Features

Your Call For All

Çağatay Yiğit
Ecem Varma
Şamil Ateşoğlu

- Procedural Terrain Generation
- Smooth Character Animations
- 3rd Person Camera Control
- Variety of 3D Objects
- Spotlight
- Object Transformations
- Different Shading Options
- Informative Messages & Responsive UI

Techniques Used

Procedural Terrain Generation

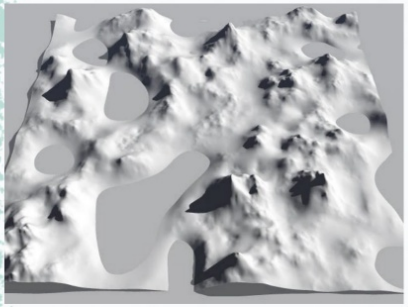
We procedurally generated heightmaps with a technique called "Hybrid Multifractal Terrain Model" that uses Fractional Brownian Motion.

We then combined those heightmaps with a chunk loading system to generate terrain around the player dynamically, so that we have an infinite terrain that we can walk on.

At last, the pseudo-random number generator that we use accepts seeds, so with the same seed number, we have the same world setup.

Chunk loading system

Blending of textures at different heights



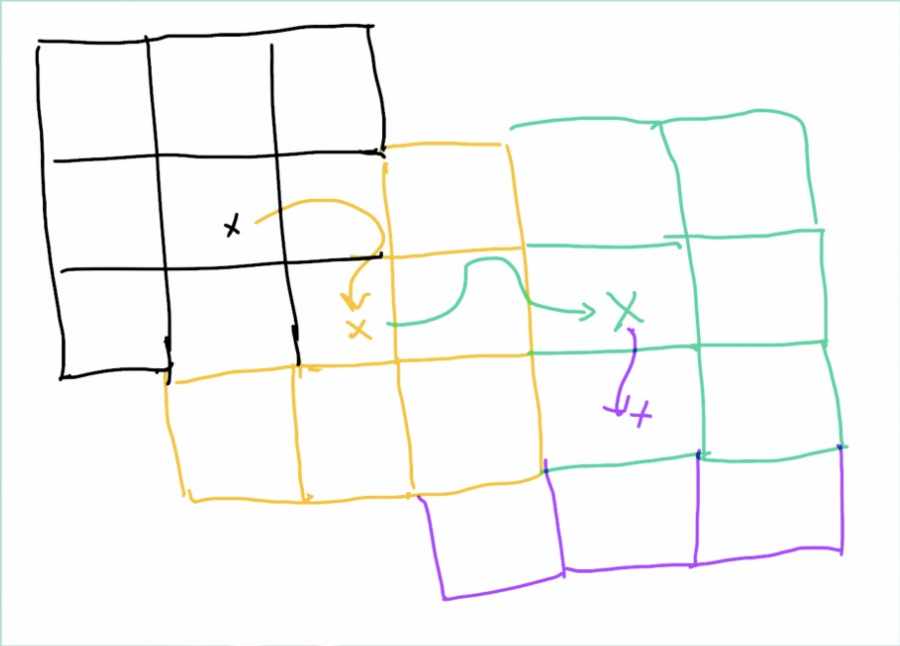
The algorithm is explained in a survey by Ken Musgrove: https://www.classes.cs.uchicago.edu/archive/2015/fall/23700-1/final-project/MusgraveTerrain00.pdf

Chunk loading

We dynamically generate 9 chunks with the center chunk being a host to the player.

As the player moves along the terrain, we generate new chunks, or use the previously cached ones using a hashmap structure. We also disable the chunks that are no longer active, there are only 9 chunks in the scene at any point in time, this helps the performance.

For collision detection, we use the ray casting API with a combination of Octree data structure provided by three.js.



