Deliverable D- Conceptual Design

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Abstract

The purpose of this report is to come up with three conceptual designs from the input of each team members personal ideas. In the previous deliverable, we developed technical benchmarking and design criteria, which we will analyze to develop a set of designs. Each member is tasked to come up with their own ideas, which will later be combined to create the three main conceptual designs.

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1. Introduction

This technical document describes concept designs generated by our team members, for our client Mines Action Canada, for an interactive Virtual Reality (VR) experience. The VR experience denounces autonomous weapon research and dissuade politicians from supporting them. It aims to be an emotional, interactive VR simulation of various scenarios, events, and their possible consequences, delivered via an easy to use and streamlined medium.

1.1 Client's central message

Mines Action Canada is a humanitarian disarmament organization currently focusing on opposing autonomous weapons and claiming that they violate international humanitarian law. Autonomous weapons raise several ethical issues that decision makers still see as theoretical. We aim to design a VR experience that illustrates the ethical concerns that autonomous weapons raise, and the dangerous impact it manifests in the battlefield.

2. Conceptual Designs

2.1 Storyline

The storyline is the most important aspect of our design product. It is what we deliver through our product, hence it must be captivating and emotional while remaining under 5 minutes.

The storyline must be impartial and thus does not reference any real-world entity. It is short, concise, and clearly demonstrates the ethical issues of autonomous weapons. It is not too graphic or violent as we want to avoid scaring users and detrimentally affecting the central message given.

2.2 Control Scheme

Our client chose virtual reality as a storytelling medium. It allows for users to possibly influence event and give the scenarios proposed a larger impact. We aimed for a small range of motion as our target users - Canadian Parliamentarians and politicians - most likely do not have much experience with VR applications. The user is prompted for an action to advance the storyline, or to make a decision and branch out the storyline. Movement if included is mostly via teleportation, as opposed to continuous motion like other VR games to avoid triggering motion sickness in sensitive people.

2.3 Art Style and Accessibility

We avoided depicting scenes in a stereotypical or unrealistic fashion, but still took artistic liberty when necessary. Nevertheless, the art style has to be modern to near future, not science-fiction. No quick motion is present, no violent imagery, and no flashing lights.

2.4 User interactivity

Our solution involves user interaction to move the story. Some degree of user-interactivity is written into the story to take advantage of VR features and create a sense of cause-and-effect. The VR headset used – an HTC Vive – consists of a head mounted display and two hand tracking controllers.

2.5 Audio

Sound effects are used throughout to provide a greater immersive experience. Voice acting and dialogue is bilingual. The audio will also play a big role in the emotional aspect of our product.

What cannot be portrayed with respect to the visual aspect of virtual reality needs to be conveyed through a voice over. This subsystem will be essential to our final product as it will ensure the user fully understands our goal and the message from Mines Action Canada regarding autonomous weapons without any confusion. A voice over can help to answer any questions, give useful information, and guide the user through the experience, ensuring the user gets the most immersive experience out of our virtual reality design.

3. Subsystem Concepts

3.1 Subsystem 1: Storyline

3.1.1 Avery

Starts off with someone watching the news on television. The news is about the creation of the next big defense mechanism… AI drones and robots. They are defined to be complex technology for military assistance that can target anyone it is programmed to target. The news reporter talks about its advantages, reporter says something along the lines of "this new technology could be the next big thing and what the world has been waiting for". Since they're new devices, there's a lack of knowledge behind their nature, and people are more excited than afraid. A couple of scenes can be shown of these drones in action on the battlefield. Showing how they can be productive in war.

A few years go by, more and more drones are being created and are being modified/improved. The government starts using these drones to maintain civil demeanor in communities (act as the new police). They're seen more and more scavenging on streets, watching civilians, taking their privacy away from them. Suddenly, a default/ deficiency in these drones begin to appear. They start targeting anything that can be classified as being alive, that being civilians and animals.

