**2D Space Adventure Game Report**

**Project Title and Description**

**Title: 2D Space Adventure**

**Description:**

This project is a 2D space shooter game where the player controls a spaceship to defeat enemy ships, collect bonuses, and avoid enemy projectiles. The game is implemented in C++ using OpenGL for rendering and employs stb\_image.h for texture loading. The game includes animations, textures, and interactive gameplay to provide an immersive experience.

**GitHub Link:**

https://github.com/themome21009/SpaceGame

**2D/3D Models Used**

**Models Used:**

* **Spaceship:** A 2D triangular model, textured using spaceship.png.
* **Enemies:** Rectangular 2D models, textured with enemy.png.
* **Floor/Background:** A full-screen 2D rectangular model textured using floor.png.
* **Collectibles:** Represented as 2D circles with solid colors.

**Source of Models:**

* All textures (spaceship.png, enemy.png, floor.png) were sourced from royalty-free image libraries and processed for compatibility using stb\_image.h.

**Transformation Techniques Applied**

**Techniques:**

1. **Translation:**
   * Spaceship movement using keyboard inputs (w, s, a, d).
   * Enemy and projectile movements.
   * Collectibles falling downwards.
2. **Scaling:**
   * Enemy models resized to maintain proportionality.
   * A screenshot of a video game

     Description automatically generatedA screenshot of a video game

     Description automatically generated
   * A screenshot of a computer game

     Description automatically generatedA black screen with red text with Marfa lights in the background

     Description automatically generatedA screenshot of a computer

     Description automatically generated

**Projection Techniques Used**

**Orthographic Projection:**

The game uses **orthographic projection** to render 2D scenes. The coordinate system is defined using gluOrtho2D, mapping the world coordinates directly to the screen.

**Textures Applied:**

* **Spaceship:** Textured using spaceship.png.
* **Enemies:** Textured using enemy.png.
* **Floor/Background:** Textured using floor.png.
* A blue and orange space ship

  Description automatically generatedA close-up of a stone

  Description automatically generatedA cartoon of a robot in space

  Description automatically generated

**Benefits of Textures:**

1. Enhances visual appeal by adding detail.
2. Improves player immersion by creating realistic-looking elements.

**Use of Lines or Parametric Curves**

**Lines:**

* Used for debugging hitboxes around player and enemy models

**Parametric Curves:**

* Collectibles are represented as circles drawn using parametric equations: x=r⋅cos⁡(θ),y=r⋅sin⁡(θ),θ∈[0,2π]x = r \cdot \cos(\theta), \quad y = r \cdot \sin(\theta), \quad \theta \in [0, 2\pi]x=r⋅cos(θ),y=r⋅sin(θ),θ∈[0,2π]