The diagram depicts the loading of the chunks as the player moves

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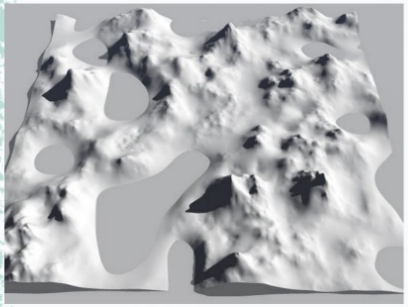

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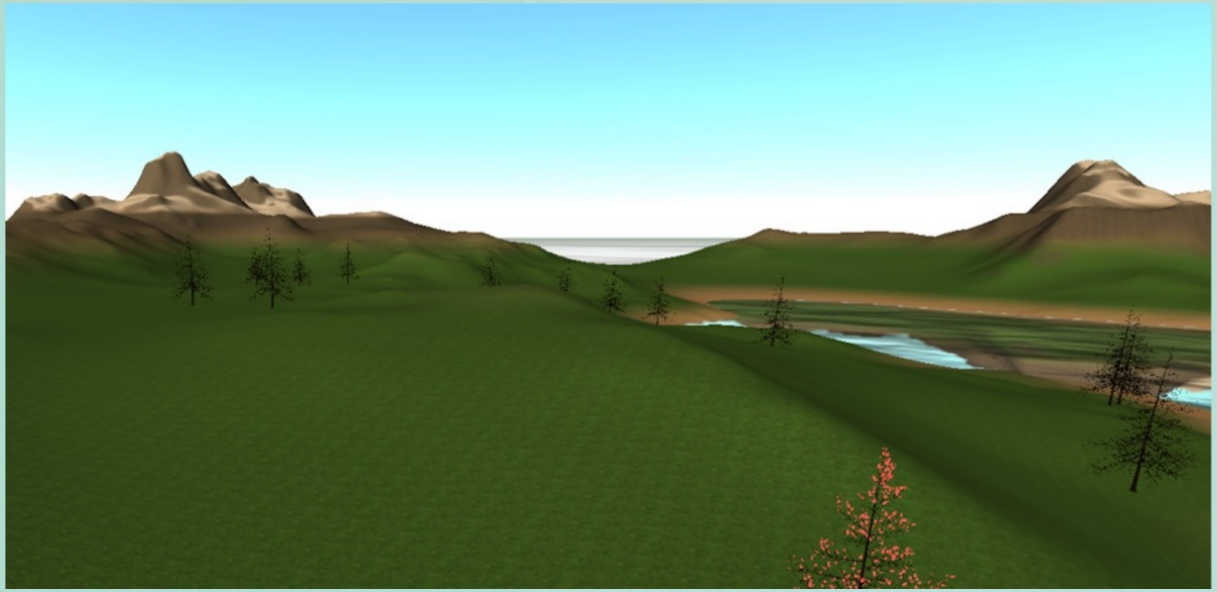
Blending of textures at different heights

We integrated a standalone function from THREE.Terrain library to blended material for the same mesh at different heights and slopes: https://github.com/IceCreamYou/THREE.Terrain/blob/50b56305705ad50263d28e0e2fd9d73027f6c69f/src/materials.js#L38



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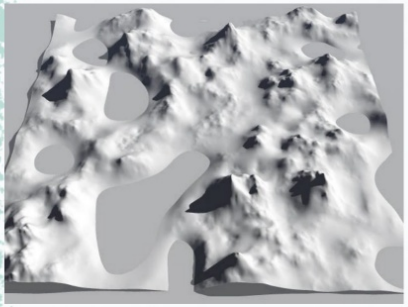

