Project Deliverable D: Conceptual Design

Faculty of Engineering – Engineering Design - GNG1103
October 8, 2024

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Abstract:

This deliverable encompasses the ideate stage of design thinking, specifically looking at the develop stage and the deliver stage of conceptual design. During the develop stage we will brainstorm multiple solutions to the issue with sketches and diagrams to communicate our ideas and we will end with picking the best one solution for the deliver stage.

In this deliverable, the problem statement, user benchmarking and prioritized design criteria will be used to ideate potential subsystems of the larger project, which will be used to categorize our preliminary ideas. Each member in the group will brainstorm one idea for each subsystem, creating five potential ideas for each subsystem which will then be evaluated to create three final global concepts. These global concepts will be created through refining, mixing and analysing the ideas formulated by the individual team members. Then, by comparing the user needs and prioritized design criteria as well as going through the pros and cons of each global concept, the best global concept out of the three will be chosen using a design criteria matrix.

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1.Introduction

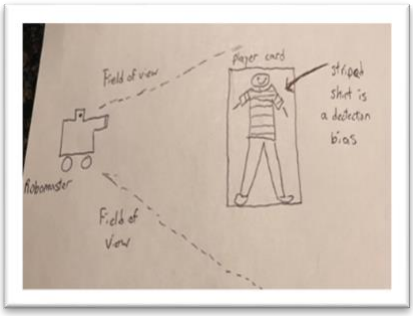
For this deliverable, each member in our group produced a set of conceptual designs in accordance with our list of interpreted needs, design criteria, and problem statement for the requested project of Mines Action Canada. Mines Action Canada has asked us to create an immersive experience which shows the participants the negative impacts and ethical issues surrounding the usage of Lethal Autonomous Weapons Systems (LAWS). The hope for this project is to create negative views about LAWS amongst those in the general public, in order to create opposition in the rising international law debates regarding the usage of LAWS. As a team, we compiled the best ideas into global concepts which we will use as the foundation for our actual prototype and game design. The 3 subsystems included for the design of the game are: *Targeting and Detection, Movement and Attack, and Player Feedback to the Robots' Actions*. The leading global concept will be further developed and implemented into the final product.

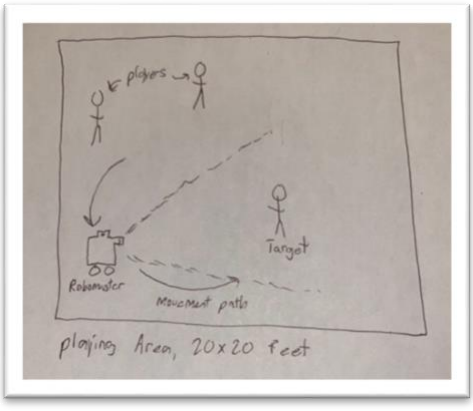
2. Individual Concepts

2.1. Thomas's Concepts

2.1.1. Targeting and Detection

The Robomaster is equipped with a camera and can be programmed to detect certain characteristics or attributes in its field of view (120 degrees). Each player will have a player card with its unique attributes. Using its camera, the Robomaster will target players in its field of view then prompt the player to show their player card. The Robomaster will then detect whether the player matches its biases or not. After each round of elimination, the Robomaster will randomly change which biases it holds. Some examples of biases could be the colour of shirt, hairstyle or type of device.

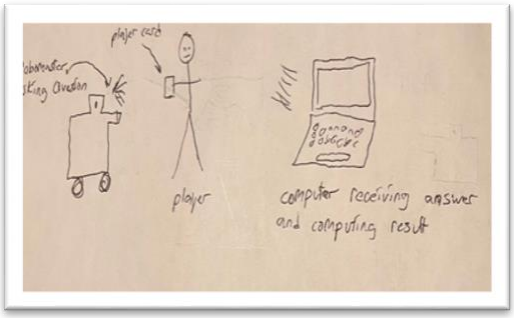




2.1.2. Movement and Attack

The Robomaster will be programmed to randomly move about the playing space by rolling forward and turning. When the Robomaster detects a bias in its field of view, it will alert that the player is selected by playing a hit sound. After each round, the movement pattern of the Robomaster may change to disrupt any patterns that the players notice.

