen | “I don't even know where to begin. Last night... was garbage night, we had waited as long as possible, but it had piled up and needed to be done. Right outside our building, not even 2 meters from our door. (pause) My husband... he was just... how is this our lives now? We had this system, you know? Tarps up in the alleyway, trying to hide any movement. He did everything right but... [Her voice catches, and she takes a shaky breath before continuing.]Woman: "He was so careful, so cautious. Checking for drones, moving slowly... avoiding anything that might attract attention. But it didn't work. None of it worked.""The emergency system... it's supposed to help. But there are protocols, rules... they couldn't send aid right away. They had to wait... wait for it to be safe. And by then... it was too late.""I had a doctor on the phone, all we could get, and I tried, I tried so hard. They were talking me through it, trying to save him. But... but he didn't make it. He didn't... he didn't make it." |

###

### 2.2.3 Scene 3

Scene 3 is the climax of our story. In this scene we really highlight the effects of the autonomous weapons. The aftermath of scene that the woman had previously described in the going to be shown. A camera will go through the alleyways which has suffered damage from the attack. Garbage will be everywhere as the husband was bringing it out that previous night. We will also show the tarps put up over the building, though one of them will be hanging half ripped up to show It had been hit. Pieces of the tarp will be laying in the hallway. The side of the building will have black marks indicating an explosion had happened and pieces of bricks will be laying around it. We will leave a half-destroyed shoe on the ground. All the buildings windows will be barred up or covered by tarps.

Bonus: if we have time, we want to show a restaurant clearly closed and out of business with its sign falling down and its windows broken to show society had not been functioning like it used to.

For the broken buildings, prefabs from a destroyed building package will be used:

<https://sketchfab.com/3d-models/destroyed-buildings-3fb7160b6d0c4350a0abc80962c47227>

**Camera work:**

The camera will move as if it was a drone, though this will not be said, this subtle hint is to show that camera crews are not able to safely film outside and drones are used instead. As flies through the alleyway, it will rotate it’s viewed to capture all the important aspects listed above.

**Audio:**

Before we go to the alley way, a news reporter will say “now we are shown the aftermath of this devastating attack”. To not steal the spotlight from our visuals, the reporter will not speak as we go through, the alley way. Instead, we will have an eery background music to add suspense and tension. [dramatic-flute-for-documentaries-165986.mp3](https://1drv.ms/u/s%21AiFNUh6SgmcogrAbQVIs_veEwEjhjQ?e=GnppUV).

When we pan the camera up to the tarps, a wind sound effect will be added: [https://1drv.ms/u/s!AiFNUh6SgmcogrAcGTuQF8GMp5W18Q?e=dBoEcU](https://1drv.ms/u/s%21AiFNUh6SgmcogrAcGTuQF8GMp5W18Q?e=dBoEcU)

Towards the end of the report, the news reporter will start speaking again before we hear the click of the remote, and the screen goes black. Tv sound: [Tv-turn-off-sound-effect.mp3](https://1drv.ms/u/s%21AiFNUh6SgmcogrAfeKDEJgqgasQYZw?e=Qf5aNK)

**Scene 4**

This scene cuts back to the room, where Richard is taking in what he had just witnessed.

Audio:

[hearbeat-71701.mp3](https://1drv.ms/u/s%21AiFNUh6SgmcogrAaG4f4AG4gAb0u1Q?e=fcabpZ)

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| --- | --- | --- | --- | --- |
| **Estimated date for completion** | **Task to be completed**  | **Programs** | **Teammate responsible**  | **Estimated duration**  |
| March 11th, 2024 | **Bedroom Design Structure** * Walls
* Windows
* Structures
* Flooring
* Doors
 | On shape |   | 5 days  |
| March 15th, 2024 | **Bedrooms Furniture and Further design*** Bedframes
* Duvets
* Curtains
* Television
* Remotes
* Picture frames
* Wardrobe
 | On shape |  | 1 week (Long duration but achievable) |
| March 25th 2024 | **Bedroom Details** * Lighting
* Audio
* Animations
* Code (within VR)
* Movement
* Panning to TV
 | Unity  |  | 2 weeks (High level Difficulty) |
| March 28th, 2024 | **Tv Animations** * Audio Movement
* Lighting
* Camera panning
 | Unity  |  | 1 week (Difficult but not a huge scale) |
| March 21st ,2024 | **Ally way Basic Structure*** Building and walls
* Pathways
* Fencing
* Background
* Windows
* Roofs
* Telephone poles
 | On shape  |  | 3 weeks (Large Scale Project part Probably the longest task) |
| March 29th, 2024  | **Details On Ally way*** Missing items
* Puddles
* Garbage
* Masonry
* Posters
* Shoes (personal item)
* Tarps Between buildings
 | On shape  |  | 1 week (creating and importing small objects) |
| April 4th, 2024 | **Animations On ally way** * Walking
* Lighting
* Camera pan
* Some interactions
* Scene merging
* Visual effects
* Coding behind the VR
 | Unity  |  | 2 Week (difficulty with importing and animating our creations) |
| April 6th, 2024 | **Bedroom Animation (final Scene)*** Animate the movement of the main character
* Returning to original scene
* Use of TV remote
 | Unity  |  | 1 week (will be the shortest animation overall out of the 3 scenes) |
| April 7th, 2024 | **Soundtrack** * Must be copy right free
 | https://pixabay.com/ |  | 1 day (fast to import) |
| April 3rd, 2024 | **Voice over** * Recordings for the story
* Voicing the news cast
 | Recording (can be imported even from an iPhone) |  | 3 days (requires scripting and editing) |
| April 10th, 2024 | **Video Editing** * Final touches editing scenes
* Cutting and transitions
* 1 minute in length
 | Lots of video editing software's  |  | 1 day  |