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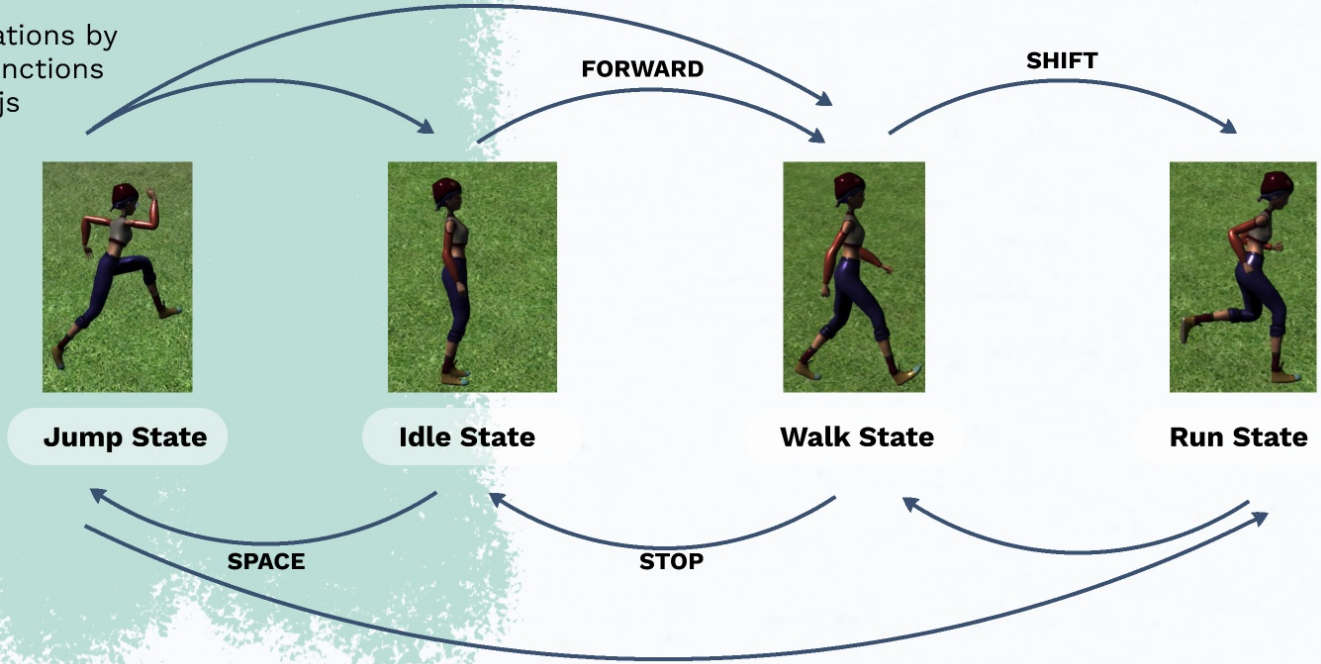
Smooth Character Animations

Animation State Machine

We apply interpolations by using crossfade functions provided by three.js



Ew! It smells awful.

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Third Person Camera Controller

We implemented a 3rd person camera controller for smoother experience

We also used ray casting and a combination of solutions that use spherical coordinate system.

(We are actually inspired by GTA 5 for camera controller (!))

This place brings me joy, make it stay that way!

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Variety of 3D Objects

There are variety of objects in our game.

Let's have a detailed look

Animated butterflies, animated sharks animated frogs, trees, grass and four types of decision points

Plastic Bag

Broken Glass Bottle

Biomedical waste

Decision Points

Decision points are the objects that change the state of the environment. They affect the environment poorly and when they are diminished by the character the environment gets better and the bar that shows the health of the environment increases. Decision points can be moved, rotated and scaled at any time by using three.js transform controls. They have labels which appear when the character is close enough.

Animated butterflies, animated sharks animated frogs, trees, grass and four types of decision points

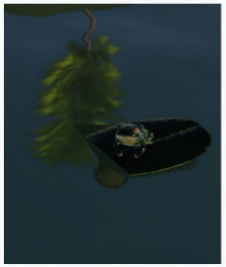
Other 3D Objects

These objects show the health of the environment. They begin to appear when player decreases the pollution. Animated objects are also moving the way they do in nature. Butterflies are flying in a circle, frogs are making a wave motion using trigonometric functions.

