Alexandria University
Faculty of Engineering
Computer and Systems Engineering Department

CS 422 Computer Graphics
Assigned: Thursday, 25/04/2024
Due: Saturday, 18/05/2024

Course Project (3D Space War Game)

Objectives

Apply the knowledge acquired through the course to create a 3D space war game.

Problem Statement

You are required to create a 3D space war game in the solar system.

The game should enable users from controlling spacecraft to explore the solar system while being attacked by enemy spacecrafts. You are required to use two view ports: One for spacecraft (first person view) and the other for the whole solar system (See figure 1 for more declaration).

In the game you need to handle:

- Instantiation of Sun and 8 planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune)
- Solar system animation (spinning and rotation of planets around Sun and Moon around Earth)
- User spacecraft instantiation, movement, shooting, and health.
- Enemy spacecrafts instantiation, movement, shooting, and health.
- Spacecrafts projectiles instantiation, and movement.
- Pickable objects instantiation and its effects (upgrading weapons, increasing health, etc.)
- Lighting of the scene and emission of objects.
- Skybox.
- UI System (Menus, Health bars, etc.).
- Collision Detection (Spacecraft with projectile, Spacecraft with planet/Sun, Spacecraft with pickable objects).
- Scoring System
- Sound effects (UI, Shooting, Destroying, etc.).
- Visual effects (Shooting, Destroying, Collision, etc.).
- Planets and spacecrafts textures
- Survival mode: play the game until your health drops to 0.
- Time attack mode: destroy all enemies before the time passes.

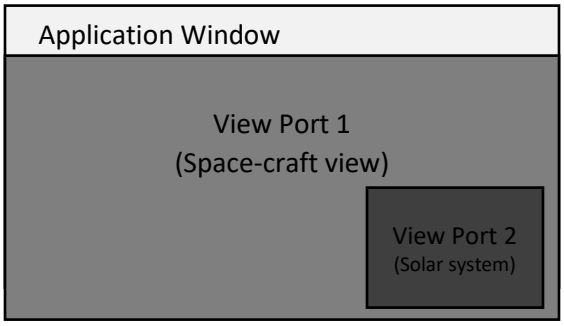

Figure 1: Application View Ports Structure

You are free to choose the proper implementation of:

- Planet sizes.
- Planets speed.
- Game Mechanics:
    - Enemy interactions and difficulty.
    - Pickable objects and its effects
    - Level design.
    - Scoring System.
- Sound and visual effects.
- Mouse and keyboard interaction.

Make sure your choices are sensible and give a good game experience.

You can use code in lighting, space craft, animation as reference.

You can use “Computer Graphics Through OpenGL (From Theory to Experiments)-Sumanta Guha” reference and its experiment source.

Delivery Policy

- You should submit a report describing your code flow, screen recording of sample run and challenges you faced (if any).
- You should submit the project source code (.cpp file(s)).
- You should cite any additional resources you used.
- You should work in groups of 5.
- Further details for the submission instructions will be posted later on MS Teams.

Good Luck