Part C Deliverable

Prioritized Design Criteria

Functional requirements:

- Interactive Gameplay must provide an immersive interactive experience where players can make decisions affecting game outcomes.
  *(Metric: Number of decision points a player can make)
- Progressive loss of control means players experience a gradual loss of control over the autonomous robot as the game progresses.
  *(*Metric*: Control responsiveness)
- Moral and ethical dilemmas by confronting players with moral dilemmas related to the use of autonomous weapons. Create moments where the players come across the actions of LAWS and have to make evasive moral decisions when targeted. There's no way of avoiding making a hard choice.
  *(*Metric*: Number of moral choices)
- A post-game reflection after the players have completed the game should be presented with a reflection on the consequences of their decisions, relating to real-world implications.
  *(Metric: Reflection time (target: 1-3 minutes post-game reflection))

Non-Functional Requirements:

- Demographics; Who is it targeted to?
  *(*Metric*: how many groups are being included?)
- Accessibility; English, French, ASL?
  *(*Metric*: how many languages should be included? Should we focus on Latin languages or explore our range?)
- Player response. Survey format; how do the players feel after the game? Did they get the intended message?
- How functional is the robot in the game?
- How intuitive is the game?
  *(*Metric*: Average user onboarding time)

Constraints:

- Time: Development of the game must be completed within the semester
  *(Metric: Finish within 12 Weeks of the semester)
- Ethical Constraints: Avoid stereotyping or bias scenarios, no specific group is targeted
  *(Metric: Ethics review approval(no complaints or negative feedback)
- Geographical Constraints: avoid specifically mentioning or implying that the game takes place in a certain country or continent.

Technical and User Benchmarking

Technical Benchmarking:

- Products involved in automated robotics: Robin the Robot, WebGazer
- Terminator warns us about killer robots. It shows how humans get displaced by robots, and eventually the loss of control over the robots entirely.

- Terminator shows how easy it is to confuse the line between automated and truly autonomous weapons.
- Real life weapons can just as easily be repurposed for destruction similar to the movie, if they get in the wrong hands, or aren't perfectly designed.
- However, an example of autonomous robots being used for good is Robin the Robot. Robin the Robot is an autonomous robot used in hospitals as mental caregivers for children. This emotionally intelligent robot is able to recognize the children's emotions and empathise with them, helping make their stay at the hospital more relaxing.
- An example of a controversial use of automated robotics is WebGazer. It is a program that uses the front cameras in laptops and mobile devices to track the user's eye movement.
- This is problematic because it raises concerns of privacy. If an automated system that is capable of tracking eye movement gets in the wrong hands, it can be used to manipulate the user's attention in advertisements without their consent.

User Benchmarking:

- We can connect this to movies such as Terminator and 2001, a space odyssey
- Users (viewers of the movies)
- In Terminator, they use relatable characters to help users easily draw the line between the good (being humans) and the evil (being robots), and makes the threat of machines more personal
- Terminator is dystopic and set in 2018 showing a clear dystopia, which makes it a little more real to the users (viewers)
- The struggle of the resistance emphasises just how bad it can get, and gets users to actually consider the threat
- 2001: A space odyssey also shows the dangers of killer robots.
- They leave it more ambiguous to provoke the user to actually think about it on their own
- HAL makes distinguishing the difference between good and bad decisions more difficult
- It's more chilling to the viewers when HAL refuses to open the door as it shows that maybe the actual best decision is for the machine to rise up against the human

Target Specifications:

