

Deliverable D

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1 Problem Statement

Mines action Canada needs a VR experience directed to politicians and decision-makers that demonstrates the potential horrors of using automated weapons (to evict feelings of concern) in order to prompt them to take action before it becomes harmful to mankind.

2 Task 1

Subsystem 1: Immersion of the user in their environment (At least most of the length of the video (more than 50%). Using different senses to get the user to be more immersed and interested in the environment, like sound and visual effects.

Subsystem 2: The environment shown throughout the video. This includes showing the adjustments that people have made to their surroundings because of the robots. For instance, we can display buildings and adaptive measures that people have taken to protect themselves.

Subsystem 3: Individual appearance (individual adaptation). what citizens have changed in their appearance to protect themselves. Showing the adjustments that people have made to themselves because of autonomous weapons (to avoid being detected by them). This could also include everyone's day to day life and what they must do to survive.

Subsystem 4: Social aspect of the new environment. This subsystem shows the changes made in society in general caused by the presence of robots, like the way citizens protest the killer robots.

3 Task 2

3.1 Subsystem 1

Kate: Throughout the video, we can play a sound that becomes more and more unnerving while we show how severe the consequences are.

Caelen: Having a specific colour at a specific time to indicate the mood/importance of the scene and to really communicate the ideas and the emotion to the viewer to fully immerse them in the experience and portray the message we wish to get across. This can be done for example by showing bright eye-catching colours when there is something specific that we want the viewer to see or having a highlight around interactable objects.

Hind: We could use light to change the atmosphere of the environment. For example, when the user first puts the headset on, the brightness gets increasingly higher (as a sign of awareness), then when danger is shown, the screen could start dimming, to show fear. Additionally, if our virtual reality was to be separated in multiple days, it would be useful to separate the days by dimming the light after each one. This technique could also be used if we were to skip a few days or show a time lapse.

Leticia: Presenting a simple storyline from three different perspectives. The story is about a

celebration that is surrounded by automated robots (offscreen). Everyone is happy, but when a person starts to shout on the podium (giving a speech), the AR confuses his emotions and thinks that person is aggressive, so the AR kills him. Some people shout, scream, run away, or confront the AR, causing the AR to kill them as well. The 3 different perspectives would be 1) the narrator's view (general view), 2) the person who is killed first, and finally 3) the people running and one of them looking at the destruction caused. To not show explicit violence or blood, when someone is killed, a dark screen and the sound of a gunshot should be enough.

Derrick: A municipality that replaces its police officers with Artificial Intelligence powered robots. There could have been a hacking group that hacks the robots and adjusts their operating parameters.

3.2 Subsystem 2

Kate: first person views of someone doing an everyday task, like doing their groceries, in a familiar city, like Ottawa. As they're doing the task we see that most of the population has moved underground to avoid being detected by robots (benchmarking: this is similar to the underground farms built in Yemen/ the underground train stations in Ukraine converted to bomb shelters), and that whenever people are in buildings above ground the windows are always covered up (benchmarking: similar to Bird Box (movie where people adapt to an threat by altering their environment, except that in that movie they're trying not to be able to see outside but in our VR environment, the civilians are trying to ensure that nothing can see inside). We could also show a sign beside one of the covered windows warning the viewer not to remove the covering, we could also make it say that someone tried to remove it before and got shot. Also, just like in one of the previous projects we saw, we can make the underground city small to keep the project simple/doable.

Caelen: Can show a style of before and after which specifically focuses on what the robots did to the environment to make it scarce and in "ruins". This can be done by respecting the features mentioned with the human adaptation as well as on top of that, show what and why they are adapting to this certain environment.

Hind: Showing buildings made from a certain material and other technological adaptations that were done. This will further reinforce the fact that humans were obligated to adapt to the presence of robot killers and had to create technologies to do so. For example, reflective materials were placed on buildings to avoid detection from robot killers. Furthermore, there could be adaptations in using certain items. For instance, billboards are no longer used to show commercials and celebrities. They are now used to show a mine map so that citizens are aware of the at-risk locations of the day.

