Tide

Computer Graphics Project 9: Interactive 3D Art

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Target Users

👫 People who want to enjoy the sunrise and sunset in a virtual space.

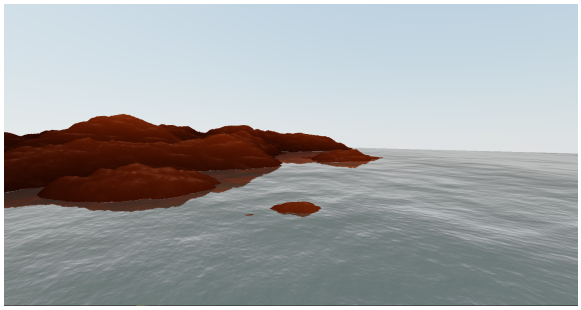
Features

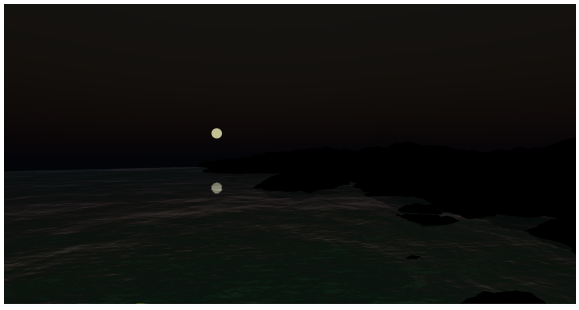
- Virtual coast exists, and the background changes over time, with the sun rising and setting.
- On this virtual coast, tidal phenomena occur at intervals of about 12 hours and 20 minutes.
- Users can use the left arrow and the right arrow keys to make time flow slower or faster.

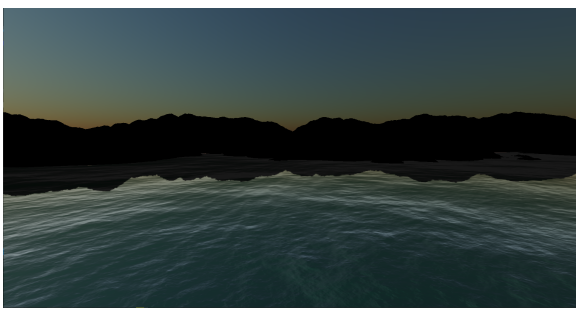
Concept and Idea

When I thought about the things that I could feel the flow of time in nature, the sun and the moon rising and falling, and the tides coming and going came to mind. So I tried to capture those moments in this Project.

Screen Shots

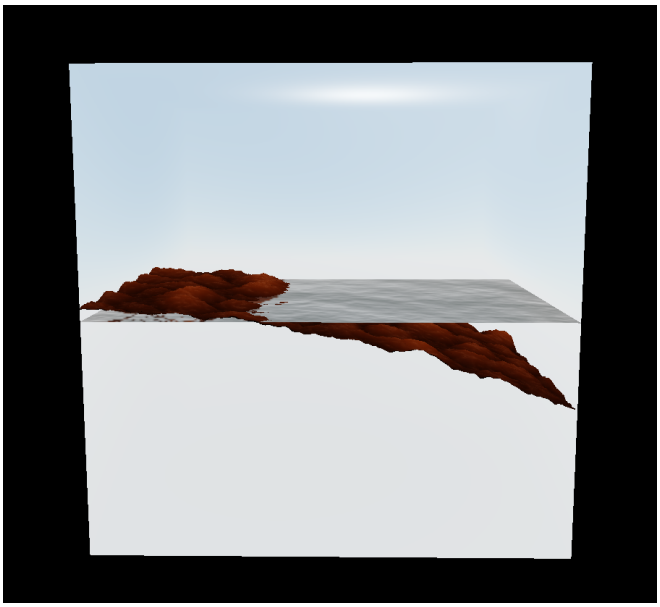






Algorithm & Code

Scene



Two planes were installed inside the Skybox to represent the surface of land and water.

```
const vertices = geometry.attributes.position.array;

    for (let i = 0, j = 0, l = vertices.length; i < l; i++, j += 3) {

        vertices[j + 1] = data[i] * 2 - Math.pow((i % worldDepth), 2) * 0.002;

    }
```

In the case of a plane representing the ground, the points were moved in the y-axis direction using noise, indicating the unevenness of the ground. In addition, the plane is tilted by subtracting a value calculated using z-axis coordinates to the vertices' y value.

Lighting

```
sun.setFromSphericalCoords(1, phi, theta);

moon_coord.setFromSphericalCoords(8000, moon_phi, moon_theta);
moon.position.set(moon_coord.x, moon_coord.y, moon_coord.z);

light.position.set(sun.x, sun.y, sun.z);

sky.material.uniforms['sunPosition'].value.copy(sun);
water.material.uniforms['sunDirection'].value.copy(sun).normalize();
```

Scene has a directional light for texturing the land. The direction of light is updated at each render to match the direction of the sun. The position of the moon is also updated at each render so that the moon's position is in the opposite direction of the sun.

Control

```
if (keyCode == 39) { // Left Arrow
    speed = speed > 32 ? speed : speed * 2;
} else if (keyCode == 37) { // Right Arrow
    speed = speed < 2 ? speed : speed / 2;
}
```

When a key press event is observed to occur, a callback function is called to handle it. If the left arrow or right arrow is entered, update the value of the speed variable that controls the speed of time. Time can be up to 64 times faster.

Link to the project

https://chan2ie.github.io/Tide/index.html

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