- The experience should last no more than 10 minutes.
- The experience must accommodate a group of between 3-5 participants.
- The "play area" must be smaller than 20' x 20'.
- Dimensions: 320 × 240 × 270 mm (without Blaster)
- Weight: Approx. 3.3 kg
- Chassis: Modular design
- Battery: Capacity: 2400 mAh, 25.92 Wh
- Maximum run time: Approx. 35 minutes
- Charging time: Approx. 90 minutes
- Max Speed (Forward): 3.5 m/s (S-mode)
- Max Speed (Backward): 2.5 m/s (S-mode)
- Max Speed (Left/Right): 2.8 m/s (S-mode)
- Max Turning Speed: 600°/s (S-mode)
- Chassis: Mecanum wheels with 4 encoders for omnidirectional movement
- Gimbal: Two-axis stabilization with pitch range of -20° to 35°
- Blaster: Shoots gel beads or infrared beams, with a firing range of up to 6 meters
- Field of View (FOV): 120°
- Max Resolution: 1080p (FHD), 30fps

- Image Transmission Resolution: 720p at 30fps
- 6 Intelligent Armor Modules: Detect physical impacts from projectiles or infrared beams
- Infrared Distance Sensors: For obstacle detection and AI programming
- Gyroscope: 6-axis
- Accelerometer: 6-axis
- Languages Supported: Python, Scratch
- Object recognition (humans, gestures)
- Line following
- Visual recognition of QR codes, other robots, numbers, and more
- Voice recognition
- LED Lights: Customizable with various colors
- Battle Mode: Combines movement, strategy, and shooting accuracy

Impact of Client Meeting on Design Criteria:

- Client meetings helped determine what cannot be done to the actual robot, including what specifically we can include in the game, including sounds and visuals.
- Design is a physical game, which means we cannot use imagery to convey the messages.
- Very open ended and designed for interpretation, thus design criteria is also very open ended.
    - Impacted how we want to approach the problem considering how open ended it is including which aspect of the side effects of autonomous robots we want to include

Military implication of autonomous robots:
https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1001&context=phil_fac

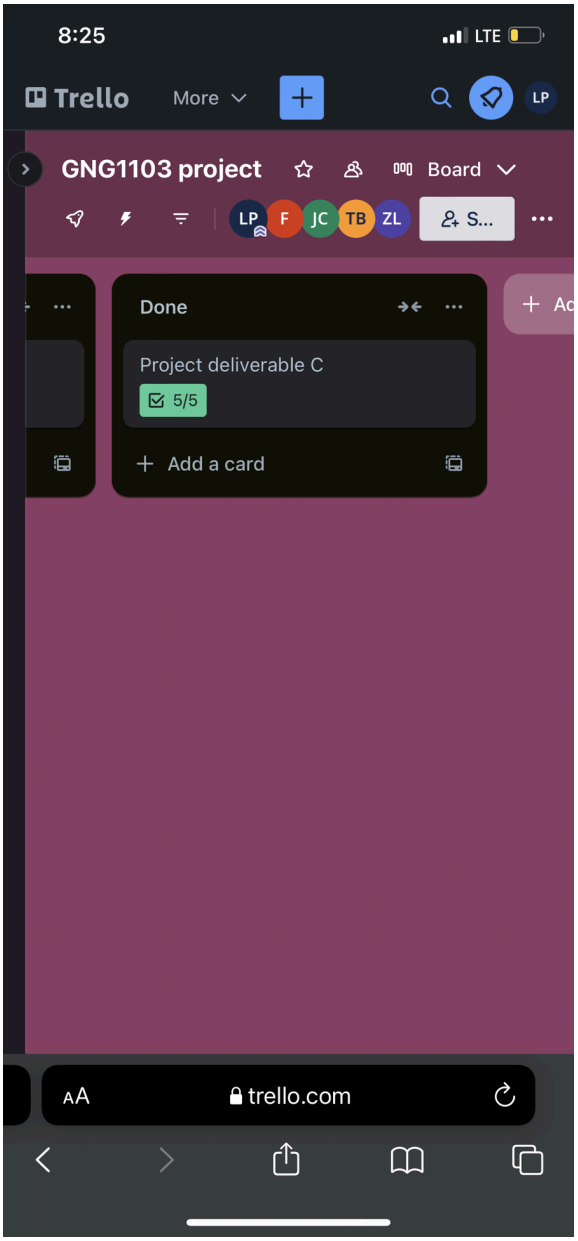
Attitudes towards autonomous robots:https://link.springer.com/article/10.1007/s00502-019-00742-3

Robin the robot: Varvaloucas, Emma. “Robin the Robot.” *The Progress Network*, 9 May 2022, theprogressnetwork.org/robin-the-robot/.