2.1.3. Player Feedback to the Robots' Actions



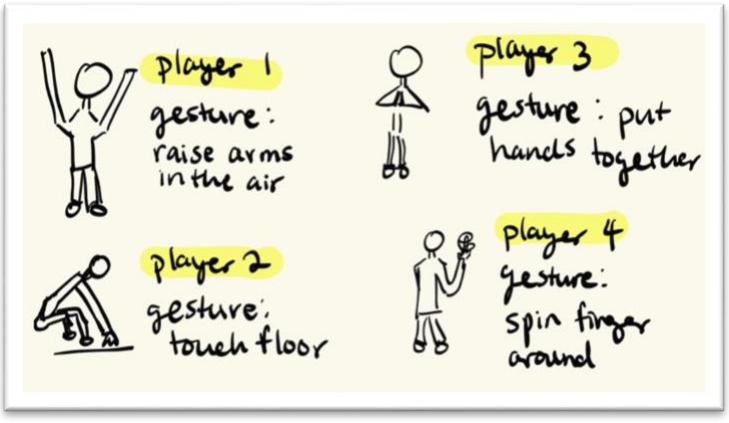
When a player has been selected by the Robomaster, they will be given an option to stay in the game if they correctly answer a question. The objective correct answer will lead to the player being eliminated while the wrong answer keeps them in the game. For example, if the Robomaster prompts the player to give the value of pi to 3 digits, the answer 3.14 will lead to elimination.

2.1.4. Pros and Cons of The Concepts

The pros for this concept are that the design for the game is simple to understand and can change and vary for each round of the game. This prevents the game from being too complicated, but also repetitive. A key criterion for this project is to have the player feeling loss, and by having a changing environment, it reduces the players ability to gain any advantage by recognizing patterns. Some cons of this concept are the reliability of the detection. The camera may not properly recognize player cards, or the cards could be covered which will hinder the games effectiveness. Another con is that the concept relies on taking user answers, which could be affected by loud conditions surrounding the game which prevents answers from being processed.

2.2 Nithini's Concepts

2.2.1 Targeting and Detection



Each player will be given a specific gesture that they will have to do 8 times within a 45-second round without being detected by the Robomaster S1. In each round of the game, the Robomaster will have a specific targeted gesture, and by extension player. Using the camera and gesture recognition feature of the Robomaster S1, we will create a bias in the elimination process. If the Robomaster detects a player doing their gesture in its line of sight, but gesture is not the targeted one for the round, nothing will happen to the player. If the Robomaster sees the targeted gesture in their line of sight, the Robomaster will indicate that the player has been eliminated using the LED light feature of the Robomaster S1. The Robomaster's chassis will start flashing red lights to indicate that the player has been eliminated.

2.2.2 Movement and Attack

For the attack of the Robomaster S1, the players will know that they are eliminated based on the red LED lights on the Robomaster's chassis. For movement during the game, we will use the Robomaster S1's ability to move in specific patterns and program the Robomaster to move in different patterns across the arena each round. We will make the Robomaster move in unpredictable, sharp and fast motions to create a sense of anxiety in the players.

2.2.3 Player Feedback to the Robot's Actions

This concept will create emotions of unfairness and confusion within the targeted players, where they will continue to see the other players doing their gestures within the sight of the robots, but somehow not being eliminated, while they are getting eliminated as soon as they are seen by the robot. This will create a sense of mistrust in technology as the player will not be able to rely on the robot to accurately play the game as it should be played. It will also show the dangers of algorithmic biases as well as the loss of meaningful human control, as the players will begin to understand that there are deeper algorithmic biases within the robot that is causing them to act in unpredictable ways and they will start to see how the game would differ if humans were there to control the eliminated parties versus how it occurs when the only ones deciding are the robots.