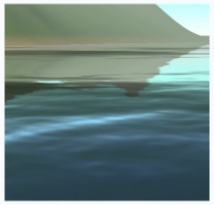
Butterflies with animation

Pink japanese trees with wind animation

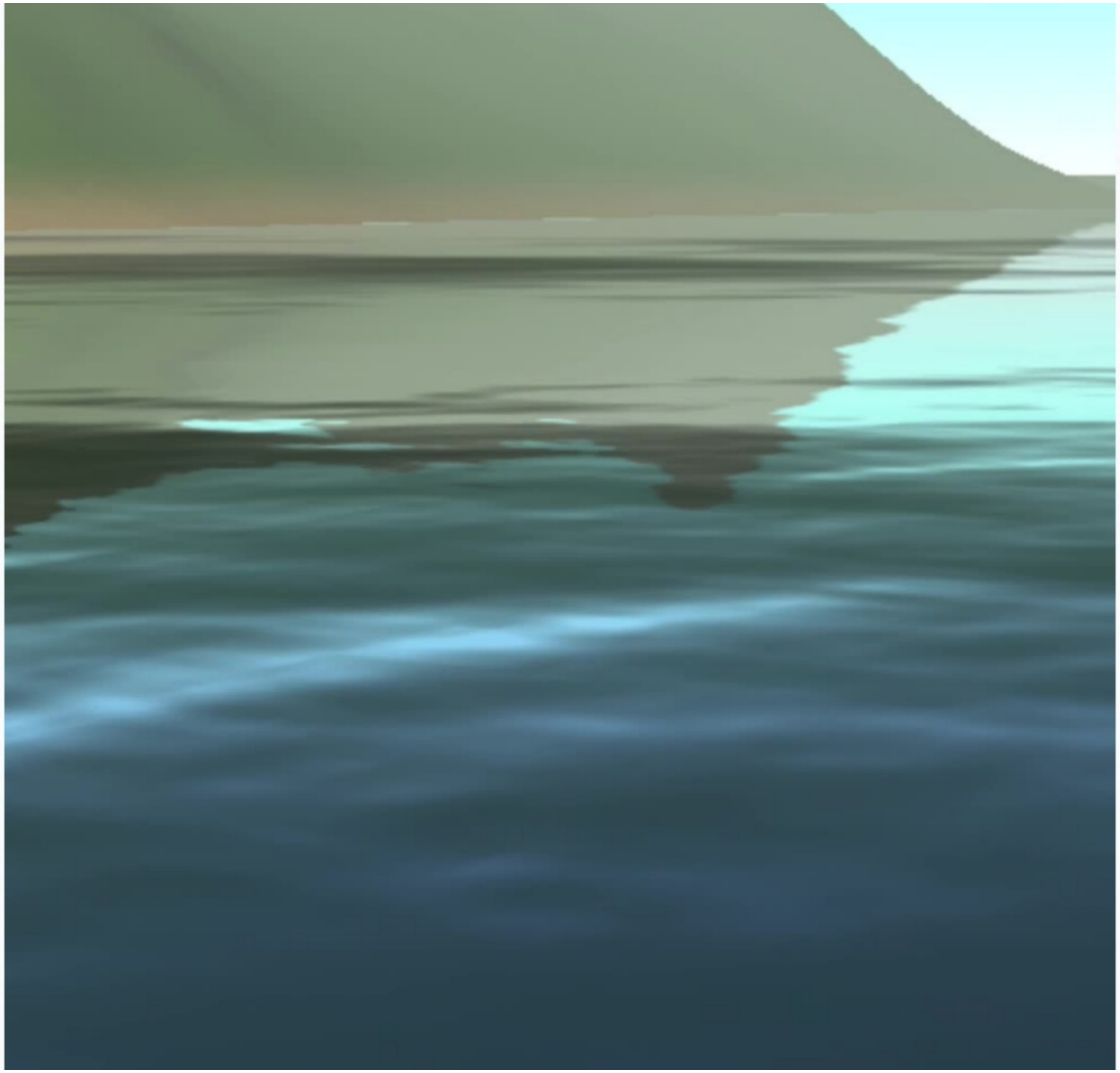
Two different type of trees