Leticia: Putting trenches around the buildings, which are used by people to protect themselves. These buildings can be styled like big malls or warehouses.

Derrick: People adapting to the existence of Killer Robots by wearing clothing material that is resistant to the robots' sensors. (Low heat conductive clothing, Geometrical Pattern)

3.3 Subsystem 3

Kate: We can show that people cover their faces with masks to avoid being detected by the robots.

Caelen: We can show the higher class in a better position than the lower class with their modified clothes that help them avoid the autonomous robot's detection against the lower class who are less fortunate and have to wear their old ripped up and worn out clothes while hiding and running in the war stricken environment.

Hind: We can display individuals wearing clothing and masks that make them completely undetectable from radars. This technology is realistic because it exists today. A small startup named Cap_able has created clothing with animal designs that are made to go unseen through certain cameras. This is because of their unique animal pattern, which helps the camera confuse the human with the animal displayed on the clothing. There could also be other clothing articles like sunglasses and scarves that emit so much light that the robot can't detect the human wearing them.

Leticia: Show people disguising themselves from automated robots by using a certain type of clothing. With that idea, there can be bands on the arm of every person that will have different colours. So, each colour represents a task. One colour could be of the people who are fighting or trying to come up with a plan to defeat the robots, other colours could represent weaker individuals (or more vulnerable like teens, kids), etc.

Derrick: Highlight the topic of facial recognition, how these artificial intelligence powered machines can use facial recognition to target certain groups of people. This is something our client is worried about.

3.4 Subsystem 4

Kate: We can show that schools have adapted to the robots by teaching kids how to avoid being detected by the robots and we can do this by showing a classroom with posters about hiding from the robots.

Caelen: Can show how people avoid using electronics in their day-to-day life as it can be easily tracked and exploited by the autonomous robot. Thus, showing how people's social lives have changed to various dark extremes.

Hind: Would show that any opposition from anyone can be demolished with killer robots. For example, if a certain group of people was protesting killer robots, it would only take a few minutes to force them to leave or eradicate them. This could also be shown by stating that an individual who shares their controversial views through social media disappeared mysteriously.

Leticia: Show how people are trying to live with this new life. Show some people depressed, scared all the time and some of them being hopeful. For example, some kids can be playing underground or in improvised shelters, while the parents try to make them happy but aside, they are scared and sad.

Derrick: Any artificial intelligence killing machines we may or may not include don't necessarily have to look like Robocop. Devices that look like pre-existing military hardware would be much more realistic. (Drones, quadcopter Drones, etc.)

4 Task 3

4.1 Summary of all the concepts

4.1.1 Subsystem 1

- Sound-Effects

We want the viewers' brains to be immersed in the environment so that we can portray the message we wish to share. We can do this by influencing what they hear with their ears. Music can be used as it is free and can share certain emotions depending on the song and even certain sound effects can be used to show that something has a bigger impact than it looks like. (an explosion noise being LOUD)

- Colours

We want to contribute a message while keeping the user immersed in their environment. This means we need to catch the attention of their eyes and thus their brains. To do this with colour is quite simple as the things we deem most important we can use bright colours that stand out and we can even use certain colours to portray certain emotions. (red=mad, blue=sad, etc.), (breaking bad colour environment example)

- Theory of Spatial Pressure

The theory of spatial pressure suggests that the viewer will be more immersed in the environment if they are involved in it. This means that to immerse the person in the environment we need to find a way to involve them. This could be by using multiple channels of sensory information, completeness of sensory information, cognitively demanding environments, and a strong and interesting narrative, plot, or story.

- Show don't tell.

Showing rather than telling paints a picture for the reader. It creates that immersive sensory experience that is unique to writing in deep POV. Show the sights, sounds, and feelings of a moment as if the viewer is experiencing them in real life. Immersion means the complete engagement of the viewer in a story so that they feel like they are there.