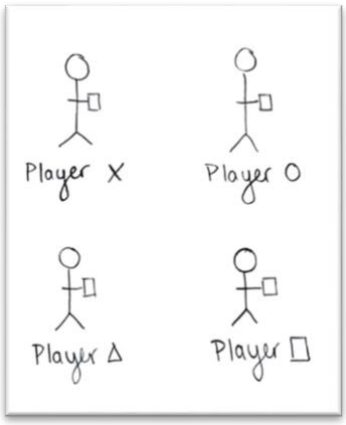
2.2.4 Pros and Cons of The Concepts

One consequence of using gesture targeting in the game is that we are unable to trust in the Robomaster ability to pick up certain gestures. For example, since the players are trying to do their movements in a non-obvious way, if the targeted player does their gesture in the view of the Robomaster, but they do the gesture in a non-obvious way or stop the gesture abruptly, we cannot be sure that the Robomaster will reliability eliminate them. Another consequence of this concept is that it relies on the participates ability to do their gesture a set number of times. If we need to make sure that the players do their gesture a certain number of times, any consequence for not doing the gesture the number of times they should, would not be a consequence showing the negative effects of using LAWs. If the players do not have consequences for not doing their gesture 8 times, then players might believe they can win the game by not doing their gesture, which blocks the robot from eliminating them if they are the target. There is also the con of not being certain that the game can be finished within the allotted time of 5-10 minutes. If the targeted players can avoid doing the gesture in front of the robomaster for multiple rounds, then no one will be eliminated causing he game to drag on. Some pros to this concept, is that the use of LED lights for elimination would make sure that, even in loud environments, the players can understand that they are eliminated.

2.3 Meg's Concepts

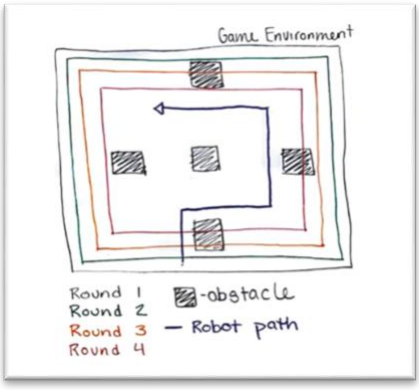
2.3.1 Targeting and Detection

Each player will be given a player card before entering the game; the player card will act as the player's identification throughout the game. During each round of the game, the Robomaster S1 will have a specific target determined by which player card is selected for that round. The Robomaster S1 will have one minute to find its target before the round is over and the target will be changed. The Robomaster S1 will use its camera and field of view to find players. If a player enters the field of view of the Robomaster S1, they will be selected to participate in a game of rock, paper, scissors.



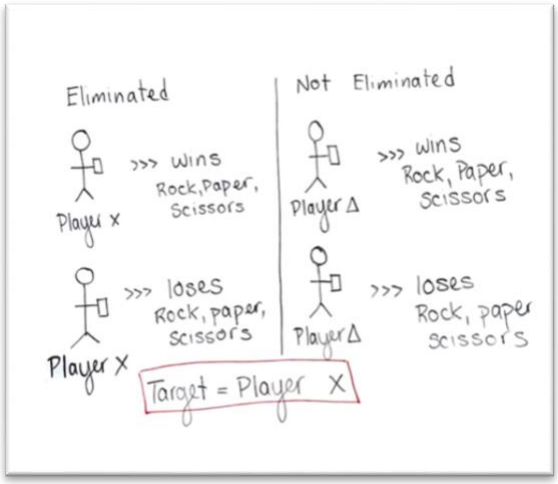
2.3.2 Movement and Attack

The Robomaster S1 will be programmed to move throughout the game environment in a specific way to avoid obstacles that have been setup to force players to move in specific ways. The Robomaster S1 will move in a predicable way such that players will be able to understand what the robot's movement pattern will be, allowing them to try to avoid the robot. However, as the game progresses, the game environment will become smaller, making being selected by the Robomaster harder to avoid. A player will be alerted that they have been selected to engage in a round of rock, paper, scissors, by having a red light be activated on the Robomaster S1 as well through a sound notification.



2.3.3 Player Feedback to the Robot's Actions

Players will move throughout the game environment and when they are selected by the Robomaster S1, they must engage in a game of rock, paper, scissors. The outcome of the game does not determine if the player will be eliminated or not; it is the player card that has been assigned to player. Depending on what round of the game, the player may or may not be eliminated. Players will be made to believe that the outcome of the rock, paper, scissors game will determine whether they are eliminated or not, while truly their fate had already been decided at the beginning of the round. Once the game has ended, players will be made aware of that they were targeted based off their player identification and not the results of the game of rock, paper, scissors and will be educated in on the ethical concerns of LAWS.



2.3.4 Pros and Cons of The Concepts

A pro of this concept is that the game evolves overtime, making the game more challenging, thus keeping players engaged until the end. A con of this concept is that part of the budget will have to be allotted to the arena corners and obstacles. Depending on how the debriefing after the game is designed, informing the players about the ethical concerns about Lethal Autonomous Weapon Systems (LAWS) at the end could be a pro or a con.

