Project Deliverable D: Conceptual Design

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1. Introduction

This document portrays a set of conceptual designs for the problem statement, based on user benchmarking and technical benchmarking and the list of prioritized design criteria that have been developed.

2. Subsystems

a. Subsystem 1: Emotional Experience Design

The first subsystem will be focused on the emotional experience of the user. This will include using 360-degree video and sound effects to create an immersive and evocative environment. The goal is to evoke empathy, sadness, and a sense of urgency in the user, making them feel the impact of autonomous weapons on humanity and the environment. The emotional experience will be designed to be unbiased, avoiding pointing fingers at specific countries or organizations, and instead highlighting the broader humanitarian impact of the issue.

b. Subsystem 2: Educational Content Design

The second subsystem will focus on educational content, providing the user with factual information about autonomous weapons, their development and deployment, and the implications for international security and human rights. This will include the use of 3D objects and texts (texts might be in the form of a voice-over) so that the information is easily digestible and engaging for the user. The educational content will be designed to be neutral and impartial, drawing on a wide range of sources and perspectives, and will be reviewed thoroughly to ensure accuracy.

c. Subsystem 3: Interactive Experience Design

The third subsystem will be focused on creating an interactive experience for the user, allowing them to explore the virtual reality environment and engage with the educational content in a hands-on manner. This will include interactive elements such as clickable objects and decision-making scenarios. The interactive experience will be designed to encourage the user to reflect on their own views and opinions on autonomous weapons, and to consider taking action to support the ban on autonomous weapons.

3. Boundaries between subsystems

- Subsystems 1 and 2 will be interconnected, with the emotional experience reinforcing and supplementing the educational content.
- Subsystems 2 and 3 will be connected through interactive elements, with the educational content providing context for the interactive scenarios.
- Subsystem 1 will be distinct from Subsystems 2 and 3, serving as the emotional foundation for the overall experience, but not directly interacting with the educational content or interactive elements.

4. Subsystem 1: Emotional Experience Design

(Talib) Concept 1: The Lost City

The user is transported to a virtual reality world of a city devastated by the use of autonomous weapons. The city's in ruins, buildings are destroyed, and there is evidence of widespread devastation. The user is free to explore the environment, taking in the sights, sounds, and emotions of the aftermath of an autonomous weapon attack. As the user moves through the environment, they will encounter the survivors, family members, and rescue workers, while having the choice to interact with them and hear stories of the impact of the weapons. The overall experience will be designed to evoke a sense of loss, sadness, and despair, and to create a powerful emotional connection with the user.

(Tian) Concept 2: No More Tears

This focuses on a soldier and a family. This would mainly revolve around a futuristic time of war, where more advanced machines and technical equipment starts taking over. A soldier would apply himself to join the military and eventually go into war with another country. What he didn't know about this country was that they are very advanced in using autonomous weapons. He gets killed, and his family is in tears. His family then goes through the emotional stages of his passing, exclaiming that machines have no regard for human life. Most of the play would involve the family expressing their thoughts about how humans shouldn’t be killed by their own creations of machines. Eventually a powerful message of “banning autonomous weapons” would come up and to prioritize human life over machines.

(Josh) Concept 3: Invasion

The user is a citizen in a small community being invaded by a foreign nation. The user is free to move around within a curtain area (sheltering them from the violence) and as they do, they witness atrocities (indiscriminate killing, etc.) being committed by their invader with the use of various AI weaponry. The user will see their town destroyed and family and neighbors killed. The experience will focus on this new technology's unique ability to intimidate and break the morale of a civilian population.

(Mega) Concept 4: No Second Chances

The user is transported to a scene and the objective is to try to stop an autonomous weapon that has been fired. However, the first attempt is rigged to fail, so the user just experiences the dire consequences that could occur because of a misfire from an autonomous weapon. The scene with the casualties should emphasize that each person affected has a family, friends, and

a vision for the next day. Also, it should portray that it was not their choice to be where they were at the moment. The key is to remind people that there is no second chance once an autonomous weapon misfires.