In the last scene, it shows families at a theme park, and a woman (a mother) on the phone with her husband saying that she wishes he were here with them. The husband mentions that if it wasn't for work, he'd be there in a heartbeat. Suddenly, the AI drones appear and start randomly targeting everyone that is moving, and the call gets cut off-indicating death (not too violent)

At the end, say something like; "This is what will happen if we don't ban autonomous weapons immediately. We must prevent this from being our future." (End with an emotional statement)

3.1.2 Joumana

In my version of the game the player is briefly introduced to autonomous weapons as well as their pros and cons. The player then takes an initial decision (should autonomous weapons be allowed in conflicts: yes, or no?). This decision does not affect the outcome of the next scene. The next scene should the player waking up with bruises in a pile of rubble. As the player gets up, they start seeing a horrible war scene. The players first words are that they do not remember this happening. Houses broken, people suffering from injuries and so on. The player is then introduced to the first character (NPC) of the game. When the player approaches the character, it starts explaining how he found the players under some rubble and saved him. The player then asks what happened here. As the character starts explaining how things have come this far the player jumps into the next scene.

This scene is a flashback of the conflict. Drones and different robots are seen gone awry. They are shooting roads, buildings, houses and practically anything they deem to be a target or threat. This scene is shown along with the explanation that character 1 is giving. The conversation then ends, and the player is prompted to start looking around, maybe someone needs their help. In the corner of their eye the player notices an injured person, this would be character 2. The player starts helping them and asks "How did this happen to you" as character 2 starts explaining the next scene starts.

Scene 3 is also a flashback depicting a normal day which is then interrupted by sudden overhead attacks by AI, destroying the civilization beneath it. As well as armed robots shooting any moving target.
As character 2 finishes talking to the player, the player thanks them for all the valuable information. The player is now looking around in disgust of all the destruction and chaos around him. The player sees a shooting star in the sky and makes a wish "If only I could've helped". At that moment the screen goes dark, and the player wakes up in an armed fortress. There is a screen in front of him displaying the same battlefield he was just in. Someone to his left asked "Sir, do we have your permission to deploy the AI drones as well as our robot soldiers?". In that instance everything makes sense to the player, and they are prompted to make a choice "Deploy autonomous weapons or Use other resources". Depending on the decision made a different outcome will be achieved.

After the showcasing of this the player is again asked, just like in the start, "should autonomous weapons be allowed in conflicts: yes, or no?". A short statement then plays on screen: Would you ever wish this outcome on your children? On your spouse? Or on anybody at all? If it is not prevented this could be a possible outcome in the near future. Stand with us and Mines Action Canada to ban autonomous weapons. Thank you for your time. The End.

3.1.3 Grace

I believe to make the experience the most realistic and relatable we need to put the user in the shoes of something they could actually see themselves in. As well, it is important to appeal to their sense of humanity and force them to realize that this is happening to real life people due to autonomous weapons.

The experience will start off with someone in their family home eating breakfast and getting ready to go off to work for the day. After some user interaction in the house, a voice will state to the user that it is time for them to go off to work for the day. This will allow for the user to see the everyday lives of someone who could be affected by autonomous weapons. As the person is walking down the street off to work (using teleportation within the VR), a sense of panic sets in as autonomous weapons start to target a nearby government building. Lucky the person can take shelter in a nearby building to wait out the attack with a few other scared citizens. After around 15 seconds (not too much time to really scare the user but enough to make them realize that autonomous weapons are a problem), the person leaves the building and looks around to see the ruins of a place that used to be so familiar to them. They then rush home to their family and are unable to locate them inside the house.

Since our target audience will mainly be government officials and one of the main goals of Mines Action Canada is to make use of personal stories and to demonstrate that this happens to real people; I believe that is it important to incorporate day to day activates in our storyline so the user can relate to it.

3.1.4 Saif

The storyline consists of three scenes. Each scene is around a minute to a minute and a half, placing the user in a scenario that portrays autonomous weapons as excessively and unnecessarily cruel, though a possible runaway conflict escalation situation.

The first scene puts the user in the place of a soldier patrolling a fictional demilitarized zone between two nations with implied political tension. The user would be doing simple routine maintenance actions around the post. An autonomous weapon suddenly ambushes the post and showcases how indiscriminate, sudden, and brutal they are.

The second scene puts the user in the place of a civilian in a small town close by. The user also performs routine tasks around the house, when outside the window another autonomous weapon squadron appears. The scene then shows the large collateral damage caused by the weapons in a short amount of time.

The third scene is a third person point of view, showing the aftermath of such escalations. Both involved nations are now engaged in a much larger scale conflict. Later it is revealed that the initial scene was caused by a programming error, covered up by a small manufacturer in the weapon supply chain, to meet a deadline.

An end card appears, communicating how realistic and possible such situations, and how relying on such mechanical and unreliable systems is a mistake with severe consequences.

