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Space Invaders 3D Design Document

# Core Concept

The player will take control of the “Core Cannon”, humanity’s final hope against an army of invading aliens resembling sea creatures. The player must shoot down the invaders as they approach the planet and attempt to survive as many waves as they can to get a high score.

# Main Features

The primary activities in this game are moving and shooting. The player is locked to a plane and moves with the WASD keys. By hitting the left mouse button, the player fires a projectile into the sky. If that projectile hits an enemy, it destroys that enemy, despawns, and the player scores an amount of points depending on which enemy was destroyed.

Following the design of the original game, the player can only have one projectile on the screen at a time. This heavily penalizes hits while also providing a faster fire rate against closer enemies, creating heightened intensity when enemies are closer. If the projectile flies past a certain altitude, it despawns.

Meanwhile, enemies will actively move along set paths and slowly move down toward the player. If an enemy reaches the ground, the player loses. Two of the four enemy types also fire their own projectiles at the player (at semi-random intervals that depends on enemy type) which must be dodged. If the player is hit by one of these projectiles, they lose. If one of these projectiles hit the ground, they despawn.

There are also green “barrier” blocks placed around the map at certain positions above the player. If either a player or enemy projectile hits this barrier, the projectile despawns and the barrier becomes damaged. A damaged barrier shows cracks depending on how many times it has been hit. After being hit three times, a barrier is destroyed. Players can hide behind these barriers to avoid enemy attacks, or intentionally destroy them to hit enemies easier.

The game’s visuals will mimic the simplicity of the original arcade game. Enemies will be planes with the original 8-bit texture applied on the bottom. Barriers will simply be cubes with a different texture applied depending on how damaged it is. The game will also feature a skybox with bright white stars.

The UI will be as simple and similar to the original as possible. The player’s score will be displayed in the top left, the current wave will be displayed in the top right, and the controls will be displayed in the bottom right.

# Timeline (following the requirements)

* November 15: Implement the game world, sky, and simple versions of the barriers. Ensure the player can move around.
* November 16: Implement enemies, enemy movement, and enemy death code.
* November 17: Implement projectiles, collisions, and a game over.
* November 18: Run test cases and submit demonstration video.
* November 19: Fix errors and do final revisions.
* November 20: Design final presentation.
* November 21: Submit project and do final presentation.

# Design Charts

## Player’s Actions A diagram of a project Description automatically generated

## Enemy’s Actions A diagram of a program Description automatically generated

## Player’s Projectile A diagram of a diagram Description automatically generated

## Enemy’s Projectile A diagram of a game Description automatically generated

## Barrier A diagram of a diagram Description automatically generated

## Wave Controller A diagram of a system Description automatically generated