2.4 Samuel's Concept

2.4.1. Targeting and Detection

With the use of machine learning coupled with advanced algorithms in vision, the Robomaster S1 detects targets based on behaviors rather than outward features. Other than relying only on shirt color or other items as visual features, it identifies dynamic motions like the pace of movement, patterns of engagement, or certain motions. Each of the players will be given a digital ID via their mobile application, which will dynamically change the bias of the robot and challenge the players to change their tactics in every game so that they do not get targeted. It may have a predisposition toward players who touch specific areas of the game or do particular things during certain rounds; it may make the games quite unpredictable and require quick thinking. Both games continuously compel

players to alter their tactics, since the experience is both captivating and immersive due to the adaptive targeting.

2.4.2. Movement and Attack

The multi-phase movement mechanics of the Robomaster S1 evolve as the game events and user behaviors change. In this case, the robot at first moves on predictable patrol paths so that players can learn the movement pattern. As the game progresses, S1 becomes an adaptive player in that in successive rounds, it already uses information gathered to barricade the most frequently used escape routes or target areas where players are piling up. The robot can also begin ambush maneuvers such as lying in a dormant state and then suddenly accelerating towards players or feigning retreats before reversing direction. It also incorporates trap mechanics whereby, if a player sets off a proximity sensor or executes a flagged action, the robot switches into aggressive pursuit mode-forcing the player to flee. This variable movement pattern removes all possibilities for any player to rely on rote memorization of routines, adding tension and excitement throughout each round.

2.4.3. Player Feedback to Robot's Actions

The immersive and interactive feedback loops that are embedded in the new framework of the Robomaster S1 will intensify psychological stress. The S1 will be able to provide real-time feedback when it has targeted a player. It is possible to design light signals as this input, sound effects, or even notifications through mobile devices for such a function, like a countdown before tagging. On the other hand, feedback is intended to mislead players. It may tell them, for example, that they are safe because they solved a puzzle or won a game of rock, paper, scissors when, actually, the course of events was predetermined by unseen actors. In this way, the players engage with the game within an environment in which it is not explicitly defined whether what they do will actually affect the outcome. This again connects to the mechanic of deceptive feedback for a final debrief, where the player is introduced to the ethical dilemma concerning AI bias and decision-making, hence making the game more memorable for its educational value.

2.4.4. Pros and Cons to The Concepts

Smart and Adaptive Targeting and Detection

Pros:

- Increased Complexity and Challenge: Adaptive targeting, based on player behaviors such as motion patterns or game interactions, would add more kinks to a game, especially towards the complexity aspect, making it very immersive and requiring fast, strategic thinking.

- Dynamic Experience: Shifting biases will keep the players on their toes, changing tactics after each round to win, hence increasing the replay ability and holding the attention of its players. Integrating machine learning and dynamic decision-making can help participants learn the behavior and biases of AI, fitting in educational modules regarding technology and ethics.

Cons:

- Complexity in Implementation: The inclusion of machine learning and tracking of behavior requires advanced algorithms with sensors, increasing development costs and the time it takes to set up.
- Player Frustration: Dynamic, constantly shifting targeting biases may overwhelm or annoy participants. This might impact the enjoyment of less experienced players.
- Privacy and Data: To the extent that digital IDs and real-time tracking to gather behavioral data raise questions about privacy concerns with data accumulation, this would in turn demand more measures to secure user information.

Movement and Attack - Evolving Movement Patterns with Player Traps

Pros:

- Adaptive movement increases challenge: The robot is able to adapt paths and block escape routes to ensure that no player can rely on simply memorizing the routines of a game.
- Ambush and trap mechanics include feigned retreats and aggressive pursuit modes, heightening tension and excitement as one key factor in the psychological thrill from the game.
- Behavior-Driven Gameplay: The robot reacts to players' actions, such as proximity triggers. Hence, the players are always involved and cannot predict the behavior of the robot, which enhances the experience.

Cons:

- Steep Learning Curve: Evolving patterns of movement and traps may be too challenging to conquer for more unexperienced or younger players. This would further narrow down the target audience.
- Greater Setup and Maintenance: With integrated trap mechanics and adaptive movement, the programming gets way more complex, increasing resource intensity in terms of development and maintenance.
- Player Injury Risk: the application of the robot in pursuit mode may lead to accidents or collisions that the calibration should account for.

Player Feedback to robot’s Actions

Pros:

- Emotional player involvement: such a sham feedback system will keep the player in the guessing position as his emotional involvement increases.
- Creates Psychological Depth: This is similar to creating false feedback, as in the case of winning a game of rock-paper-scissors, without knowing it is all irrelevant, much like real-world AI bias. It therefore adds a level of cognitive depth to the game.
- Educational Value: With the debriefing on deceptive AI behavior, topics of ethical dilemmas concerning autonomous systems and decision-making are brought in, adding great value to the AI and ethics discussion.

