Solar System

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Contents

1 Tech Manual

1.1 Dependencies

This project requires GLEW, GLM, SDL, Assimp, and ImageMagick. These libraries can be installed using `sudo apt-get install libglew-dev libglm-dev libsdl2-dev libassimp-dev libmagick++-dev` on Ubuntu.

This project also uses ImGUI and Json for Modern C++, but the headers for those are already included

1.2 Building and Running

To build the project, cmake is required. Simply use the `cmake` command to generate a makefile, and then the `make` command to build the project. If this is successful, there are several ways to run the program:

`Tutorial` - Run the program with the default config.json file

`Tutorial --help` - Pull up the help menu

`Tutorial <config>` - Run the program with the specifiifed config file

1.3 Controls

WASD - Detach the camera from any planet and move it in the cardinal directions

Space - Move the camera upwards

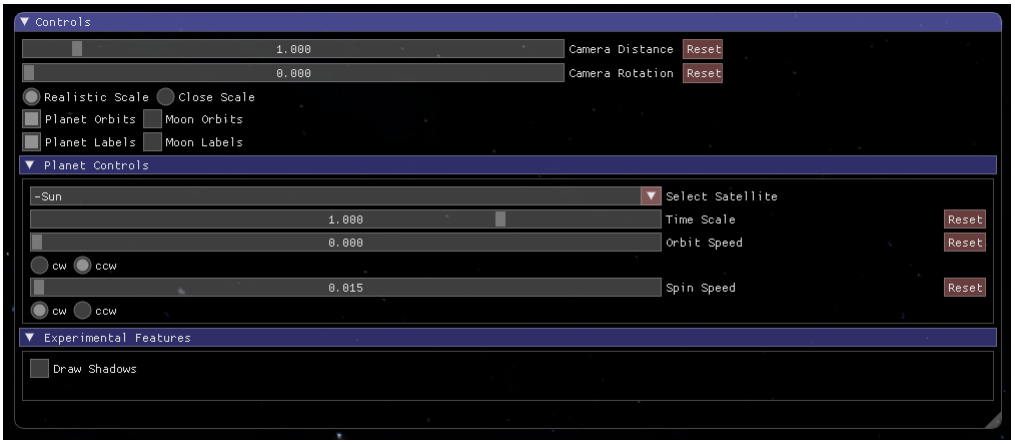
Shift - Move the camera downwards

left/right arrows - Rotate the camera

CLick and Drag to rotate the camera around a planet

Scroll wheel to zome in and out on a planet

1.4 Menu



Camera Distance - Change how far away the camera is from a planet

Camera Rotation - Change where the camera looks at the planet from

Realistic/Close Scale - Make planets have correctly scaled sizes and distances, or easily viewable

Orbits - Draw orbit lines

Labels - Label planet/moon names

1.4.1 Planet Controls

Select Satellite - Center Camera on a specific planet/moon, and choose which planet the controls affect

Time Scale - Simulation Speed for this planet and all of its satellites

Orbit/Spin Speed - Change how fast a plant orbits or rotates

Orbit/Spin Direction - Change the orbit/spin direction of a planet

1.4.2 Experimental Features

Draw Shadows - Make planets and moons cast shadows on each other

1.5 Extra Credit

1) Menu System

2) Configuration File

3) Live Adjustment of Simulation Speed (see section 1.4)

