Project Deliverable D: Conceptual Design
GNG 1103 – Engineering Design
Faculty of Engineering – University of Ottawa

Team Members:

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Note: All sketches lacking a citation are our original work. Sketches done on lined paper were done by Joshua, and the sketches done digitally and with shading were done by Joan.

Subsystem 1 - Main 'Enemy' of the Experience:

Spider AI Turrets - Joan

- Pros
    - Realistic for all potential war terrains
    - Terrifying design of nightmares, evokes terror in the user
    - Varying sizes, able to hide and jumpscare the user
- Cons
    - Design is unrealistic to normal 'enemy' styles for war
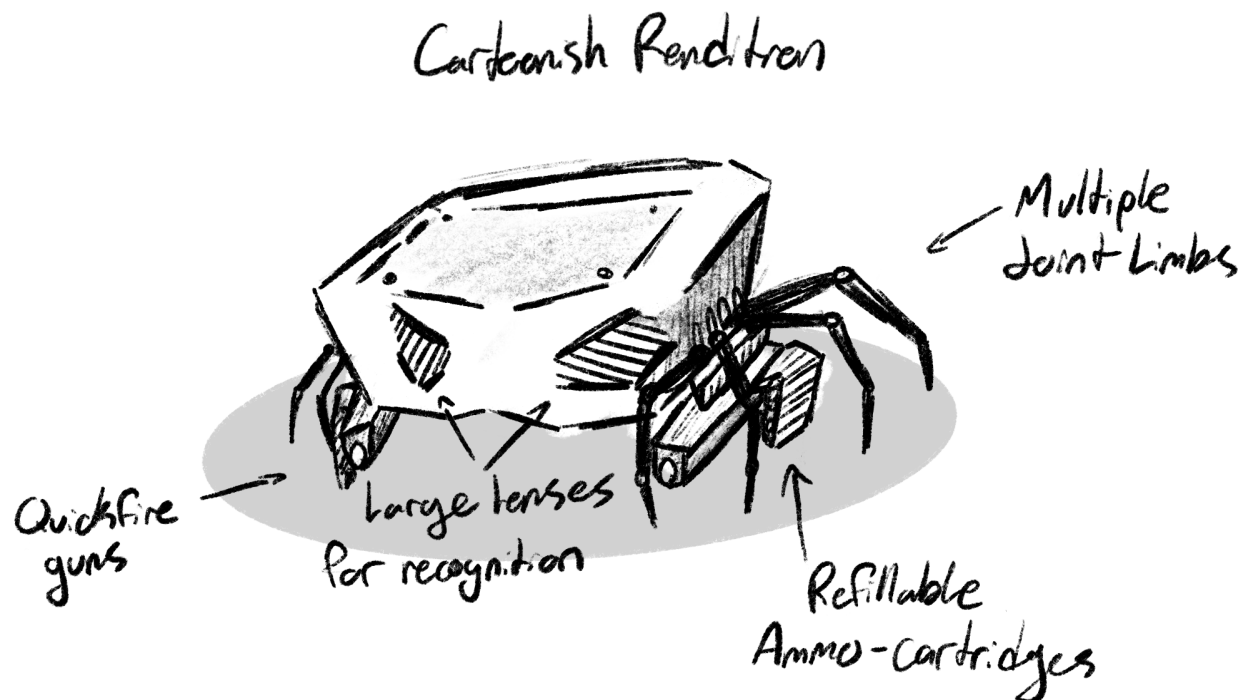   - Easily overpowered by another stronger design

Fig. 1.1. A concept sketch of a self-propelled spider-like autonomous weapon.

