

# 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, and a pause/resume functionality.

## 2. Implementation Details

### 2.1 Technologies Used

- **HTML**: Defines the game structure, including the canvas element for rendering graphics.
- **CSS**: Provides styling, including background colors, fonts, and button designs.
- **JavaScript**: Implements game logic, animations, and user interactions.

### 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. They move upward 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 Pause & Resume Mechanism

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

### 3.3 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 could include sound effects, power-ups, and different enemy behaviors for a more engaging experience.

Play the game online: [Space Invaders Game](#)