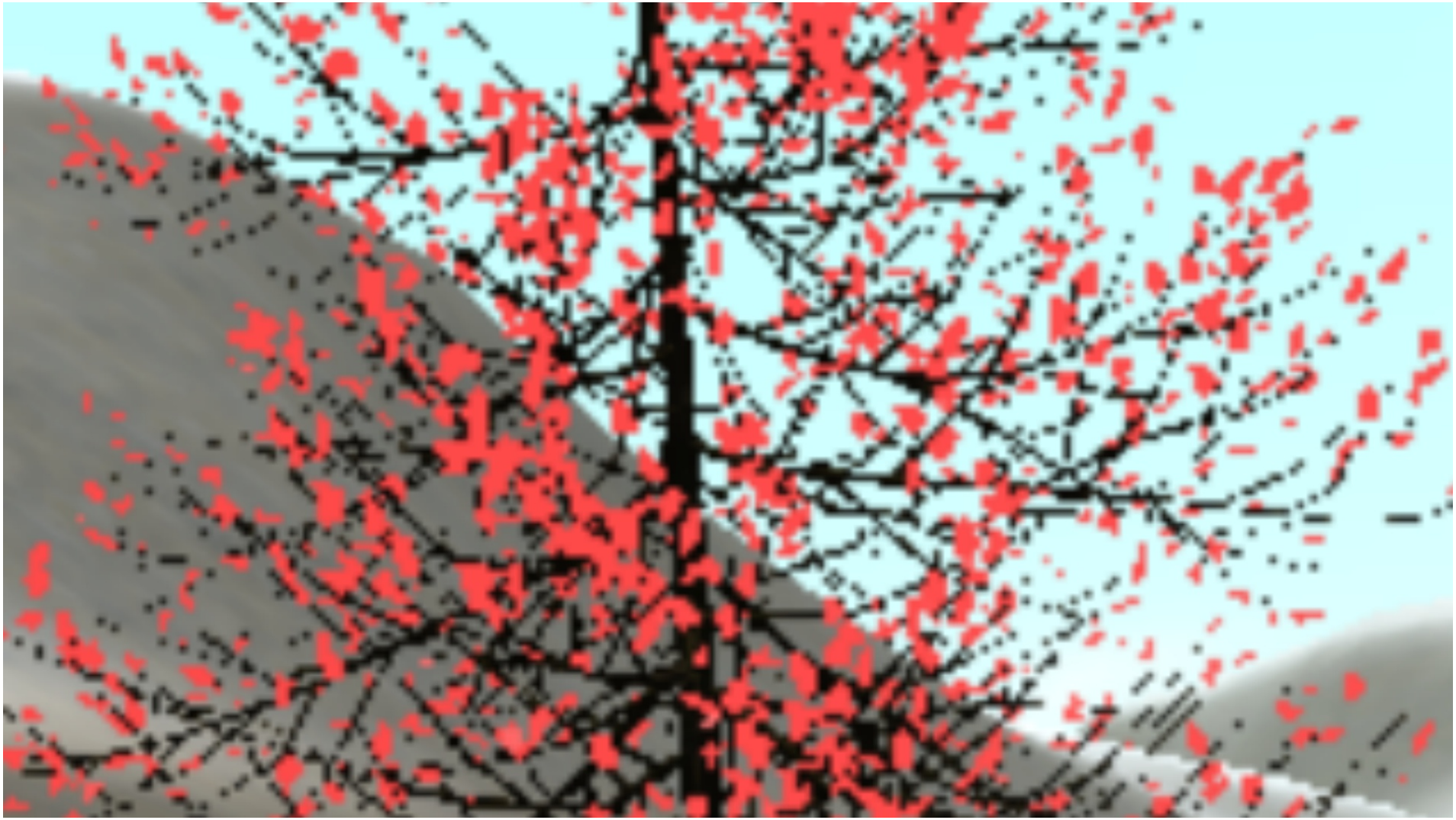


A frog on a leaf with animation



We couldn't get a better view with sharks due to safety precautions (!)