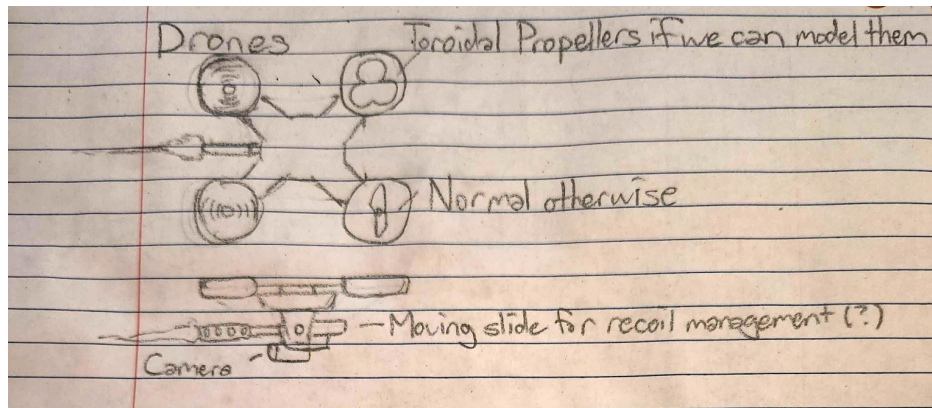Autonomous Drones w Optional Rover Support - Joshua

Fig 1.2. A quick concept sketch of an autonomous drone weapon.

- Pros
    - Easy to design and animate
    - Suitable models exist online for free
    - Realistic for all possible warzones short of hurricane winds
    - Technology not only exists but is already partially standard issue (combat drones are used by most modern militaries, and the only thing left to do is automate them).
    - Works well with support from other autonomous units and capable of hunting in packs
    - Not very hard to build a lethal robot - even by standards of high school robotics teams
- Cons
    - Might not be as scary as other designs
    - May have trouble breaking through doors
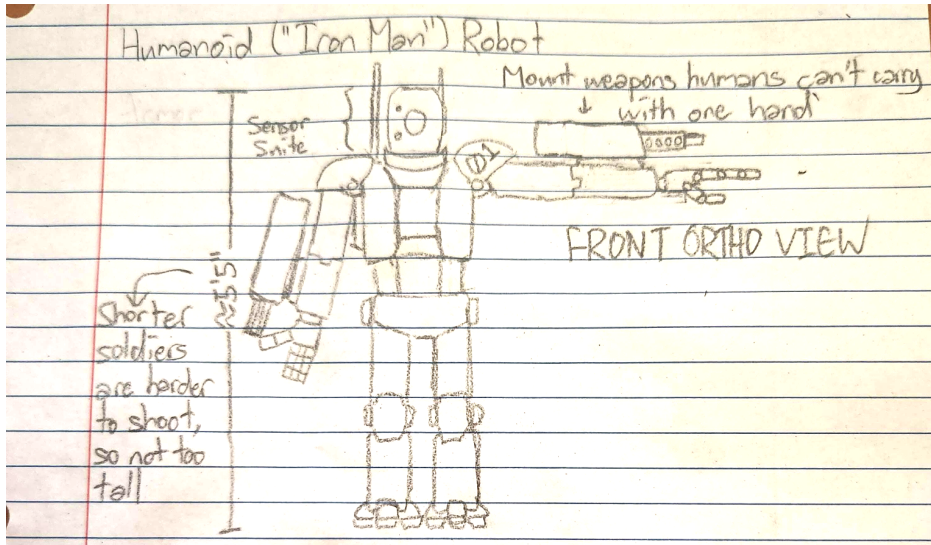
Iron Man Robots - Shiven

Fig. 1.3. A concept sketch for a humanoid combat robot (Sketcher's Note: Robot drawn loosely based on robot designs from Iron Man 2, but is not designed with the intent to plagiarize)