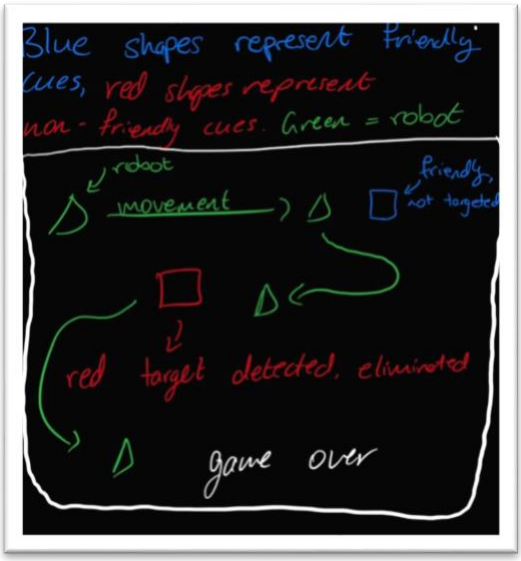
Cons:

- Frustration of Being Cheated: While the feedback here is made to be engaging, it could also be misleading or cheating; in that case, frustration or dissatisfaction may result, especially among players that may consider such to be unfair.
- Needs Delicate Handling: Poor design or too much opacity in the feedback might lead to confusion or a sense of disengagement from participants' sides, against the intended experience.
- Psychological Effects: One could foresee that the misleading feedback will lead to stress and thus dampen the enjoyment of participants should they feel manipulated through the game.

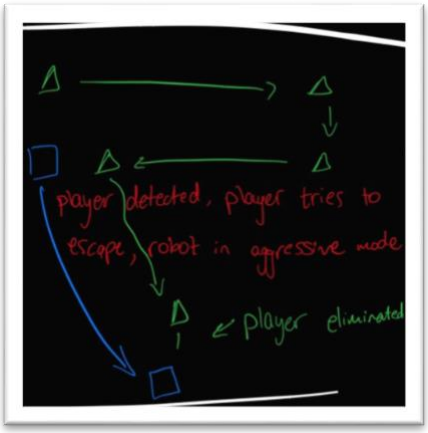
2.5 Ahmad's Concepts

2.5.1: Targeting and Detection

The Robomaster S1 could visually scan the area identify environmental cues rather than player-specific attributes. The robot can scan for distinct objects or symbols placed in the player cards as signals for initiating targeting actions. These symbols could represent ethical dilemmas, triggering the robot's response based on its pre-programmed biases toward specific symbols like prioritizing a military emblem over a civilian one, or identifying red cross symbols or white flags on player cards. A good way to present an ethical dilemma could even be allowing the robot to target friendly symbols to illustrate its lack of discrimination. Players should manipulate the environment, adding or removing symbols to influence the Robomaster's decisions.

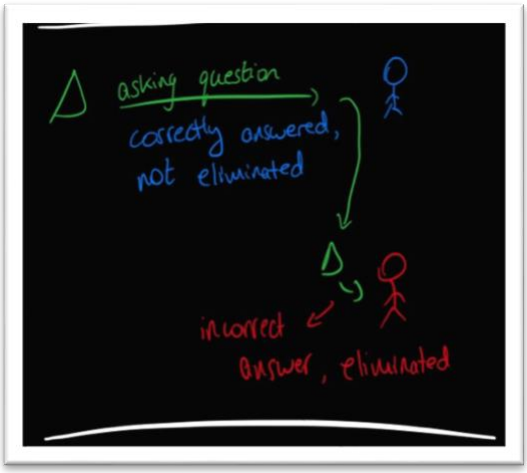


2.5.2: Movement and Attack



The Robomaster S1 could move in a way that simulates a patrolled area, whether it is a warzone, or a simulated robot invasion. It can follow a pre-programmed path, and, theoretically, the simulated path would gradually reduce the number of safe zones there are in the area, forcing players to move and adapt quickly. Over time, the robot's movement can become faster, and more unpredictable, and if it identifies a symbol of interest, it can enter a more aggressive mode and play loud sounds and flash LED lights to invoke panic.