4.1.2 Subsystem 2

- Buildings are made from reflective materials which makes them undetectable.
- Buildings are painted like their surroundings to makes them undetectable (street art)
- Neighbourhoods should be fenced from the bottom to the top.
- Underground cities are emerging.
- Barricaded windows or completely windowless buildings to avoid detection.
- They use camouflage, hide in underground tunnels and refuge in remote, hard-to-reach areas.
- Sonar systems could be up on billboards to show the threats and where mines are potentially placed.
- Sonar systems could be used on phones to indicate their proximity (google maps variant).

4.1.3 Subsystem 3

- Wear a certain type of clothes that would confuse the robots. (Italian company "Cap_able" creates these types of clothing).
- the new styles you would see (trends): "anti detection glasses" "shield mask."
- Setting decoys of oneself (some would have jobs where they pay others to create figurines of others)
- Everyone's daily tasks become to ensure that their presence has been recorded by setting their decoys in various places.

4.1.4 Subsystem 4

- News could broadcast any severe events related to killer robots.
- Underground Resistance: Forming underground resistance groups would become a common survival strategy.
- Human rights: expression is prohibited (people mysteriously die after expressing their opinion on a controversial topic)
- showing fliers of people (that disappeared)
- showing a news broadcasting on the tv ("yesterday local protest against implementing a law was shut down after people got shot")

4.2 Reconsidering all subsystems

4.2.1 Subsystem 1

Including several perspectives into our final product can help immerse the user. This is especially true for the 1st person perspective, as it will give the feeling of being in the environment. Since we will be using VR, the user will essentially exist in the world we create, they themselves will see what it's like to live in a world with Killer Robots. We have discussed many ways that we can make the user feel like they are properly immersed. One possible way we could achieve this using 1st person is have the user perform a set of simple daily tasks such as going to the grocery store when everything is normal. Another way to achieve this is by using colours and brightness to our advantage. For example, when we want the user to feel fear or confusion, we could tint the screen a red or yellow colour.

Pros:

- Extremely immersive
- Engaging
- Would make it easy for the user to interact with their environment

Cons

- Might be more challenging to include the “Big Picture”, especially if we only want to include the first-person point of view. This is why we have decided to show multiple points of views, despite them being less immersive.

Images and sketches



Figure 1: Sketch of a city with light shades of yellow



Figure 2: Sketch of a city with light shades of red



Figure 3: First person perspective of a city

4.2.2 Subsystem 2

As in most war conflicts in the world, humans have adapted their ways of living to protect themselves from possible threats. We believe that the case of robot killers will be no different. Many examples of adaptations have been discussed amongst our group. For example, we want to demonstrate fortified structures, clothing with low heat conduction to avoid IR sensors, underground grocery stores, farms, geometrical clothing that may confuse Artificial Intelligence and various detection systems (trip wires, alarms, etc), buildings with no windows, neighbourhoods surrounded with metal fences to keep drones away and many more.

Pros:

- Will show how humans adapt to live with Killer Robots
- Will make the product more immersive overall

Cons:

- May take more time to research and incorporate these elements in our product, especially because of the number of details in them.

Images and sketches

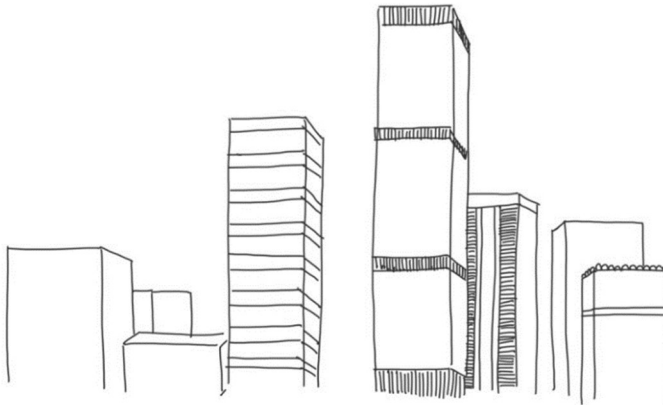


Figure 4: Buildings with no windows. These are examples of buildings that we can recreate that don't have any windows. This helps prevent killer drones from entering.

