**Game Design Document: Space Explorer**

# 1. Overview

Space Explorer is a 2D arcade-style space shooter where players pilot a spaceship through dangerous asteroid fields while collecting stars. The game features multiple levels with increasing difficulty, a health system, and a high score system to encourage replayability.

# 2. Game Elements

## 2.1. Spaceship (Player Object)

- Description: A 2D spaceship that the player controls with smooth movement and tilt animations.

- Functionality:

* Moves in all directions using keyboard controls:
  + Key D/Right Arrow: Move right.
  + Key A/Left Arrow: Move left.
  + Key W/Up Arrow: Move up.
  + Key S/Down Arrow: Move down.
* Shoots bullets using the spacebar with a 0.2-second cooldown.
* Features smooth tilt animation when moving horizontally (20-degree maximum tilt).
* Has a health system represented by three hearts.
* Starts each level with an entrance animation from the bottom of the screen.

## 2.2. Asteroids

- Description: Hazardous space rocks that fall from the top of the screen.

- Functionality:

* Move downward at a constant speed of 2 units per second.
* Spawn rate varies by level:
  + Level 1: Maximum spawn rate of 5 seconds.
  + Level 2: Maximum spawn rate of 2 seconds.
* Health system varies by level:
  + Level 1: 3 health points.
  + Level 2: 6 health points with 1.2x size increase.
* Spawn rate gradually increases over time (decreases by 1 second every 20 seconds until reaching 0.8 seconds).
* Create explosion effects and play sound when destroyed.

## 2.3. Stars

- Description: Collectible items that provide score bonuses.

- Functionality:

* Move downward at 2 units per second.
* Initial spawn rate of 5 seconds.
* Spawn rate gradually increases (decreases by 1 second every 30 seconds until reaching 1 second).
* Award 10 points when collected.
* Play collection sound effect.
* Automatically destroy when moving off-screen.

## 2.4. Health System

- Player starts with 3 hearts (maximum health).

- Hearts are displayed as UI elements with full/empty heart sprites.

- Damage sources:

* Collision with asteroids reduces health by 1 and deducts 10 points.
* Death occurs when health reaches 0.

# 3. Game Flow

## 3.1. Main Menu Scene

- UI Elements:

* Level selection buttons.
* Game title.
* Instructions panel.
* Quit button.

## 3.2. Gameplay Scene

- Features:

* Real-time score display using sprite-based numbers.
* Health display with heart icons.
* Background scrolling effect.
* Pause menu (activated with Escape key) with options:
  + Resume game.
  + Return to main menu.
  + Exit game.
* High score system that persists between sessions.

## 3.3. Game Over Scene

- Displays:

* Final score.
* High score (if achieved).

- Options:

* Return to main menu.
* Quit game.

# 4. Technical Implementation

## 4.1. Scene Management

- Separate scenes for:

* Main menu.
* Multiple gameplay levels.
* Uses SceneManager for smooth transitions.

- Persistent data between scenes:

* High scores stored in PlayerPrefs.
* Current level stored in PlayerPrefs.

## 4.2. Level System

- Multiple levels with increasing difficulty:

* Level 1: Base difficulty.
* Level 2:
  + Faster asteroid spawning.
  + Tougher asteroids.
  + Larger asteroids.

## 4.3. Score System

- Scoring mechanics:

* +10 points for collecting stars
* -10 points for asteroid collisions

- High score system:

* Stores top score in PlayerPrefs
* Updates when current score exceeds high score
* Displays using sprite-based number system

## 4.4. Background System

- Continuous scrolling background

- Planet system:

* 5 different planets
* Planets move up/down in the background
* Automatically reset position when off-screen
* Sequential planet appearance every 20 seconds