INTERACTIVE GRAPHICS PROJECT

A JOURNEY IN THE SOLAR SYSTEM

SAPIENZA
UNIVERSITÀ DI ROMA

Presented by

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Introduction

The project is a 3D representation of the Solar System, focused on user interaction.

The main model is characterized by the presence of the planets and their movements around the Sun.

The user can interact with the spaceship on the scene.

Environment

The project is realized with Three.js.

- High level APIs for building and animating objects in the scene.
- Rich standard materials
- More customizable wrt standard WebGL

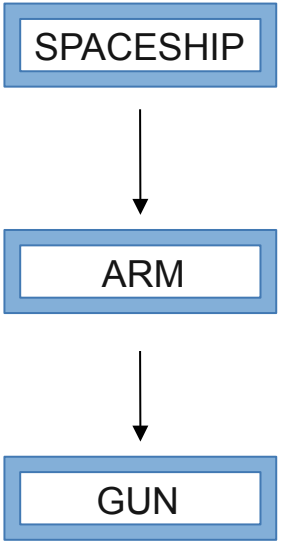
Libs, tools and models

- OBJLoader
- MTLLoader
- THREEx
- OrbitControls
- DAT.GUI

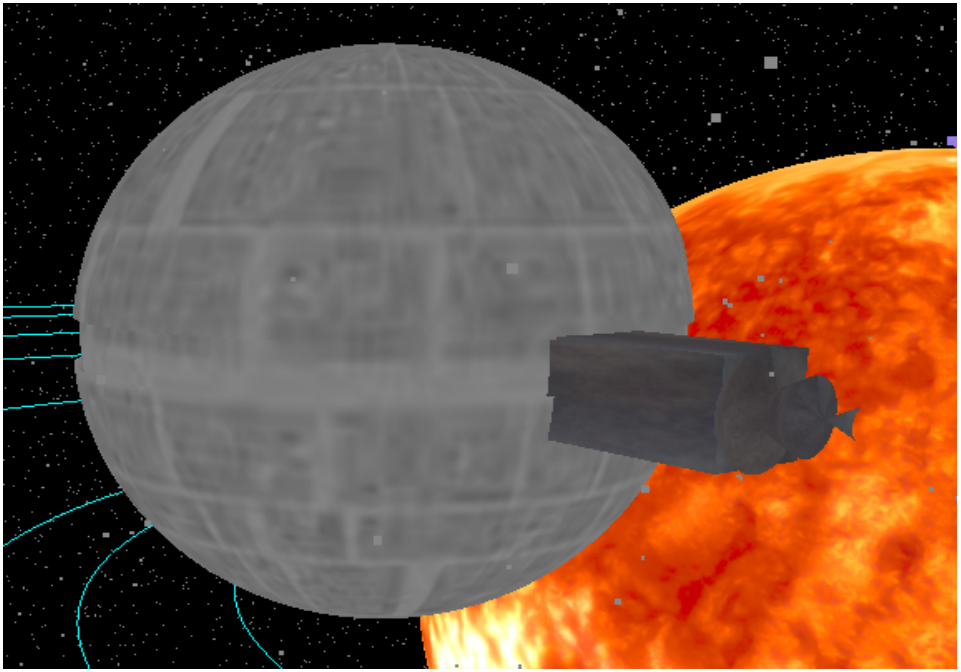
Hierarchical Model 1/4

- The spaceship is a custom render realized in blender
- Mechanical arm that is ejected from the spaceship
- ‘Rotating gun’ that is attached to one end of the spaceship

Hierarchical Model 2/4



Hierarchical Model 3/4



Hierarchical Model 4/4

- The gun is a *lathed object,* that is a 3D model whose vertex geometry is produced by rotating a set of points around an axis.

Lights and Textures 1/2

- The light comes from the sun
  - Sphere with a MeshBasicMaterial
  - PointLight
- Planets are realized with MeshLambertMaterial
  - Non-shiny surface
  - Gouraud shading model

Lights and Textures 2/2

- Unique texture for each planet to make them recognizable
- For the spaceship we used a basic material so that the user can observe the textures and the animations of the object in every point of the scene.

Animation 1/2

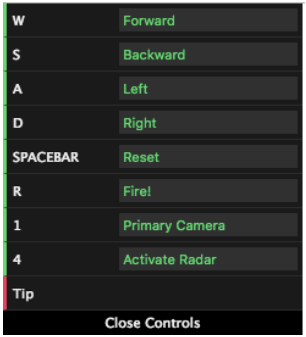
- Each planet rotates around the Sun with its orbit radius and revolution speed
  - At every render frame we increment a delta in order to change the position of each planet
- The spaceship arm is translated on the X-axis until it reaches the right position

Animation 2/2

- The gun starts moving of 45 degrees to the right and once the position is reached, it goes on back and forward for 90 degrees
- The spaceship is able to shoot projectiles from the gun
- Bullets are shot in the direction the gun is facing in a particular frame

User interaction 1/3

- Legend
  - It shows the commands available to the user and suggests hidden interactions



User interaction 2/3

- Spaceship movement
  - The Death Star can be moved on the X and Y axis using the WASD keys
  - Movements on the Z axis are handled by the up and down keys
  - Press R to reset ship's position

User interaction 3/3

- Cameras:
  - While primary camera is active, the user has OrbitControls to control the environment by mouse clicking.
  - User can switch between cameras by clicking on 1 or 2 on the keyboard.
  - He can switch to secondary camera by clicking on 4 that will actually activate the gun

THANKS FOR THE ATTENTION