- Pros
    - Easy to design
    - Can easily be made terrifying
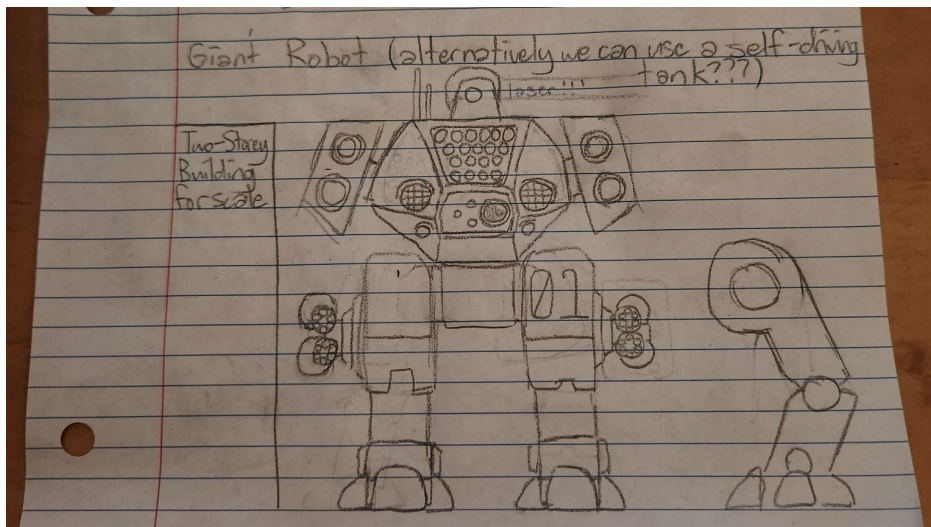- Cons
    - Cliché

Gigantic Titan Robot - Nick

Fig. 1.4. A concept sketch of a gigantic robot, roughly describing joints in the leg and scale.

- Pros

- ○ Scary enough
- Cons
  - ○ Kinda hard to build

Subsystem 2 - Area/Scenery of the Experience:

Note: Since many of these already exist, pictures of those are being used in the position of concept sketches.

Abandoned School Zone - Joan

- Pros
 - ○ Easy to model, isolated environment to design.
  - ○ Every user will identify with having the innocence of a child.
  - ○ Narrator potential with the school's announcement system.
  - ○ Psychological horror possibility of hiding from the 'Enemy'.
- Cons
  - ○ Limited Protagonist Possibilities, Plotlines
  - ○ Predictable emotional response leaves the user without surprise.

Fig. 2.1. A classroom in Pripyat, decades after the Chernobyl disaster (Dhiraj, 2014).

Urban War Zone - Joshua
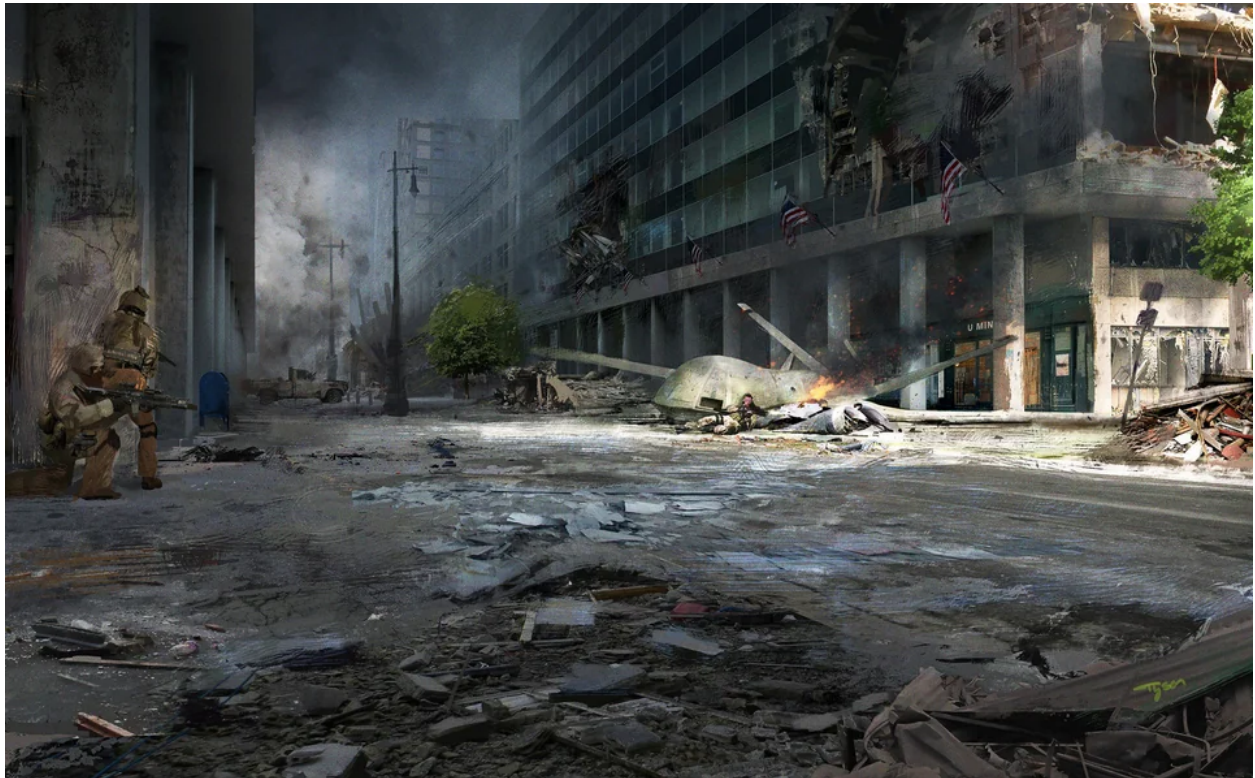
Fig 2.2. Tysen Johnson's rendition of a modern urban battlefield (Johnson, 2019).