4) Planet Orbit Paths

5) Scaled/Realistic View

6) Planet Rings

7) Specular/Normal Maps on Earth

8) Earth nighttime textures

9) Shadow Mapping

10)Tilted Orbits

11)Skybox

2 Showcase

Figure 1: The tilted orbits of Uranus' moons and rings

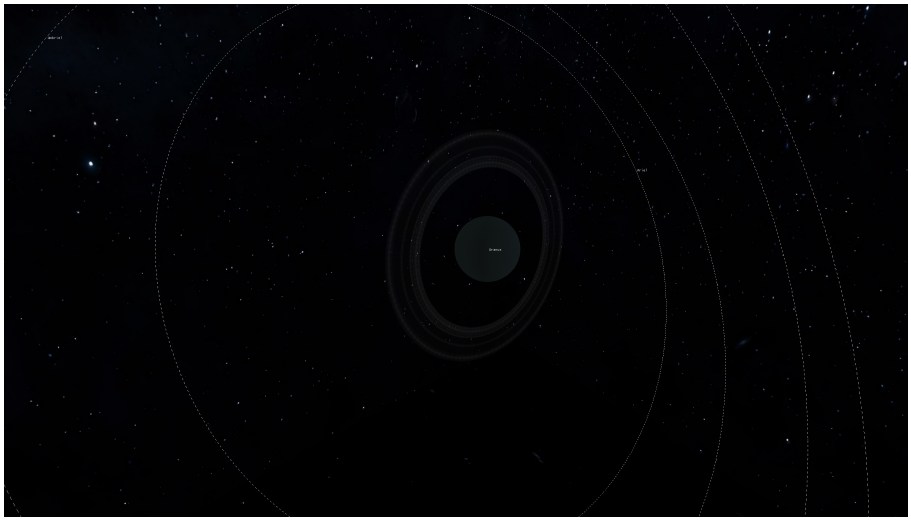


Figure 2: A view of The Sun and Mars from Mars' moon Deimos

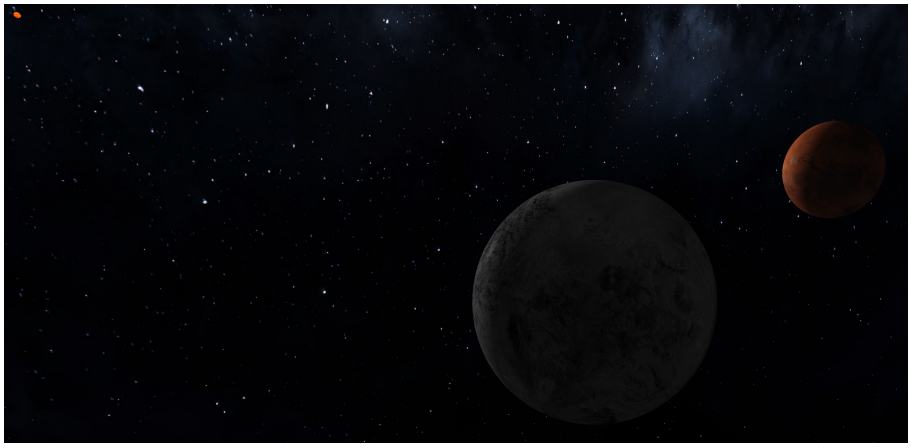


Figure 3: Earth's normal map makes the Andes cast a shadow over Western South America, causing their mornings to be later

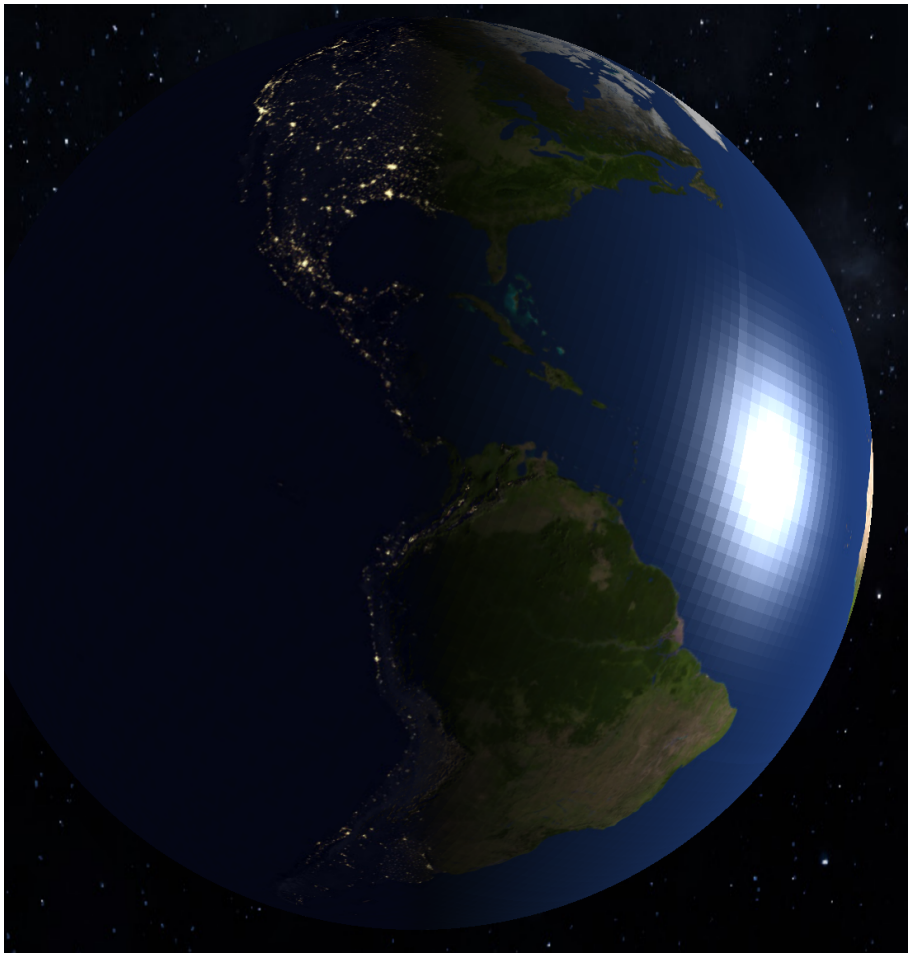


Figure 4: The Sun shines on the Red Sea

3 Report

3.1 Class Diagram