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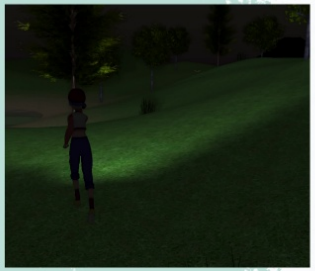
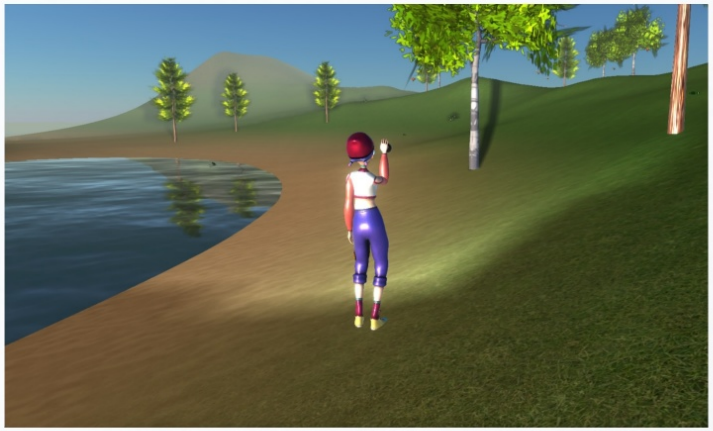
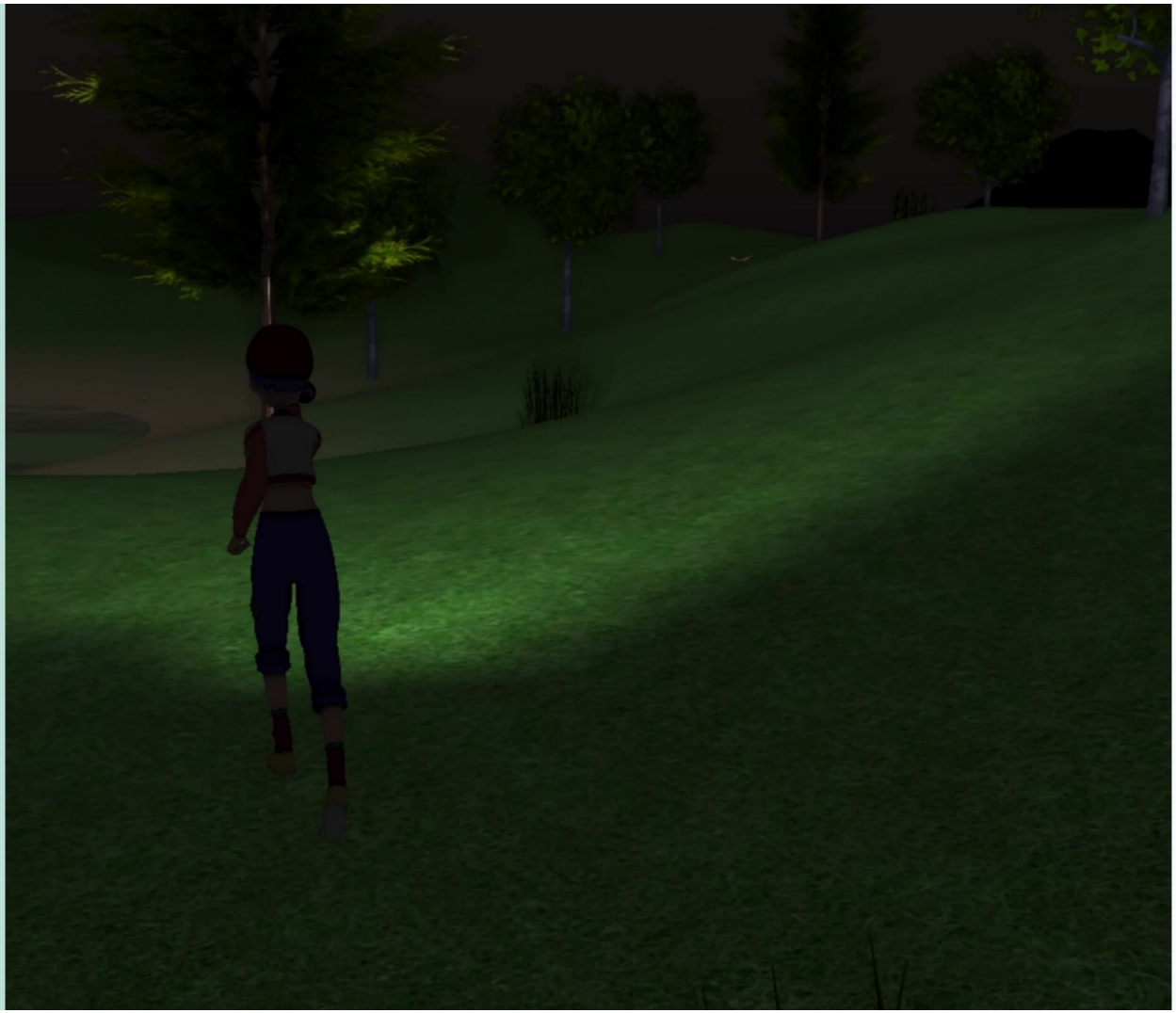
Spotlight