3.1.5 Mohammad

The storyline is more like a movie that does not require the player to keep clicking buttons or doing tasks. The scenes will be self-rolling, and the player needs just minimum interactions and simple requirements. This will give the one playing the chance to focus more on the presentation's actual content rather than being attempted to enjoy the nature of a video gaming. This will help the message to get across more effectively.

My storyline is a before/after concept where the player starts with a scene of a town of a population of non-combatant civilians in a war zone. This will help to set up the atmosphere and enhance the emotional empathy with the people affected on the ground. This region is continuously scanned by air-type autonomous weapons, autonomous drones, for any potential threats. These drones are similar to remote-controlled drones and are completely autonomous. The drones are programmed based on collected data to identify a threat and eliminate it once recognized. In the town, a wedding happens where the culture of that country is to make weddings in public. Meanwhile a drone is scanning that town and recognizes the wedding as a threat and decides to eliminate it. Since there is no human factor in the system to evaluate the situation and distinguish between a gathering of combatants and a non-combatants gathering of a wedding, the drone moves on to execute. As a result, the drone bombs a wedding of non-combatants and kills many innocent civilians instead of eliminating an actual threat.

The scenes will show the environment before and after the drone attack and the civilians who were killed in the attack. Finally, the story will end with a message presented on the screen to encourage stopping these autonomous weapons before they become a reality and result in disastrous outcomes.

3.2 Subsystem 2: Control Scheme

3.2.1 Avery

The client prefers little to no movement during the experience, hence it is important for our product to have minimal user interactions. As the user goes through the experience, they will be able to trigger certain events by looking at or pressing an object. For example, if the user turns towards an NPC, this movement could trigger the next scene in the storyline. To keep the user intrigued, the VR controller could be used a few times. However, it will be minimal since the client wants it to be more of an experience than a game. It would be interesting if it was possible to have scenes activated by the users' step, so if the user takes a step forward or backward, there is a change in scenery.

3.2.2 Joumana

One of the most important needs of our client is that the game should be short and have very little movement. This also applies to in game interaction, meaning the player should not have to press buttons for everything. Not only is it a waste of game time but it is also efficient when presenting the game in a confined space. Walking will be done by using buttons on the controllers and head movement will be done by panning the image sideways when needed. The player can still look around but this way it doesn't become necessary to do so. Choosing options will be done by pointing at and selecting the player's preferred choice.

3.2.3 Grace

To allow for minimum movement but keeping the user engaged, it is important to incorporate controllable movements to give the user the VR experience they were expecting but to keep them on track to be under 5 minutes. To abide by these guidelines, the use of teleportation within the game would be sufficient as it is a step down from continuous movement. Also, the user will be able to move their head around and take in the entire environment.

3.2.4 Saif

The control scheme here avoids holding buttons or keeping hands up in the air for a long time. Almost all interactions are done via a single button click. Hovering on a selection and waiting for a timer to trigger selection is not used to avoid frustrations in case the device is not well calibrated.

3.2.5 Mohammad

To satisfy the client's desire of minimizing the movement of the one using the VR, the controlling will simply be by:

- As the scenes will roll automatically, pushing the buttons will be to move inside each scene and look at specific view.
- moving of the head to look around.
- moving hands to grab things without the need of walking or running or other major movements.

Also, to enhance the emerging experience, there will be some speaking running in the background for each scene to explain the scenes more and point out the important things to look at so that the individual using the VR will not be distracted since it is probably their first time trying a VR.

3.3 Subsystem 3: User Interactivity

3.3.1 Avery

It is important for our product to use user interactivity as minimally as possible. The client made it clear that they wanted the outcome of the product to be more of an experience than a game. Hence, user interactivity will be kept as simple as a look or a couple clicks of the VR controller.

3.3.2 Joumana

User interactivity is another aspect of the game that could take away from the game time if the player is made to do menial tasks like opening the door, pressing “next” for each dialog block, and walking towards an NPCs to interact with them. Instead, doors can open automatically when near, dialog blocks will proceed at a natural reading rate and NPCs will have a spot near them where the player can jump or teleport to. It is even possible to revoke this completely, for example the player will meet the new NPCs automatically without having to lift a finger. Although it is an option, limiting the game to this extent would remove the immersive experience that VR is meant to deliver.

