

# Implementation Report - Space Invaders Game

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## 1. Introduction

The Space Invaders Game is a web-based game implemented using **HTML, CSS, and JavaScript**. The objective is to control a spaceship (🚀) and eliminate enemy aliens (👾) using bullets while avoiding enemy attacks. The game includes features like movement controls, shooting mechanics, enemy spawning, collision detection, a pause/resume functionality, and an **interactive start screen**.

## 2. Implementation Details

### 2.1 Technologies Used

- **HTML**: Defines the game structure, including the **Canvas API** for rendering graphics.
- **CSS**: Provides styling, including background images, fonts, and button designs.
- **JavaScript**: Implements game logic, animations, user interactions, and event handling.

### 2.2 Game Components

#### Canvas API

The game heavily relies on the **HTML5 Canvas API** for drawing and animating game elements. The **canvas element** serves as the game screen, where all visual components like the player, bullets, enemies, and explosions are rendered using JavaScript.

#### Player (Spaceship 🚀)

The **Player class** defines the spaceship with properties like position, size, speed, and movement. The **draw()** method renders the spaceship as an emoji on the canvas.

#### Bullets

Bullets are **circular projectiles** fired by the player, moving upwards at a fixed speed. The **Bullet class** handles their creation, movement, and rendering using the **Canvas API**.

#### Enemies (Aliens 👾)

Enemies spawn at **random positions** and move downward. The **Enemy class** defines their behavior. If an enemy reaches the bottom, the game ends.

## Collisions & Explosions (💣)

The game detects **collisions** between bullets and enemies. When a bullet hits an enemy, the enemy is removed, and an explosion effect (💣) appears briefly using **canvas-based animations**.

## 3. Key Features

### 3.1 Controls

- **Left Arrow (←)**: Move spaceship left
- **Right Arrow (→)**: Move spaceship right
- **Spacebar**: Shoot bullets
- **P**: Pause the game
- **R**: Resume the game

### 3.2 Start Screen & Exit Button

- **Start Screen**: The game now includes a **start screen** with a **Start Game** button. Players begin the game only after clicking the button.
- **Exit Button**: Players can **exit** the game at any time, returning to the **start screen**.

### 3.3 Reserved Score & Exit Area

- The **top 50px** of the canvas is reserved for **displaying the score** and an **Exit button**, keeping it separate from the main gameplay area.

### 3.4 Pause & Resume Mechanism

- Pressing **P** stops the game and displays **"Game Paused"** in yellow.
- Pressing **R** resumes the game.

### 3.5 Score System & Game Over

- Players **gain 10 points per enemy hit**.
- If an enemy reaches the bottom, the **Game Over screen** appears, displaying the **final score** with a **Restart button**.

## 4. Conclusion

The **Space Invaders Game** demonstrates **fundamental game development concepts** using **JavaScript** and the **Canvas API**. It features **smooth animations**, **responsive controls**, and an **interactive UI**.

## Future Enhancements:

- **Power-ups** to enhance gameplay 🚀
- **Multiple enemy types & levels** 🕹️

 [Play the Game Online](#)