Gebze Technical University

CSE462 - Applied Augmented Reality and 3D User Interfaces

Homework 4 Report

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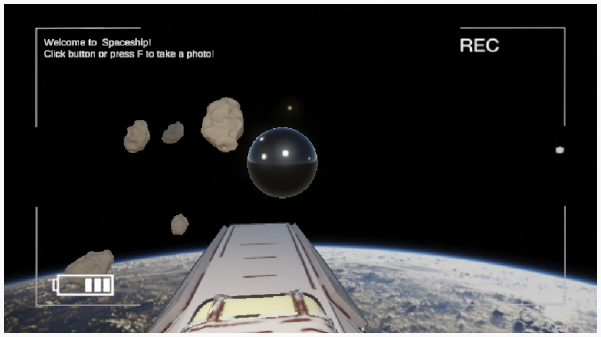
Introduction

This project involves creating a 3D simulation in Unity to capture and visualize the effects of a black hole using a custom pinhole camera system. The camera renders the scene by simulating light ray bending based on the gravitational influence of the black hole. The project also includes interactive features, such as toggling the black hole effect and capturing images, providing an engaging and dynamic visualization.

Project Structure

The project structure includes a space environment featuring stars as light sources, asteroids as objects, and a visually simulated black hole at the center. The black hole interacts dynamically with light rays, creating realistic gravitational lensing effects.



Black Hole object.

Ligth objects as stars.

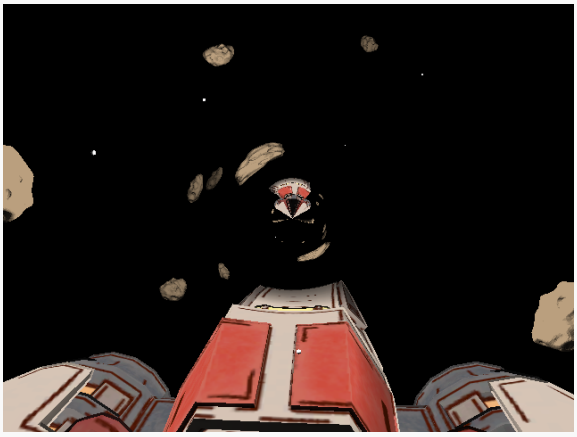
Asteroid objects

User can adjust the light intensity from the bottom right slider and use the checkbox on the bottom left to activate black hole effect on the images. On the Pinhole camera panel user can change the FoV value.

Light intensity = 0 (minimum)

Light intensity = 200 (maximum)

Black Hole Effect Results



Saved image when black hole effect is active.

Image from the same spot when black hole effect is not active.

Saved image when black hole effect is active.

Image from the same spot when black hole effect is not active.

Field of View (FoV) Results

Image with FoV = 30

Image from the same spot whit FoV = 90

Light Intensity Results

Image with light intensity = 0

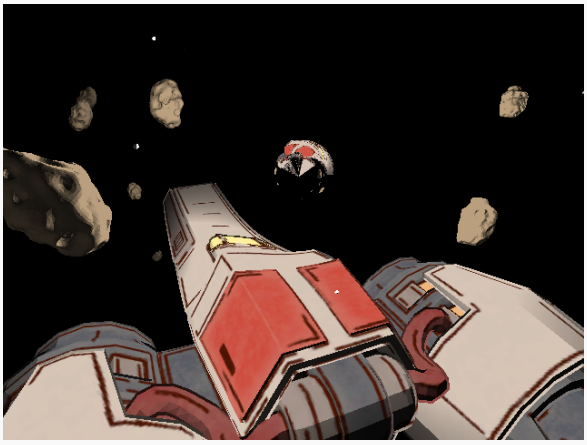


Image from the same spot whit light intensity = 200

Number of total triangles on the scene will be printed on the console after starting the program.

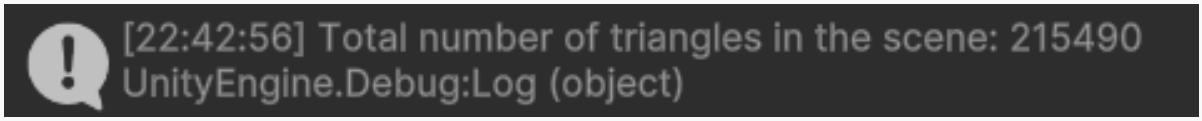


Image will be saved after clicking the capture button on the bottom left.

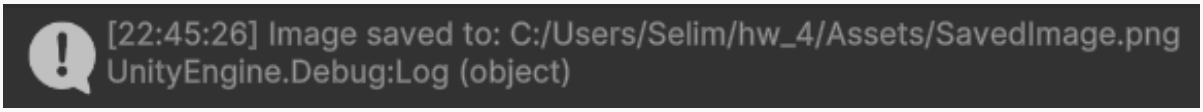


Image will be saved to Assets folder as "SavedImage"