# 3 BOM

|  |
| --- |
| **Bill of materials**  |
| **Item number** | **Item description** | **URL/source** | **Price** |
| 1 | Unity |  | 0 |
| 2 | Sound effects  | <https://pixabay.com/sound->  | 0 |
| 3 | Broken building | <https://sketchfab.com/3d-models/destroyed-buildings-3fb7160b6d0c4350a0abc80962c47227>Rubble Pieces Detailed Package [Nathanael Gazzard](https://assetstore.unity.com/publishers/22780%22%20%5Ct%20%22_self) | 0 |
| 4 | Room design  | On shape  | 0 |
| 5 | Road material for alley way  | <https://assetstore.unity.com/publishers/40637> | 0 |
| 6 | Garbage and waste  | https://assetstore.unity.com/publishers/21584 | 0 |
|  | Alleyway building | <https://assetstore.unity.com/publishers/48757> | 0 |
|  | Fencing | **Kobra Game Studios**[minhle99.wixsite.com/kobra-game-studios](https://minhle99.wixsite.com/kobra-game-studios) | 0 |
|  | Building in background | <https://assetstore.unity.com/packages/3d/environments/urban/russian-buildings-pack-113375> | 0 |
|  | Sky/background  | <https://assetstore.unity.com/publishers/19016>  | 0 |
|  | City material (garbage, signs, barriers wt.) | <https://assetstore.unity.com/account/assets> | 0 |
|  | Wood Flooring  | [Free Pack Woden Planks | 2D Floors | Unity Asset Store](https://assetstore.unity.com/packages/2d/textures-materials/floors/free-pack-woden-planks-214610) | 0 |
|  | Tables and Furniture  | [Furniture FREE | 3D Furniture | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/furniture/furniture-free-260522) | 0 |
|  | Television | [TV / arm mount | 3D | Unity Asset Store](https://assetstore.unity.com/packages/3d/tv-arm-mount-73139) | 0 |
|  | Bedframe  | [Bed PBR | 3D Clothing | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/clothing/bed-pbr-227070) | 0 |
|  | Wood Pieces  | [Wood Set Pieces | 3D Props | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/wood-set-pieces-33853) | 0 |
|  | Pictures Frames  | [Picture frames with photos | 3D Interior | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/interior/picture-frames-with-photos-106907) | 0 |

# 4 Equipment

|  |  |  |
| --- | --- | --- |
| **Item name** | **Description** | **Source**  |
| VR system | To test the project | Maker Lab |
| Unity hub+ installer  | To create VR | https://unity.com /download |
| On shape  | To create prefabs | https://www.onshape.com/en/ |
| Laptop/computer | Tool to access creation sites  | Personal belongings |
| Headphones | To test VR sounds | Personal belongings  |
| Phone | Recording of audio  | Personal belongings |

# 5 Prototype outline

The document outlines a comprehensive project schedule and cost analysis for a virtual reality (VR) project focused on autonomous weapons. It includes detailed designs, a Bill of Materials (BOM), equipment list, and tasks to be completed with estimated dates and durations for each phase of the project. Key elements include the development of VR environments, integrating sound effects and animations, and designing interactive scenarios to demonstrate the impact of autonomous weapons. The project aims for a realistic depiction of a future world affected by these technologies, emphasizing the importance of careful planning, design, and testing in engineering projects.

# 6 Bibliography

Army University Press. (n.d.). *Pros and cons of autonomous weapons systems*. <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/#:~:text=In%20the%20Human%20Rights%20Watch,to%20kill%20and%20instill%20fear>