(Sarah) Concept 5: Battlefield

The user is a medic in a war zone. The medic is in a trailer filled with monitors displaying what is happening outside in the battlefield and is ready to respond to any soldiers in need. Through the monitors, the user can see the damage the autonomous weapons are causing and can see special cases in which the autonomous weapons are unethical. The user can have the option to go out and help soldiers in need so they can see the damage first-hand and be fully immersed emotionally. By the end of the experience, the general in command can inform the medic that they are now retreating because they are experiencing heavy damage due to the robots, leaving all the injured soldiers behind with the autonomous weapons, triggering that emotional aspect.

(Griffin) Concept 6 : Ottawa

The user is placed right in our city of Ottawa. They are shown the destruction of various sites, including the parliament building. The target of our virtual reality experience is mainly politicians, therefore this experience could be one that strikes them the most. The experience takes place directly after an autonomous weapon attack has occurred, so the city is in chaos. The user passes by a school that has been hit by the attack, and they see children fleeing onto the streets. Emergency responders are flooding the streets trying to help all those that were able to survive.

5. Subsystem 2: Educational Content Design

(Talib) Concept 1: Interactive Infographics

The educational content is presented in the form of interactive infographics, allowing the user to explore information about autonomous weapons at their own pace. The infographics cover a range of topics, from the history and development of autonomous weapons to their impact on international security and human rights. The user can click on different sections of the infographic to access more detailed information, watch videos, and read articles. The overall experience will be designed to be engaging and accessible, with clear and concise information presented in an easy-to-understand format.

(Josh) Concept 2: Through rules of war

Educational content will primarily focus on rules of war and The Hague Convention. The atrocities and actions committed by the AI will be clear examples of various humanitarian law violations (destruction of nonmilitary buildings, indiscriminate and unnecessary civilians).

(Griffin) Concept 3: Narrator

The educational content is presented by a narrator speaking to the user while they go through the experience. The narrator will provide facts about autonomous weapons as well as give details on what the user is seeing during the experience. At certain points, the narrator pauses, and the user is given the option to click on various elements that they see throughout the experience and learn more about them.

(Sarah) Concept 4: Leader

To keep the user informed throughout the experience, there can be a leader-type character presenting facts about the weapons, why they are immoral/unethical as well as guiding the user throughout the experience, making sure they stay alive. This leader-type character is responsible for making sure the user is educated enough to make their decision on whether autonomous weapons should be implemented in reality.

(Tian) Concept 5: Growth

A young engineer decides to build a career of designing these weapons. A breakdown of how these weapons will work would provide information to the user watching on how unethical they are. They could be displaying 3D models of certain designs and go in-depth of what they are used for. This can directly transition from the first subsystem of emotions. The engineer could realize how harmful these weapons are and eventually scrap the idea of designing these weapons. Of course, the main point is to educate about the weapons.

(Mega) Concept 6: Real Images

We can use real images to portray times that algorithms have not worked efficiently and caused discomfort or inconveniences to people. This could include making false arrests, content censorship errors and eventually relate it to the fact that algorithms could lead to potential

errors, and thus it is not safe to leave matters that directly affect life and death in the hands of technology.

6. Subsystem 3: Interactive Experience Design

(Talib) Concept 1: The Moral Dilemma

The user is presented with a series of interactive scenarios, each one presenting a moral dilemma related to the use of autonomous weapons. The user is asked to make a choice, with each choice leading to a different outcome. For example, in one scenario, the user may be asked to decide whether to deploy autonomous weapons in a war zone, with the outcome being either success in neutralizing the enemy or the unintended death of civilians. In another scenario, the user may be asked to decide whether to invest in the development of autonomous weapons or to support a ban on their use. The overall experience will be designed to encourage the user to reflect on their own values and beliefs and to consider the implications of their decisions.