2.5.3: Player Feedback to the Robot's Actions



When a symbol is identified by the Robomaster S1, its program will prompt it to scan for feedback from players. Whether the robomaster S1 has asked a question, played a sound, or made a certain movement, the way the player reacts to an ethical dilemma will influence the Robomaster's decisions. Most importantly, the players may feel that their decisions directly affect the robomaster S1's decisions, but in reality, the robot may have internal biases instilled in its program, in a way that makes it impossible for the player to make an actual correct decision. The player should always lose. That introduces a sense of deception in the experience highlighting an ethical concern. At the end of the experience, a report could show how the robot's decisions were influenced by player feedback, just as a way to introduce an educational aspect to the experience.

2.5.4: Pros and Cons of the Three Concepts

Pros of Targeting and Detection Concepts:

- Encourages dynamic player interactivity as it allows the player to manipulate the environment.
- Emphasizes ethical dilemmas as it illustrates biased decision making by the robot.

Cons of Targeting and Detection Concepts:

- Having different symbols for the robot to recognize could increase the difficulty creating the program.

- Complexity of experience gives the robot more room to make mistakes, increasing risk of glitches / bugs.

Pros of Movement and Attack Concepts:

- Increasing movement speed and unpredictability raises tension and excitement.
- Encourages strategic thinking by the player in an effort to dodge the robot's scans of the area.

Cons of Movement and Attack Concepts:

- Experience could become repetitive and boring if robot's movements do not vary very much between rounds.
- Must be programmed and calibrated to extreme detail in order to avoid making it too difficult for players. Yes, they must lose every round, just not within the first 4 seconds.

Pros of Player Feedback to Robot's Actions Concepts:

- Since the players do not realize the robot is biased and will eliminate them in almost every outcome, it introduces psychological tension, as it encourages players to think deeply about their answers.
- Offers educational value when players realize that their efforts were wasted as the robot is biased anyway.

Cons of Player Feedback to Robot's Actions Concepts:

- Players might become progressively disengaged with the experience as they start to realize that their decisions and responses have little effect on the outcome of the experience, that being their elimination.

3. Global Concepts

3.1 Global Concept #1

This concept is an elimination game played in a closed environment relying on the deception of the players. Players are assigned player cards at the beginning of the game that will act as their identification throughout the game. Players are told they must avoid the Robomaster S1's field of vison while remaining in the game environment. If a player enters the field of vison of the Robomaster S1, they will have to participate in a game of rock, paper, scissors. Players are made to believe that the results of playing rock, paper, scissors will determine whether they are eliminated or not, however the true cause for elimination is based off their player card/identification. The Robomaster S1 will be assigned a target at the beginning of each round and must find the assigned target within the allotted round time. If the targeted player must participate in a game of rock, paper, scissors, no matter the outcome, this player will be eliminated. If a player who is not the target must participate in a game of rock, paper, scissors, no matter the outcome, they will not be eliminated. After each round, a new target will be selected by the Robomaster S1, as well as the game environment will become smaller.

The game environment will be marked out by 3D printed arena corners which will be moved throughout the game. The game environment will also contain 3D collapsible obstacles to make avoiding the Robomaster S1 more challenging for the players. While the obstacles and decreasing size of the game environment put the players at a disadvantage against the Robomaster S1, one advantage they have is that the robot will follow the same path each round to avoid the obstacles in the game environment. The last player remaining in the game is the winner. Once a winner has been determined, all players will be told the true cause of elimination and will be educated on the ethical concerns about Lethal Autonomous Weapon Systems (LAWS).

Pro of concept: This game evolves overtime, making the game more challenging, thus keeping players engaged until the end.

Con of concept: This concept is one of the more expensive concepts due to the need of arena corners and obstacles.

Depending on how the debriefing after the game is designed, informing the players about the ethical concerns about Lethal Autonomous Weapon Systems (LAWS) at the end could be a pro or a con.

3.2 Global Concept #2

This is a gesture-targeting game that may be played in an open space or outside where participants are given various gestures to make to avoid attracting Robomaster S1's attention. Every time a game begins, the robot chooses a target gesture at random. Players who make nontarget gestures will trigger a warning but will still be able to play the game; those who make targeted gestures will be knocked out with a hit sound. The trick is to strategically move without stepping within the robot's area of vision while it uses gesture recognition software to regularly survey its surroundings. As they compete to outlast one another, gamers can work together to divert the robot's attention or fool it with sly gestures. The pressure increases as the game goes on and fewer players remain. The players must reverse and adjust their methods to avoid being discovered and eliminated. As a result, the game turns into an exciting blend of quick thinking, deceit, and stealth.

