CGRA151 Project Plan
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VISION - GAME CONCEPT

Back then when I was younger and ".io" games were fairly mainstream, a significant one that I recall playing on many occasions was this game called Diep.io. The concept is that you play as a beginner tank in this large open map with the purpose of moving around, destroying objects, leveling up,upgrading to become a stronger tank, and trying your luck at defeating other players with their upgraded tanks.

ACHIEVEMENT   [describe what you were actually able to achieve]

In this Game Project I was able to: (tldr a lot of math, geometry, and matrix manipulation)

- Draw regular shapes & rotate it - Matrices
- Shoot bullets in desired direction (mouse)
- Add Level up system and Attribute scaling
- Add FSM w/ 2 Gamemodes & repeatability
- Make Hit Animation Frames and Particles

- Implement Object Hitboxes - Geometry
- Track Object Healthbars and Death
- Move around w/ Acceleration WASD
- Add AI Opponents that track/shoot player
- Add Unique Endgame Bosses, AI patterns

TECHNICAL CHALLENGES   [describe challenge, how you addressed, show 2 challenges overcome]
Challenge #1: Keeping the Player Fixed at the Center while the universe moves.

- During the first half of my game development I focused entirely on the player's ability to move around, shoot bullets at objects I created, and calculating hitboxes / health bars decrements.
- Everything was working well, bullets were hitting and missing as expected etc. The problem was that the universe was static while the player would move around, I knew that at some point my player had to be static at the center while the universe around it moved, in response to WASD.
- The difficulty of this challenge comes from the fact that I had coded so much already that it was tricky to find a way to add this game changing feature without tampering with object interactions
- I addressed this problem through persistence and breaking the concept into pieces. I knew that I had to use a matrix transformation and inevitably got a translation effective on the entire universe.

Challenge #2: Frame Rate Inconsistencies between my epic gaming PC & budget school Laptop

- Near the end of my project development, I tested my game on my lower end laptop. I realized that it ran unbelievably slow because my code was set to 240 fps, which is a lot of redraws in a single second for my laptop to handle. This also means Tutors may find the same issue when marking.
- To address the issue I had to find a way to match the feel of 240fps on 60 fps devices. This meant that I had to reduce the frameRate and painstakingly redo my parameters to speed up all objects

REFLECTION   [Easier / Harder than expected? Did it match your plan well? Things done differently?]

- I actually started coding this game during the mid trimester break. I spent 4 days back to back and got 70% of the game finished before the second half began. This meant that I could focus on other work and come back to this at a later time knowing that I had made some good progress
- Two weeks before submission I finished the remaining 30% by adding an endgame, repeatability and interesting AI bosses. Overall, this game was a brilliant challenge for my level of standards
- The only hard thing about this project was the limitation of processing power. I found a way to make backgrounds way cooler than how I did in the project. This may have reduced my style points a little, but I had no choice because the game would run incredibly slow like a potato.