(Talib) Concept 2: Immersive Dialogue

Through immersive dialogue, the user has the opportunity to connect with individuals who have been affected by the aftermath of an autonomous weapon attack. This humanizes the data, painting a vivid picture of the devastating consequences these weapons can bring. The stories shared by the survivors will showcase the profound impact that such weapons can have on their lives, and serve as a powerful reminder of what could become a widespread reality if action isn't taken to halt the production of autonomous weapons.

(Tian) Concept 3: Deserted

Only the rich survive. The programming of autonomous weapons goes wrong, and they target specific individuals for no reason. Eventually, machines would control the world, and only the very rich who can fend them off can survive. The world would be completely trashed and deserted. This would then allow the user to see what the world would look like if robots were the main use of problems. The grounds would be burned to ashes, there would be no nature left, just these machines that roam around doing what they’re supposed to be doing with no feelings of anything else. Without control, chaos would spread.

(Griffin) Concept 4: User decision

The user will be able to make their own decisions as to where their experience goes. This goes along with the emotional experience design set in a city. The user is essentially traveling through the city in a vehicle, and they get to decide which direction they want to go. We will have multiple possibilities loaded into the virtual reality experience so that each user can have a unique experience. For example, the user comes to an intersection, and they have the choice between going right to see a school destroyed by an attack gone wrong, or go left to see a family stranded outside of their home that was unintentionally destroyed.

(Josh) Concept 5: Curtain

The user would interact by walking around a set path through their town and be able to look around and see different things happening. Certain events would be triggered when the user looks in a certain direction or walks over a certain area.

(Mega) Concept 6: Personalization

There should be a free character or element that the user should be able to define. For example, the user's best friend is his team member, and together they journey through the experience as though they were in reality.

(Sarah) Concept 7: Help others or deploy weapons

The user can make decisions whether to help people against the autonomous weapons, or to deploy them and watch as the events carry on during the experience. This will make the user more inclined to make the decision the client wants on whether autonomous weapons should be implemented, since they will see the consequences of their actions first hand.

7. Potential solutions

Global Concept 1:

Subsystem 1: Concept 3, Subsystem 2: Concept 4, Subsystem 3: Concept 4

Global Concept 2:

Subsystem 1: Concept 6, Subsystem 2: Concept 1, Subsystem 3: Concept 6

Global Concept 3:

Subsystem 1: Concept 5, Subsystem 2: Concept 4, Subsystem 3: Concept 4

8. Selection Matrix & Final Choice

Global Concept	Functional Requirements Met?	Non-Functional Requirements Met?	Constraints Met?
1	Meets all functional requirements. Gives the user a lasting emotional and interactive experience, but also provides enough factual information where the user can learn.	All non-functional requirements can be met in the prototyping phase.	All previously described constraints can be met.
2	Meets most of the functional requirements except the following: - Emergency responders' flashing lights as well as sirens can be a trigger for photosensitive users. - Could be less emotionally engaging than ideas with actual motion/ an engaging story line.	All non-functional requirements can be met in the prototyping phase.	All previously described constraints can be met.
3	Meets most of the functional requirements except the following: - Can exceed the level of violence and gore, as stated by the client, being shown first-hand to the user.	All non-functional requirements can be met in the prototyping phase.	All previously described constraints can be met.

Based on this selection matrix, global concept 1 is the concept we will continue with. Here is the final description of the concept:

The user is a citizen in a small community being invaded by a foreign nation. The user is free to move around within a curtain area (sheltering them from the violence) and as they do, they witness atrocities (indiscriminate killing, etc.) being committed by their invader with the use of various AI weaponry. The user will see their town destroyed and family and neighbors killed. The experience will focus on this new technology's unique ability to intimidate and break the morale of a civilian population.

To keep the user informed throughout the experience, there can be a leader-type character presenting facts about the weapons, why they are immoral/unethical as well as guiding the user throughout the experience, making sure they stay alive. This leader-type character is responsible for making sure the user is educated enough to make their decision on whether autonomous weapons should be implemented in reality.

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9. Conclusion

In conclusion, this report has properly summarized our ideas to respond to the problem statement by using our benchmarking tools as well as our design criteria. The next step in our design process is to expand on global concept one and come up with a detailed design.