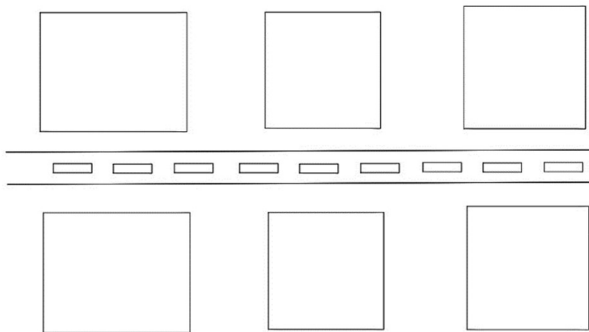


Figure 5: Ways that neighbourhoods could be grouped to protect them with fences:

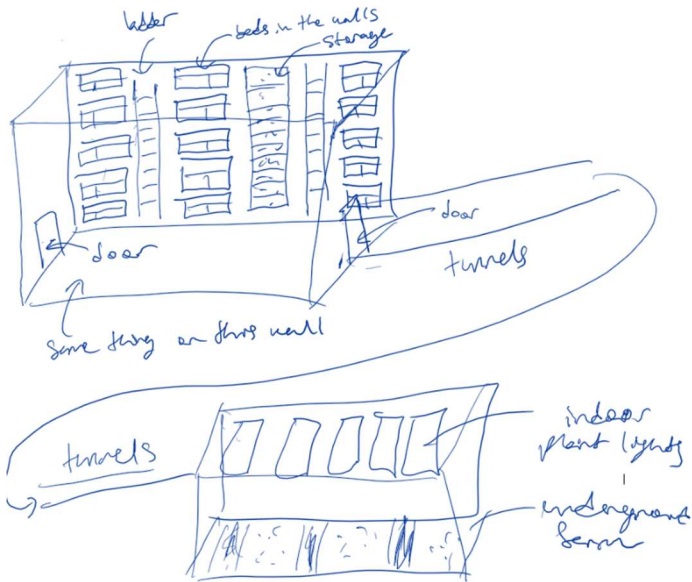


Figure 6: Underground shelter:

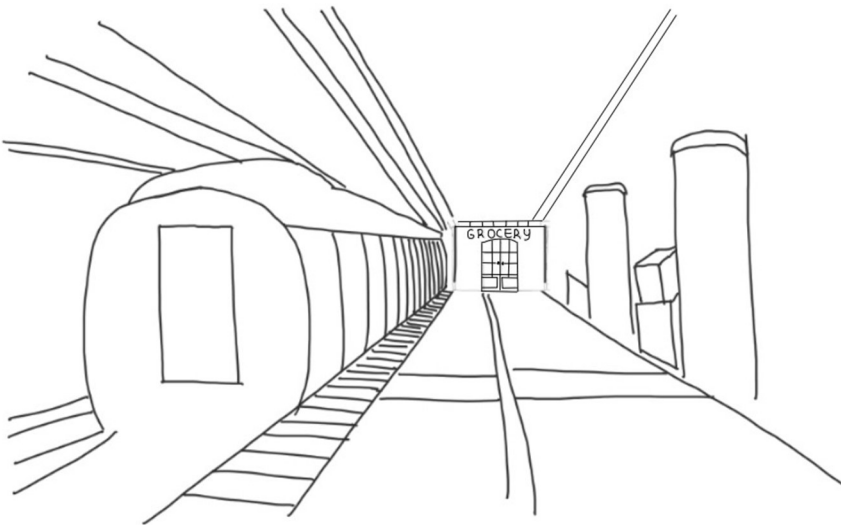


Figure 7: An underground train station that was turned into a grocery store. This shows how citizens adapted their living to protect themselves.