3.3 Global Concept #3

The overall concept for the experience revolves around an open environment where the Robomaster S1 can freely navigate without obstacles. The robot's targeting system is based on player cards that each participant holds, allowing the robot to identify players by these cards. Players could have the opportunity to engage in ethical dilemmas by answering open-ended questions, with objective answers influencing the robot's actions. As players move around the open environment, the Robomaster's movement pattern will be different with each round, making it progressively difficult to predict its behavior. If a player enters the robot's line of vision, they will be pulled into a decision-based game, adding complexity, fear and strategy to the experience. The game will highlight the ethical concerns surrounding LAWS, with the robot's actions reflecting unethical, inhumane behavior and raising awareness about the implications of LAWS. The subsystems of targeting and detection, movement and attack, and player feedback will provide the immersive and educational parts of the experience.

4. Design Criteria Matrix Comparison + Benchmarking

A list of prioritized design criteria was used to compare the three global concepts against one another. Each of the criterion was given an importance ranking out of 5 and each of the concepts were ranked 1, 2, or 3 for each criterion, where the concept that achieves the criteria to the greatest degree receives 3 and the concept which achieves the criteria the least receives 1. The ranking of each global idea is multiplied against the importance of each ranking then summed up. Whichever global idea receives the best score is the global idea that will be chosen.

DESIGN CRITERIA	IMPORTANCE	GLOBAL IDEA #1	GLOBAL IDEA #2	GLOBAL IDEA#3
The Experience is Environmentally Adaptable	4	The usage of obstacles and moveable arena size indicators might cause issues in windier environments, but the usage of LED is good for loud environments 2	The usage of LED lights and no moveable pieces would be good for different environments 3	The hitting sounds might not be suitable for every environment 1

The Experience is Not Biased Against the Player's Identity	5	Usage of symbols are not related to players in any way 3	Usage of gestures that players do themselves 1	Usage of player cards which look like people wearing specific attire 2
The Players are Easily Identifiable to the Robomaster S1	4	Using identification cards which have symbols on them make each player easily identifiable to the Robomaster 3	Using gesture recognition could be easily obscured and done differently by each player, making it difficult for the Robomaster to recognize the movements 1	Using Character cards, where each character has specific attire, could be hard for the Robomaster to identify 2
The Experience Highlights Minimum 3 Ethical Concerns	5	Targeting occurs in two scenarios, when trying to stay away from the robot, and when playing rock, paper, scissors with robot 3	Through usage of targeting in one area and being unable to guarantee that targeted player will be caught 1	Through usage of questions where elimination occurs no matter the answer 2
The Experience is Easy to Set Up	3	Will need to set up obstacles 2	Will need to teach players to do the gestures 1	Nothing needed to set up arena or players movements 3
The Experience is Portable	3	Usage of obstacles and shrinking arena corners, more moveable pieces 1	There are no moveable pieces 3	Need for a computer or other device to give questions to participants 2
	4			

The Experience is Accessible for All Players		The usage of LED lights can be inaccessible for players with light sensitivity 2	The usage of LED lights and gestures can be inaccessible for players with light sensitivity and mobility issues 1	The usage sounds will be accessible for people who are not hard of hearing 3
The Experience creates emotions of anxiety, confusion and unfairness towards usage of LAWs	5	Arena becoming smaller and targeting players, elimination occurs or doesn't occur no matter the answer given 3	Only targeted players being eliminated and random movement patterns of Robomaster 1	No matter what given answers are to questions, elimination will occur randomly, random movement pattern of Robomaster 2
Total Sums:		82	47	69

Our final global concept choice will be Global Concept #1 based on the values obtained by the design criteria matrix.

User Benchmarking:

The main product that we had benchmarked user reaction's from was the movie "*The Terminator*".

The movie "*The Terminator*" has shown the dangers of the usage of LAWS and has generated powerful negative emotions towards its usage through a long-form narrative. This is what we had wanted to mimic within our immersive experiences. The movie shows the result of implementing LAWS and AI into the real world and portrays the many ethical issues regarding the usage of LAWS, such as the creation of a lasting distrust in technology, the digital dehumanization humans face in the eyes of the robot and the lack of human understanding that these LAWS have. We believe that our immersive global concept will create a similar feeling as this movie, though our concept will create these feelings through an immersive game rather than through a long-form narrative. Through using the Robomaster to target participants, we will create a lasting distrust of technology in the players, where players are unable to understand why robots would let some players win but

eliminate them. We will create emotions of fear and anxiety through the first portion of the game, where the robot is hunting the players in an enclosed environment which shrinks each round. Overall, we have created a concept which aligns with the reaction resulting from the movie, our immersive experience will create a lasting negative impression on the usage of LAWS.