Vilmer, J.-B. J. (2015, March 23). Terminator ethics: Should we ban killer robots? Ethics & International Affairs.
https://www.ethicsandinternationalaffairs.org/online-exclusives/terminator-ethics-should-we-ban-killer-robots

WedGazer: Papoutsaki, Alexandra, et al. “Webgazer: Proceedings of the Twenty-Fifth International Joint Conference on Artificial Intelligence.” *Guide Proceedings*, 9 July 2016, dl.acm.org/doi/10.5555/3061053.3061156#:~:text=We%20introduce%20WebGazer%2C%20an%20online,a%20page%20in%20real%20time.

For robot features:
DJI. "RoboMaster S1 Specifications." *DJI*, www.dji.com/robomaster-s1/specs. Accessed 6 Oct. 2024.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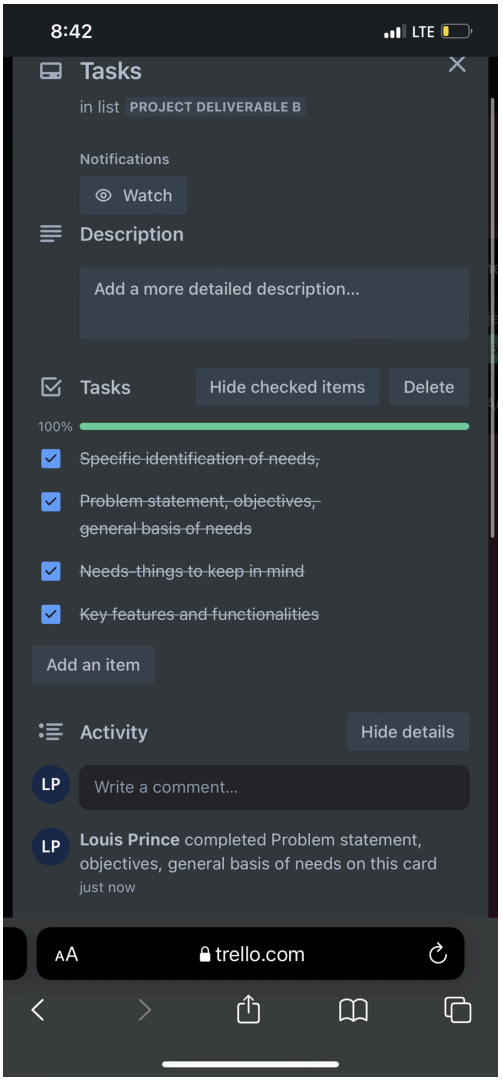
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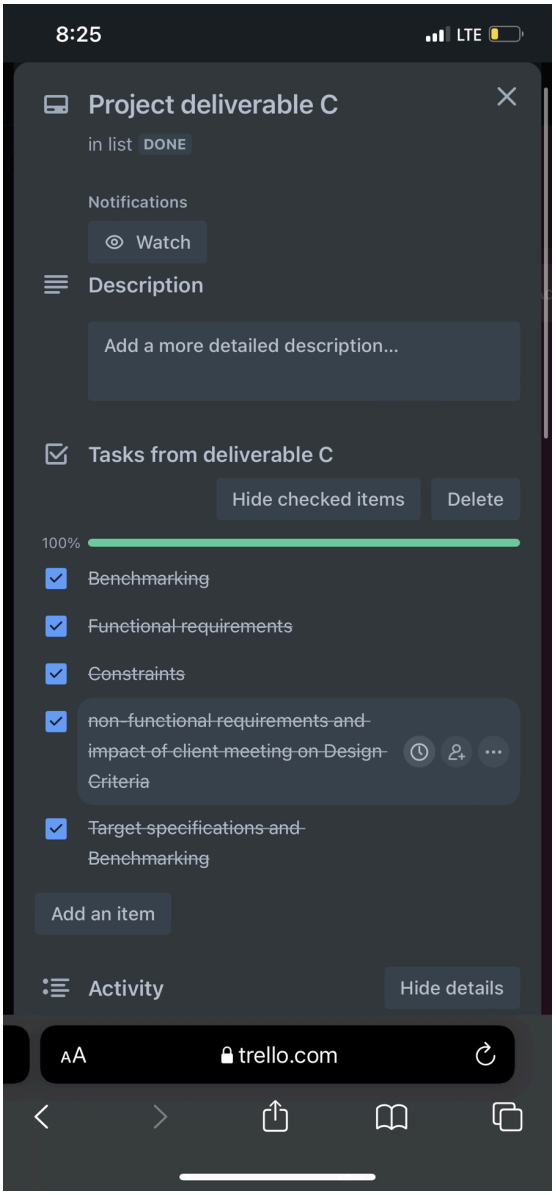
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Benchmarking
Functional requirements
Constraints
non-functional requirements and impact of client meeting on Design Criteria
Target specifications and Benchmarking
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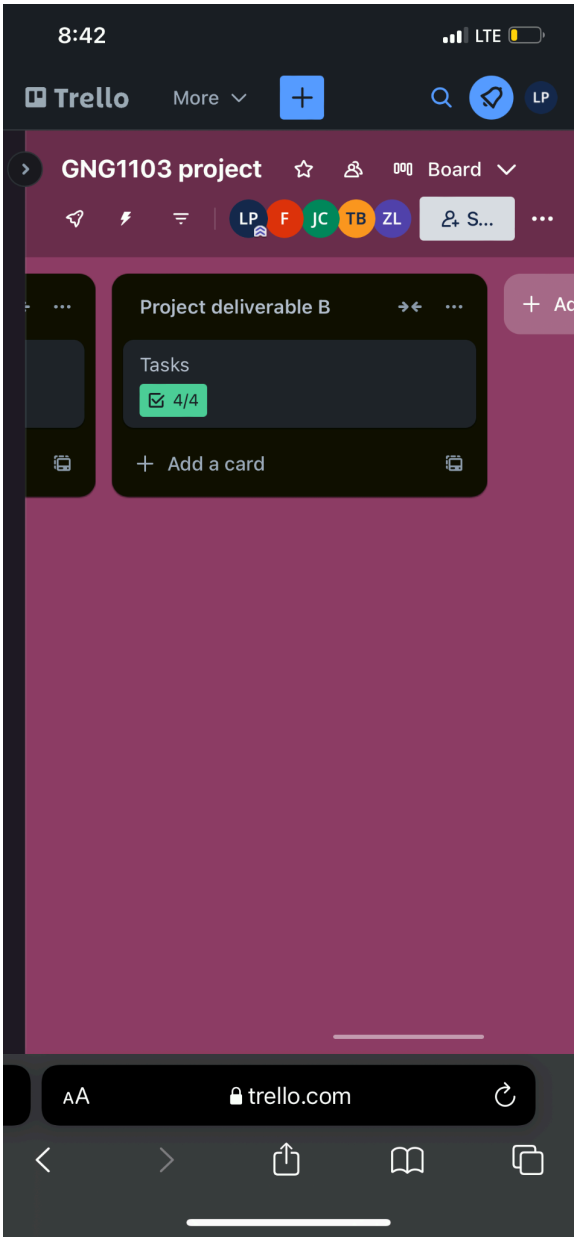
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