The spotlight is a three.js spotlight as a flashlight. It's orientation changes with the character's motion (procedural animation). The players can use the flashlight whenever they want by pressing "P". But the players will mostly need it at night time.







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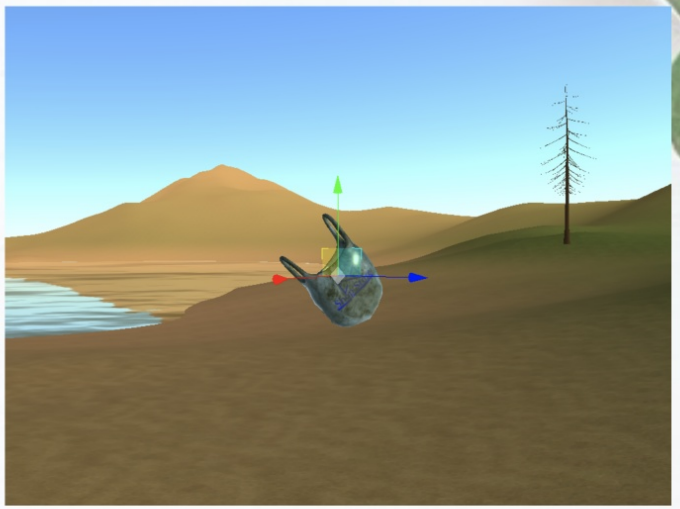
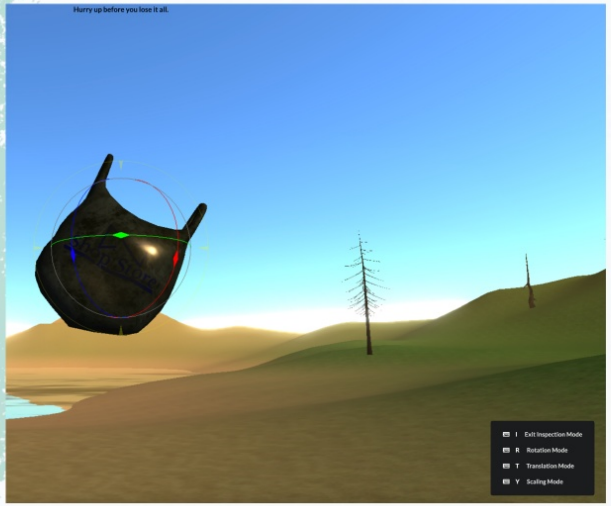
Object Transformations

We implemented an "Inspection Mode" in which the player is able to transform the object as they like.

We used K-d trees to efficiently query nearest object out of hundreds of objects in in real-time.



As the player gets closer to an object, an bubble that contains the name of the object shows up. At this point, "Object Focus Mode" is activated as long as the player holds down he right mouse button. In this mode, pressing "I" would activate "Inspection Mode".



These two figures show the different transformation modes.

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Different Shading Options

We implemented different rendering & shading options

Two changeable shading types are: Smooth shading and flat shading. Flat shading is a shading type in which a face reflects the light as a whole, rather than interpolated, giving a block-like look.

We also integrated environment mapping & tone mapping, and made them changeable in settings user interface.