3.3.3 Grace

The user will be able to partake in small and insignificant movements to make them feel as though they are really in the experience. This would be important as small movements and interactions can make the user feel more invested in the storyline and make it feel more personal. However, the interactions should not be many insignificant things to distract them from the main message and theme, but used as a tool to enhance the experience and be worked into what the user is doing.

3.3.4 Saif

User interactivity here is used to make the user more immersed in the experience. Interactions are kept simple, like moving paperwork or placing sandbags around the environment, to instill a sense of calm and avoid fatiguing the user. Dialogue, when present, is restricted to simple and immediate yes/no responses. While this does unfortunately take away some creative liberty to some degree, the simplicity of it outweighs the restriction it imposes.

3.3.5 Mohammad

The interactivity with the environment will be limited yet effective. Unnecessary interactions will not be included like opening a door or touching a wall; however, effective interaction that will demonstrate the case will be more focused on, such as flipping a rock that fell on a civilian because of the attack or helping a kid who are reaching out their hands for help from under the rubble. This will increase the awareness of the one using the VR (politicians) to make them experience the situation of being one of the civilians bombed instead of including unnecessary interactions that will probably distract the politician away from the main purpose. So, rather than enjoying an ordinary VR game, they will realize the danger of autonomous weapons.

4. Subsystem categorization

1	2	3
Bad	Average	Good

4.1 Storyline comparison

Specifications	Importance	Avery	Joumana	Grace	Saif	Mohammad
Interactivity	3	2	2	2	1	2
Relatability	4	3	2	3	3	2
Emotionally captivating	5	3	3	3	2	3
Delivers the message	5	2	3	2	3	3
Total		**43**	**44**	**43**	**40**	**44**

4.2 Control Scheme comparison

Specifications	Importance	Avery	Joumana	Grace	Saif	Mohammad
Physical actions	4	1	3	2	1	1
User interactivity	3	2	1	2	2	2
Minimal movement	5	3	3	2	3	3
Safe space for VR	5	3	3	3	3	3
Beginner friendly	4	3	2	2	3	3
Total		**52**	**53**	**47**	**52**	**52**

4.3 User Interactivity comparison

Specifications	Importance	Avery	Joumana	Grace	Saif	Mohammad
Small range of motion	4	3	2	2	2	3
Immersive experience	5	2	3	3	3	2
Total		**22**	**23**	**23**	**23**	**22**

5. Final Conceptual Design

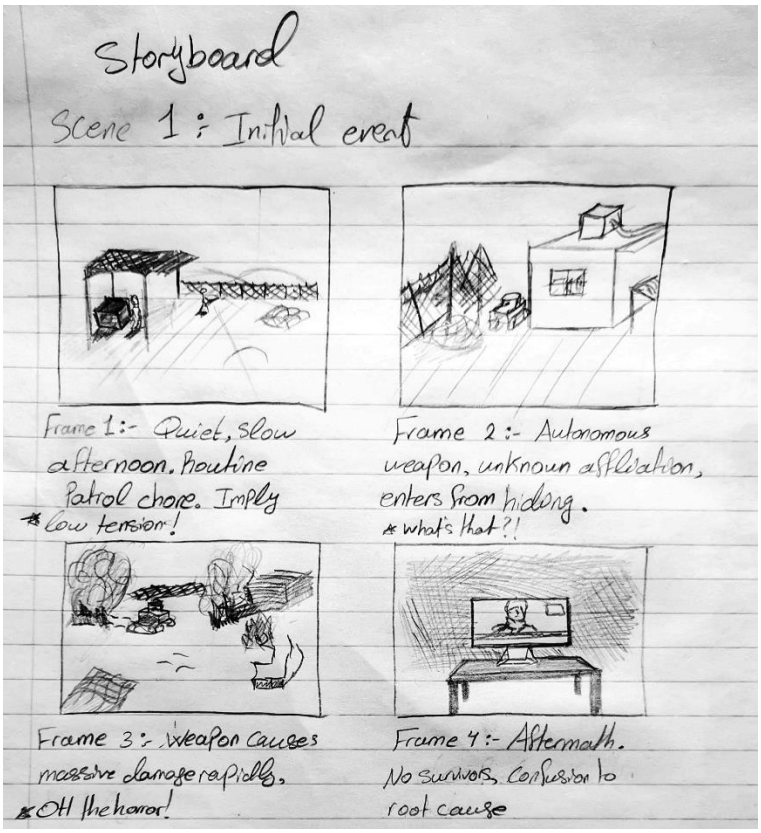
The subsystems are chosen based on the scores above. For the storyline, Joumana's storyline is chosen. For the control scheme, a mixture of each members' scheme is chosen as each member prioritized teleportation and simple inputs for interactions. For user interactivity, Saif's interactivity plan was chosen as it discusses dialogue and avoids unnecessary prompts. Grace's plan also has some similar elements, in particular the importance of immersive experiences.