- Pros
  - Realistic setting
  - Suggested and favored by clients
  - Most people able to access the experience live in urban environments and would be able to imagine themselves in the position better
  - Psychological horror possibility (though I personally argue AGAINST relying overly on fear factor)
  - Such assets already exist and might be compatible with our project
  - Would allow the user to be a civilian rather than a soldier, which they could resonate better with
- Cons
  - Extremely complex to model and make
  - Difficulty of finding assets that work perfectly (nevermind I found one that could)

○ Increases program's strain on system resources significantly due to complexity

An 'Enemy' Base - Shiven

Fig 2.3. A forward operating base used in a modern military operation. (Mahajan, 2022)

- Pros
  - Shows how an AI might misidentify targets if the enemies are dressed normally
  - Autonomous weapons could kill trapped civilians
  - Easy storyline to create
  - The protagonist being alongside the robots may help convince them more as it will allow the users of the VR system to feel for the opposition while showing that humans would not want to be alongside the weapons which can experience glitches and harm civilians.
- Cons
  - Storyline needs a lot of writing to go with this scenario

Dark Fantasy City - Nick

Fig 2.4. This is the city Nick had in mind at the time - he imagined we could make it not dissimilar to the anime Attack on Titan. This image is a still depicting the main city featured in the anime (Bobduh, 2014).

- Pros
  - Horror element, triggers emotions of the user
- Cons
  - Unrealistic
  - Doesn't fit the requirements of the project

Subsystem 3 - Protagonist/Playable Character Description:

Note: Since these are generic character descriptions, there are no notable features that require specific sketches.

Parent fighting in the War - Joan

- Pros
  - Loss of family
  - Potential storyline that fits the criteria
  - Emotional response that latches onto the pity of a child

- ○ Potentially a person involved in the fight
- ● Cons
  - ○ User may not be able to relate to the playable character

Fig 3.1 Kid ignores military protocol to run into mom's arms after serving nine months in Afghanistan (VPC, 2014).

One of the 'Enemy' - Joshua

(This would be identical to the sketch of the enemy we picked and thus character design is not needed)

- ● Pros
  - ○ Gives the option to show WHAT the Killer Robot's AI behaves like while determining what to do and show the situations in which they will pose ethical concerns and commit war crimes
  - ○ Commands, directives, protocols, and perceived threats can show the user what the robot is thinking and how they differ from human soldiers in action and in thought processes (how they misinterpret ques in the fog of war)
  - ○ Horrify users with how robots see human lives in terms of numbers, commands, and boolean logic
  - ○ Put users in a position where they KNOW living, or at least human-operated, soldiers can and will do a better job (e.g. hostage negotiations/scenario, natural disaster relief operation) and show the robot whiffing (e.g. getting hostage killed, being unable to figure out how to remove people from under debris and harm them more by firing on debris)
  - ○ Put users in a position where they are part of the force application process, but then show them what the robot would do instead of what they pick