4.2.3 Subsystem 3

Individual appearance (individual adaptation), a certain type of clothes that is worn and what citizens have changed in their appearance to protect themselves. We will be showing the evolution and the adaptation on an individual scale. For example, citizens start to wear more articles that cover their faces, like masks or certain types of clothes that help them remain undetected from the killer robots.

Images and sketches

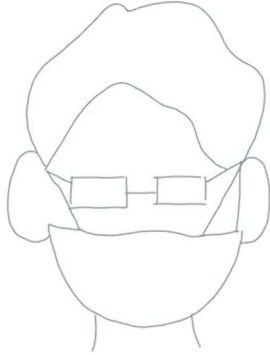


Figure 8: Person wearing glasses and a mask to avoid detection.



Figure 9: Types of shirts that help avoid detection from robots [1]

4.2.4 Subsystem 4

The social aspect of the new environment. The goal here would be to show the effect Killer Robots has on a society from the social aspect. This would be beneficial, because it adds another layer by showing that oppositions to these machines have been created and continue to stand. It would also show how difficult it is to remove the robots from the system after implementing them, even if most of the population opposes their use. It would show that there is no going back, after creating them. We have discussed many ways that would help incorporate this subsystem into our project. We could display groups of people (protests) that are actively fighting against these robots and show posters of missing individuals that were fighting for the cause.

Pros:

- Can easily show how killer robots will affect our life over a period of time
- Can be incorporated into any other idea that has to do more with a story
- Making our experience show events chronologically gives us some structure when it comes to making our final product as we will have x seconds allocated for showing the 1st day, y seconds allocated for the first month, etc.

Cons.

- Gives us less freedom when creating the final product as we will only be able to show the “big picture” and won’t have much time to show the “little things” that may occur in a world with killer robots

5 Task 4

5.1 First concept

Idea: first person views of someone doing an everyday task, like doing their groceries, in a familiar city, like Ottawa. As they’re doing the task, we slowly start to realise that it is not a normal grocery store and as we leave the store, we realise that we are still inside. Then we see that most of the population has moved underground to avoid being detected by robots (benchmarking: this is similar to the underground farms built in Yemen/ the underground train stations in Ukraine converted to bomb shelters), and that whenever people are in buildings above ground the windows are always covered up (benchmarking: similar to Bird Box (movie where people adapt to an threat by altering their environment, except that in that movie they’re trying not to be able to see outside but in our VR environment, the civilians are trying to ensure that nothing can see inside). We could also show a sign beside one of the covered windows warning the viewer not to remove the covering, we could also make it say that someone tried to remove it before and got shot. Also, just like in one of the previous projects we saw, we can make the underground city small to keep the project simple/doable.

5.2 Second concept

Idea: showing an environment that evolves with time (by pressing a button or interacting with the surroundings). This would be a first person view of a character walking around a city. We would be separating the time into 3 stages. The first one would be right after the robots are implemented. This would be in the middle of a city and would show a few changes made by humans and implementations of new technologies. For example, more cameras would be shown, there could be some group protests and the city would be slightly damaged (broken windows and destroyed cars). At the end of every stage, we want to show that the population is decreasing in numbers (without the violence). This will be done by adding less and less individuals in every stage. In the second stage, there would be many more alterations made by civilization. In this one, there would be more damage, the streets would be emptier than in the previous stage with only a couple of people left protesting. The people seen outside are wearing masks and clothes with patterns that help them hide from the detection of robots. The neighbourhoods are fully covered with fences, barricaded and cars will not be present anymore. There are cameras everywhere, billboards are destroyed and there is a slight red tint to the environment to depict stress and fear. The final stage is showing that there is no one left in the streets, all the buildings are fully closed and there is a stronger red tint in the sky.