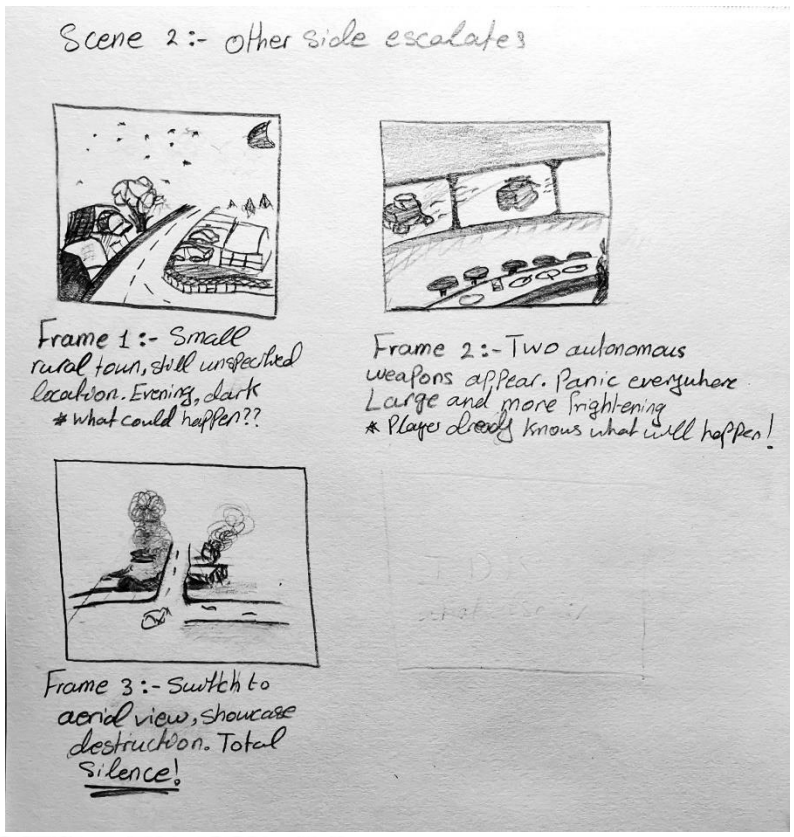
6. Conclusions and Recommendations

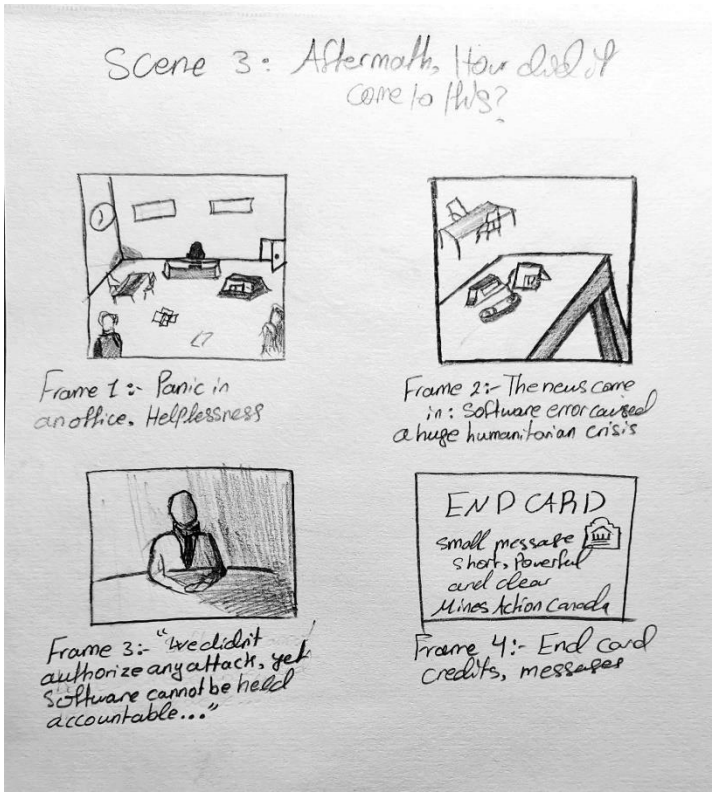
To conclude, we all provided individual concepts and ideas to create a well-rounded conceptual design. Our conceptual design includes all important aspects that will make our product as efficient and as close to our client's needs. Our initial design is far from perfect, and we anticipate further feedback and suggestions from our client to refine our proposal.