- Cons
    - Cannot fit with a few 'Enemy' type ideas
    - If I recall correctly, the clients want the experience to be from a human perspective
    - Makes it necessary to animate human opponents
    - Lack of human body could be problematic

Farmer - Shiven

- Pros
    - Evokes emotion from the user as it could give them first-hand experience of the drawbacks of being against an autonomous weapon.
    - Keeps the storyline and experience simple
- Cons
    - Limited storyline potential
    - User may not be able to relate to the character

Fig 3.2 Army National Guard volunteers from agricultural states have deployed here to train and advise Afghan farmers (Hodge, 2009).

Very General/unspecified player character - Joshua

- Pros
  - On average more relatable because players can project themselves onto the blank canvas character
  - Provide very general motives, such as not dying, finding help, or contacting family, that most people can relate to realistically
  - Could be more immersive than embodying a character that you are dissimilar to in life
  - Simplifies any animation actions taken if there is no player body model needed

- In-game character can be scaled to match the height of the user without consequence
- Cons
    - Lack of body could break immersion for some people
   - Relies entirely on first-person perspective, which we are likely to but not guaranteed to be using

Fig 3.3 Concept art by: Jarold Sng. Soldier Explorations of Future Marines (Sng, 2016).

Subsystem 4 - (Optional Idea - Joan) Interactable Elements:

Click to Hide - Joan

- Pros
    - Realistic element that triggers the user's fight or flight response
    - 'Enemy' is seen as a dangerous threat to the user's safety

- ○ Simple *one-click* element easy to understand for the user with potential limited knowledge for video games
- ● Cons
  - ○ The user may have a slow reaction time
    - ■ Possible to fail the prompt leaving user dissociated from the experience
    - ■ Impossible to fail the prompt - Same result
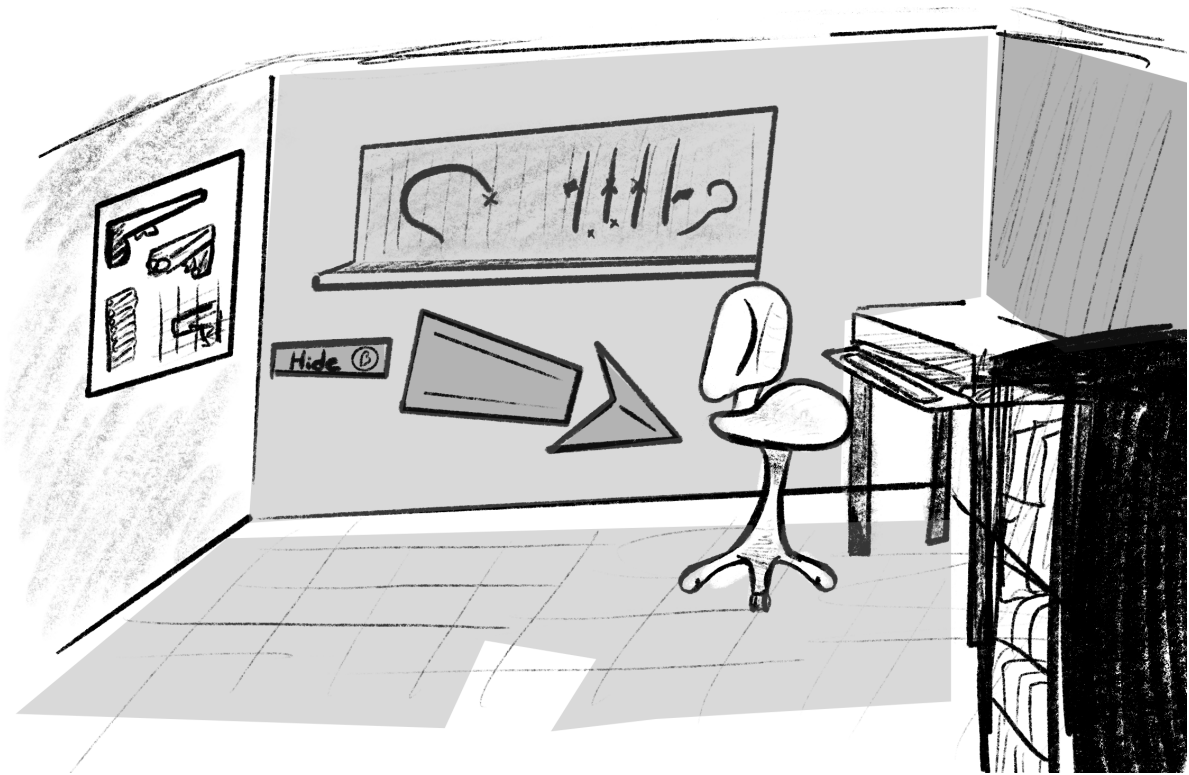
Interactable Objects/Pickups - Joshua