5.3 Third concept

This idea utilises news broadcasting. It will show an array of events caused by robot killers. For example, “a mysterious disappearance of a group of teenagers after posting a controversial item”. This will help us show that robots can be controlled by anyone. This means that if there are two opposing views on a topic, with killer robots it would be very easy to silence one of the two sides. Furthermore, this concept focuses more on the violence and chaos caused by killer robots as opposed to the adaptations made by humans to survive. This version would be more likely to catch the attention of the viewers because of the numerous events unfolding.

5.4 Comparison Table

Design criteria	Concept 1	Concept 2	Concept 3
No blood or violence shown	No blood nor violence (3)	No blood nor violence (3)	No blood nor violence (3)
Can be shown in about 30 to 60 seconds	It is fairly easy to show this in the amount of time given (3)	It is fairly easy to show this in the amount of time given (3)	A news broadcast might last longer than 60 seconds (0)

Possible to create within time constraints	Might be difficult to create this VR environment because of the number of details involved (2)	Might be difficult to create this VR environment because of the amount of details involved (2)	Could be difficult to create, because we will need to make a script and add voices in the simulation. (3)
No robots are shown	The robots aren't shown (3)	The robots aren't shown (3)	The robots aren't shown (3)
No elaborate story lines	No complicated/elaborate storylines. This video will focus on the changes in the everyday life of a citizen. (3)	There is no story line present (3)	There is a storyline present: the broadcast of the events that unfolded. However, the broadcast will simply be showing events that occurred, meaning that it is not too elaborate (1)
Full immersion into the environment	The environment might be too unfamiliar since it's set underground, or mostly underground, not in a known city. This could cause the user to feel disconnected. (1)	There is a progressive evolution in the environment shown. This will help the user understand the changes made and remain immersed, even if their environment is becoming unfamiliar. (3)	Only displaying the news would not be effective in fully immersing the user into the environment. (2)
Realism	The tasks being performed (shopping at a grocery store) are real tasks (not too far fetched) (3)	It will show the evolution of a standard city, so it will be real. No elements that are too far fetched will be present. (3)	Showing the news is very realistic, as it is mundane. (3)
Shows different points of views	Is only in first person point of view (0)	It will be in first and in third person point of view. (3)	Is only in first person point of view (0)
Shows precise examples of the	It does not incorporate enough examples of	It shows several examples of adaptations, such as	It does not incorporate enough examples of the

adaptations made by humans to survive	the changes made by mankind in order to adapt. (1)	new buildings with no windows and fences around neighbourhoods. (3)	changes made by mankind in order to adapt, because it would only focus on one or two specific ones for the news coverage. (1)
Focuses on the message that we want to deliver	It does revolve around the changes that humankind had to make in order to survive, but the central message is not clear. (2)	The change in environment in response to robot killers is clearly shown. (3)	The message is clearly demonstrated as the news reporter shows drawbacks of implementing robot killers in society. (3)
Interests the user	The mystery of the events makes the user feel invested in the story (2)	Evolution is interesting, because it shows that humans are adapting to change. However, it is not the most captivating idea. (2)	The news and showing events is more likely to interest the user, because more events are unfolding. (3)
Total amount of points	23	31	21

5.5 Comparison

All these ideas show the consequences of automated robots in a city and how they affect society. The first idea: first person, shows a society that has already been affected by automated robots, which is not very accurate to what we want to show the audience. Still, it meets the idea of not showing explicit violence or robots.

The second idea: evolving city, uses the first-person perspective, which might be difficult to create but very effective when showing the consequences of automated robots as it puts you as the person who is being affected. It shows, in 3 phases, the change that automated robots have caused in society, increasingly showing a more devastating and depressing end to life, while indicating that the population drops more and more until almost zero. This idea of an evolving city can be more emotional, but you just must be careful to show only the message and not more.

