CSI4130 Computer Graphics Assignment 4 Report

Project Description

Our project is a dynamic real-time simulation showcasing a textured, rotating planet orbited by satellites, a glowing sun, stars, and comets, all rendered using WebGL2. The planet uses a combination of image-based texturing and procedural noise blending in the fragment shader to simulate a greener and more alien atmosphere on the planet. Particle systems are used to generate realistic thruster effects behind the satellites and glowing comet tails. The user can freely explore the 3D scene with mouse and keyboard controls or switch to cinematic camera modes that follow either a satellite or a comet. The scene includes a twinkling starfield and procedurally generated comets that spawn and animate across the screen. In this project we illustrate two prominent graphics techniques, a particle system for the creation of a thruster system in the satellites, as well as procedural noise that shows an alien-like atmosphere on the planet. The original texture is blueish, so this noise changes that and generates a cloud-like atmosphere.

Work Distribution Table

Name of Group Member	Achievements
Thirunavukkarasu Harshini - 300455065	Implemented camera controls: +/- keys for zooming in and out, and arrow keys for vertical panning. Comet Class(Head and Tail as well as glow)
Kevin Naveen - 300235454	Satellite, and thrusters/ particle system Planet and noise creation on the atmosphere Starfield background Sun and directional light
Zachary Fagnou - 300119189	Comet Class (Head and Tail)
	Comet Class (Glow / main)

Program Usage Guide

- **+** key: Zoom in
- **–** key: Zoom out
- Up arrow key: Pan up
- Down arrow key: Pan down

Dat.gui Control Panel

- There exists a planet slider to increase planet rotation speed
- Satellite speed controls the speed in which the satellite's orbit
- Thruster on/off toggle
- Simulation speed slider which controls the speed of the simulation overall
- Lighting mode setting: controls whether the lighting is full, ambient light only, or sunlight only to test different lighting modes for the planet
- Camera mode setting: determines where the camera follows, whether it's in free camera mode or the camera follows a satellite or comet
- There are also toggles to pause the simulation, remove the starfield, or remove the comet shower.

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External Resources Acknowledgment

All models, shaders, and code were created by the team except for standard libraries (glMatrix, dat.GUI) and textures as listed above.

 Planet Image Texture: https://sanwal_af.artstation.com/projects/aRbm2R
Satellite image texture is from the internet, source has not been saved