- ● Pros
  - ○ Straightforward and easy to use
  - ○ Can be used in conjunction with many other interactable elements
  - ○ Lets the user hold the evidence in their hands
  - ○ Easy triggers for narration or other events (e.g. flashback scenes, wartime audio)
  - ○ Could be used to help the user decide pacing
- ● Cons
  - ○ Requires setup for each individual object; even if the process is fast it could get tedious with many objects
  - ○ Pickup prompts may break immersion if done incorrectly

Feature Analysis:

Assuming all Criteria are of equal weight of priority

Realism: User is able to feel as if the experience relates to real life.

Immersion: User is able to feel like they are in the experience.

Emotional Response: User is able to develop strong emotions from the experience.

Asset Potential: The element is possible to be found on the unity store within budget and/or designable.

Subsystem → Criteria ↓	Spider Turrets	Drones	Humanoid ("Iron Man") Robots	Giant Robots
Realism	1	5	5	1
Immersion	2	5	5	2

Emotional Response	5	5	4	3
Asset Potential	3	5	4	4
Total Points	13	20	18	10

Subsystem → Criteria ↓	Abandoned School Zone	Urban War Zone	An 'Enemy' Base	Dark Fantasy City
Realism	2	5	5	1
Immersion	5	4	5	1
Emotional Response	5	4	4	2
Asset Potential	4	5	5	3
Total Points	16	18	19	7

Subsystem → Criteria ↓	Parent fighting in the War	One of the 'Enemy'	Farmer	General Character
Realism	5	4	2	5
Immersion	5	1	1	3
Emotional Response	5	5	3	3
Asset Potential	5	5	5	5
Total Points	20	18	11	16

Subsystem → Criteria ↓	Click to Hide	Pickup Objects
Realism	5	5

Immersion	5	5
Emotional Response	5	4
Asset Potential	5	5
Total Points	20	19

Final Solution:

Winning Subsystems - Drones, an 'enemy' base, a parent fighting in the war and click to hide.

Our final solution features autonomous drones as the main enemy of the experience, as they are realistic, easy to find assets for and animate, and can make terrifying adversaries when done right (we do note that some humanoid robots could be present to accomplish tasks such as opening doors that combat drones are ill-equipped for). The setting will be a combination of the first three options we have, as we realized that they could reasonably be expected to overlap; at the current point in time, we expect to have the experience begin on school grounds during an urban warfare event, and gradually move through an urban battlefield towards an enemy position. The player character will be a parent involved with the war as a member of a local militia, presenting opportunities for emotional engagement, immersion, and attachment due to them being a fairly normal civilian as well as their familial attachments. As for interactivity, we will implement a click-to-hide system as primary, both as a cover system for realism during combat and as a horror element (interactable objects are considered for extra immersion but optional and will be secondary if we have time to implement them).

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