Game Design Document (GDD)

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## Game Title:

Space Invaders Clone

1. Game Overview

Genre: Arcade / Shoot 'em up

Platform: PC (Windows), using Pygame

Target Audience: Casual gamers, retro game enthusiasts, students learning Python game development

Game Objective: Defeat waves of descending alien enemies by shooting them with bullets. The player must survive and score as many points as possible before any enemy reaches the player's level.

2. Gameplay Mechanics

## Player Mechanics:

- Move Left/Right using arrow keys

- Fire bullet with Spacebar or on-screen FIRE button

- Only one bullet can be active at a time

## Enemies:

- 6 enemies move horizontally and descend on hitting screen edges

- Reappear after being destroyed

## Bullet:

- Moves upward from player's ship

- Resets after hit or leaving screen

## Collision:

- Detected using Euclidean distance

- Triggers explosion sound, score update, enemy respawn

## Game Over:

- When any enemy crosses y = 440

- Displays GAME OVER and ends game

3. Controls

Move Left: Left Arrow

Move Right: Right Arrow

Fire Bullet: Spacebar or FIRE button click

4. User Interface (UI)

- Score at top-left

- FIRE button at bottom-right

- "GAME OVER" centered when player loses

5. Assets

Player Sprite: spaceship.png

Enemy Sprite: enemy.png

Bullet Sprite: bullet.png

Laser Sound: laser-312360.mp3

Explosion Sound: explosion-42132.mp3

6. Audio

- Laser sound when firing

- Explosion sound on enemy hit

7. Art Style

- Retro arcade look

- Dark background, minimalist UI

8. Future Improvements

- Multiple levels or waves

- Enemy variety

- Background music

- Power-ups

- Scoreboard

- Restart functionality

- Touchscreen support

9. Technical Requirements

- Python 3.x

- Pygame (pip install pygame)

- Desktop platform compatible (Windows/Linux/macOS)