7. Appendix

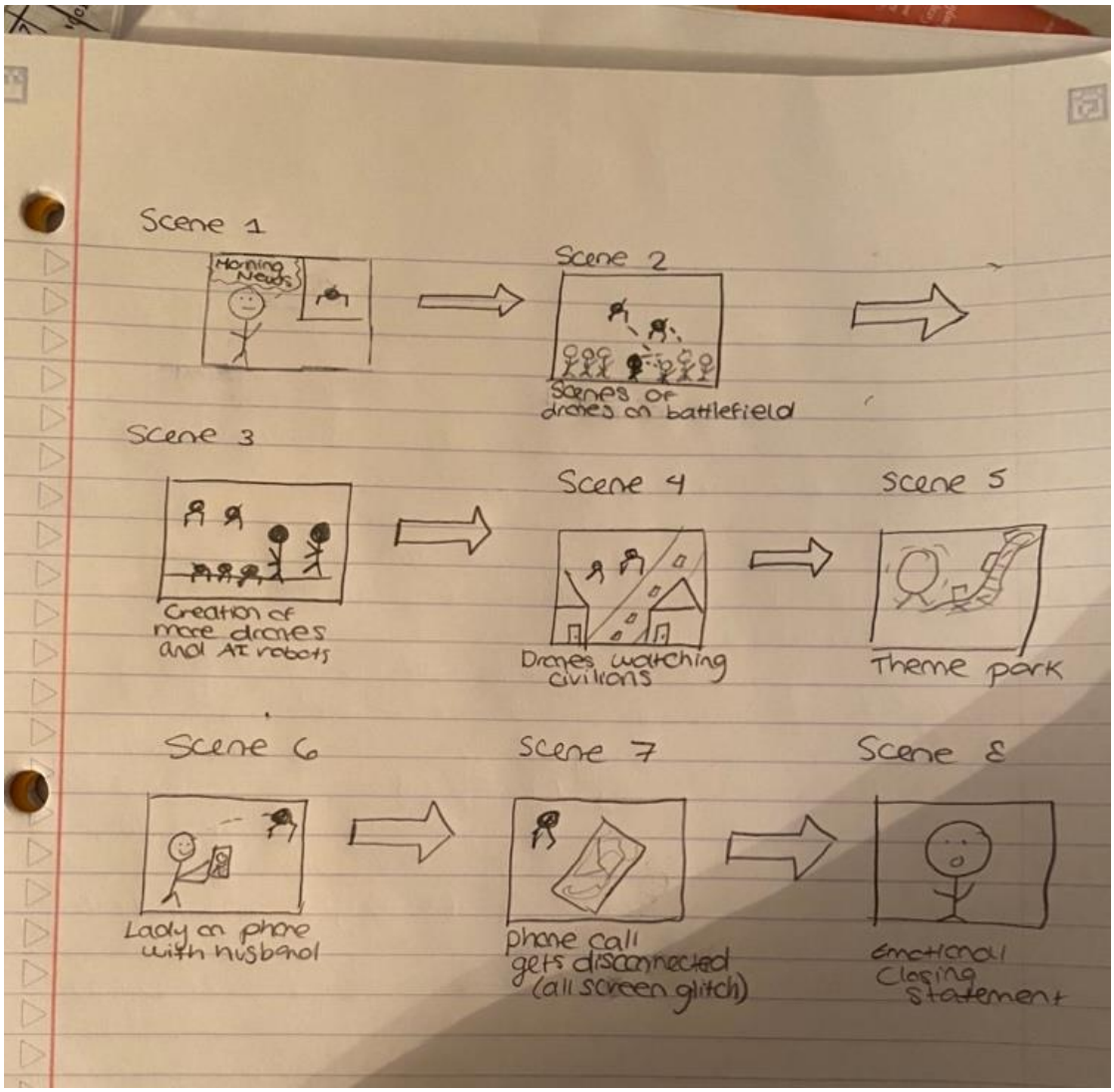
7.1 Saif's concept art



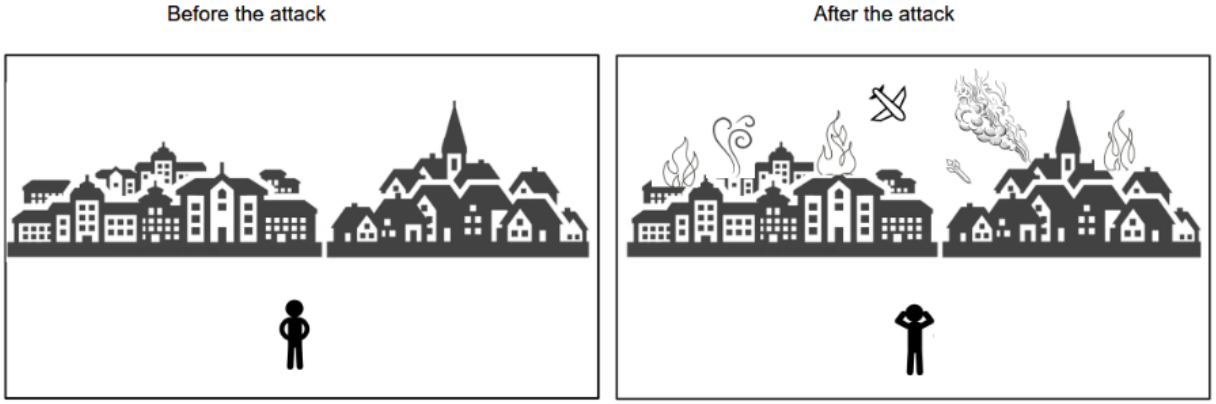




7.2 Avery's Conceptual Design