5. Overall Global Concept Choice

As a group, we have decided to use the Global Concept #1 to continue the development of this project. This concept was chosen because it combines an easy-to-understand set of rules along with a challenging experience for the users. Firstly, by using symbol-based player cards rather than character attribute cards or player gestures, it will allow for more consistent detection by the robomaster. This is because the symbols are inherently simpler than the other two which would enable detection in scenarios where it may be more difficult for the camera to register visual identifiers. Secondly, the elimination style for the game will increase intensity and difficulty as time flows and ensures that the game does not carry on for longer than expected. This is achieved by cleverly using corner markers to shrink the playing space and always having a loser each round independent from their performances. Finally, this concept will clearly highlight ethical concerns related to automated targeting systems by having biased targeting, lack of human control/accountability, dehumanizing the players by turning them into symbols on a card, and the inability to explain what happened. Overall, this concept has been chosen over the others for simplicity, effectiveness, and respect to the design criteria list.

6. Conclusion

This project integrates multiple creative and strategic concepts to incorporate the functionalities of the Robomaster S1 in a way that develops an engaging, educational, and immersive gameplay experience. From each team member, on different levels of the subsystems, namely Targeting and Detection, Movement and Attack, and Player Feedback, each had unique ideas, and these together lay the ground for innovative game design. From gesture recognition-based targeting in an open environment to role-based player identification, the focus is to make it fun while also allowing the players to reflect on ethical dilemmas, inspired by the collaboration of the project with Mines Action Canada.

The game systems will include aspects of stealth, deception, and uncertainty that force players to change their tactics in real-time and not get eliminated by the robot. For instance, gesture-based games require players to make 'strategic' gestures without being recognized while role-playing with digital IDs or symbols introduces the element of AI bias and decision-making. The adaptive movement pattern of ambushes, traps, and misdirection executed by a robot increases the level of psychological challenge, compelling players to be thoughtful about their actions. While discussing parallel projects, the feedback systems with their misleading sounds, lights, and mobile notifications add tension to obscure the true success criteria by concentrating their attention on limits and ethical implications given by autonomous systems and LAWS-Lethal Autonomous Weapon Systems.

Global concepts integrate the subsystems without borders by fusing physical activity, teamwork, and AI interactions in open-closed environments. Whether this is a game of gesture targeting or symbol-based identification, the robot's ability for dynamic behavior changes promises replicability and excitement. The final debrief supplies the necessary educational component that knits the experiences in the game together with real-world ethical concerns about technology and autonomous decision-making. Ultimately, designs will provide an appealing, interactive way of exploring the complexities of AI in military and ethical contexts, while keeping the game light-hearted and fun for participants.

7. References

RoboMaster S1 - DJI. DJI Official. (n.d.). https://www.dji.com/ca/robomaster-s1

RoboMaster S1 - specifications - dji. DJI Official. (n.d.-b). https://www.dji.com/ca/robomaster-s1/specs

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8. Appendix

1- Communication and Teamwork Between Players:

Players would need to communicate and collaborate in real time during the experience to help each other make it further in the experience and avoid getting eliminated. For example, one player may have information on the robot's first set of movements, and another player may have access on the robot's next set of movements, and they would help each other survive, in a sense, however ultimately, they would be eliminated as that's the whole point. However, the robot could also be able to randomly switch directions if it recognizes gestures being made between players in order to disrupt their collaboration. However, this would add a huge level of complexity to the experience, and may not be worth all the effort, and could also lead to wasted time if not executed correctly.

2 – Stationary Robomaster:

The Robomaster S1 could be stationary throughout the course of the gameplay, and only when on player is to be eliminated, it would maneuver towards the players and use a hitting sound to eliminate them. We would have to create a specific pattern that the Robomaster S1 would move in and would have to make sure that the players stand in a particular spot so the Robomaster can travel to their location. This would not be the best idea for our game as it would create less tension, as no fear or anxiety would be created from the idea that the robot will catch you. This would also make set-up harder for the game, as the players will need to be in particular spots, and we would need to develop a way for the Robomaster to be indicated when it should go to the players and eliminate one.