Finally, the third idea: Storyline one, starts a news broadcasting, saying that there are disappearances or shooting, which implies the idea of automated robots in the city. If this is going

to be a complex story, there might be not enough time in a 1 min video. Also, it is simple to create but like with the first idea, it does not fully immerse the user with the problem. In conclusion, by looking at the benefits/drawbacks tables and concluding paragraphs, the idea with more benefits and less drawbacks is the second one: the evolving city.

In conclusion, by examining our design criteria, it is possible to state that the best solution that we have come up with is the second option. While it does have more details and could be possibly less interesting than the two others, it does the best job at displaying the message that we want to deliver to the users. It will also help us show the most examples of the impact of killer robots on our society. It is also the most versatile of the 3, because we can use multiple points of views, which will help immerse the user into the environment.

6 Task 5

The best global concept that we are going to continue developing for this project is the evolving city idea: we're going to show a city at different times: before the autonomous weapons start being used, a few days after, then a few weeks, months, and years. The user will observe that the city adapts more and more. First, there are little adaptations, like boarded up windows, and later the adaptations become more extreme. For example, we were thinking of showing that the surviving population decided to move underground to avoid being detected by the robots. We were also thinking of showing that the population is decreasing more and more using one of those signs that are placed outside cities with the population written on them. Moreover, we're planning on using sound and visual effects, like a noise that gets more and more unnerving as the city evolves, and by slightly tinting the colours used in the environment to portray different emotions (for example, we can use gray for emptiness (so to represent the decreasing population and loss of hope in general, or blue for sadness).

We also considered creating a short story line including an attack on the pentagon, hackers, and/or a TV broadcast explaining the situation since the client mentioned that the autonomous weapons being hacked is a concern. Plus, an attack on the Pentagon would directly impact the decision makers, so we thought it would make them pay attention to our project more and would make them more concerned in general. We were also considering including a scene where the autonomous weapons murder someone because of a misunderstanding: the robots think that the person is shouting angrily but they're shouting happily. Thus, said person is perceived as a threat and loses their life because of it. This would effectively show that the robots can easily mistake someone for a threat when they aren't, and that human approval must be present before applying force, especially lethal, to a target. We were also thinking of showing that people started to wear a certain type of clothing that would confuse the robots. However, this idea has several drawbacks, which is why we decided not to use it. For instance, if we were to use this idea for our project, we wouldn't be focusing on the adjustments that people made to their environments because of the robots as much, which is one of the most important criteria of this project since the client mentioned it multiple times. Moreover, the story line for this is elaborate, which is also something

that the client said that they didn't want. Plus, it would be difficult to code this idea and to finish it on time.

We were also thinking of doing a first person view of someone engaging in everyday tasks, like doing their groceries, in a familiar city, like Ottawa. As they're doing the task, the user sees how the city has evolved. This idea and the one we chose to have some of the same benefits. For example, no robots/gore are shown, only the modifications that people made to their environment are, which is what the clients wanted. This evokes more emotions than showing the robots would since, like in horror movies, it's scarier to show the effects of a threat without showing it, since it leaves more to the imagination. Another benefit of these ideas is that, unlike the previous idea, there's no elaborate story lines: we focus only on the changes that civilians made to their environment because of the robots. Moreover, a benefit that this idea has that the one we chose to do doesn't is that this idea includes a first-person view, which leads to the user feeling more connected and invested in the experience since it seems like what's happening is happening to them. However, we chose our other idea since this idea has a few drawbacks. For example, it might be difficult to code it since we'd have to move the camera in Unity around quite a bit. Plus, we find that the evolving city idea is more effective since it's more shocking because it shows the progression of the city well. Thus, we use the user's fear of change to evoke strong emotions. Moreover, this idea focuses on the progression of the city a lot more than the first-person view idea.

7 Conclusions and Recommendations

The chosen concept for this project will be the second concept, as it is much more aligned to the needs that were expressed by the client.

8 References

1. [Ariel Zilber, January 25th 2023, *New York Post: Clothing designer tricks AI Powered face recognition into thinking you're an animal* (viewed October 9th, 2023)]