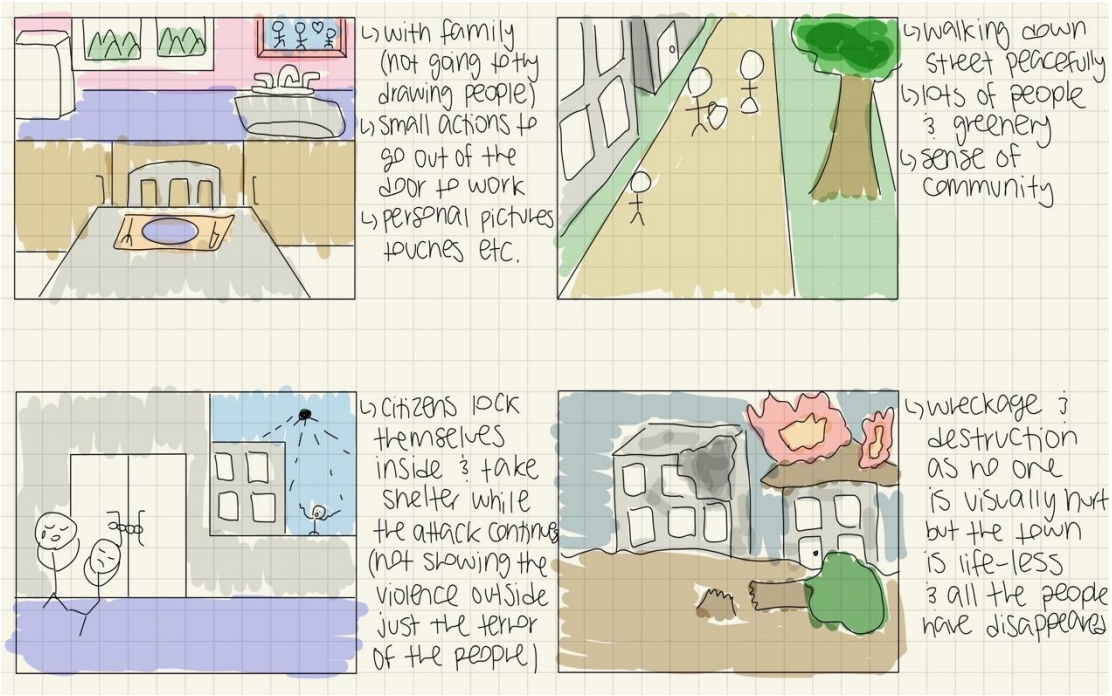


7.3 Mohammad's Concept Art



Mohammad's example scene. The art style is only for demonstration.

7.4 Grace's Concept Art



7.5 Joumana's Conceptual Design