Different objects in the scene also have different materials, for example some models use physically based shading, while terrain chunks use lambert shading

Flat Shading

Smooth Shading

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Your Call for All has a user interface that is designed to be simple and user-friendly. Descriptive messages shows the game flow and enhances the playing experience.

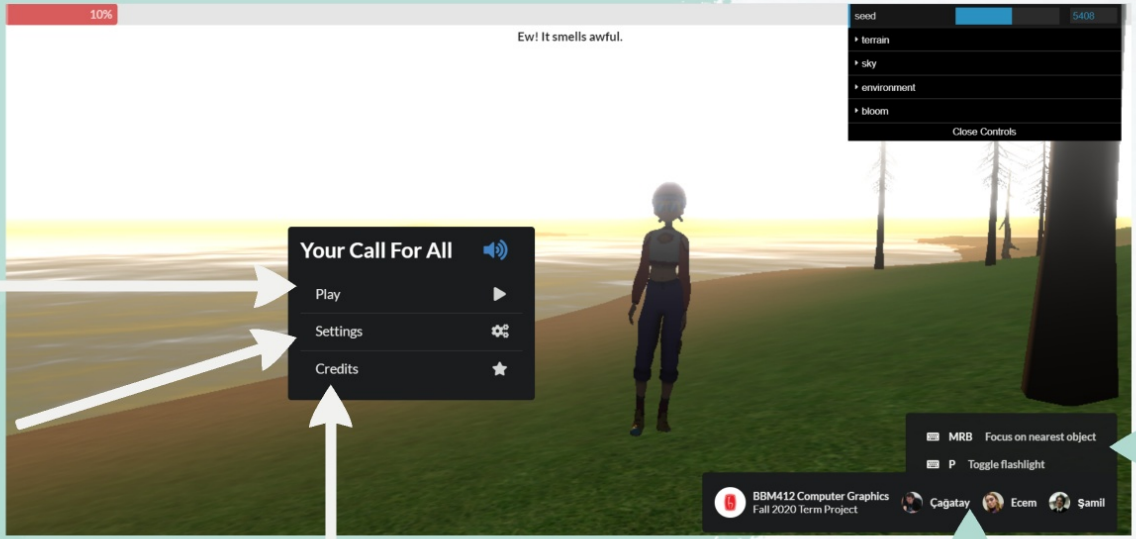
Loading Screen

Game Menu

Informative Messages

State of Environment

Game Menu



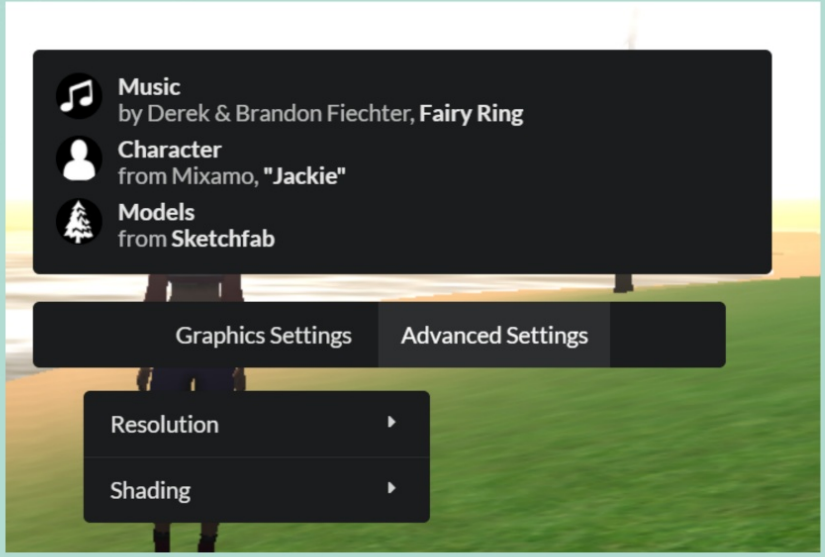
Play and Resume button

Settings for resolution, shading options, tone mapping, environment mapping and bloom

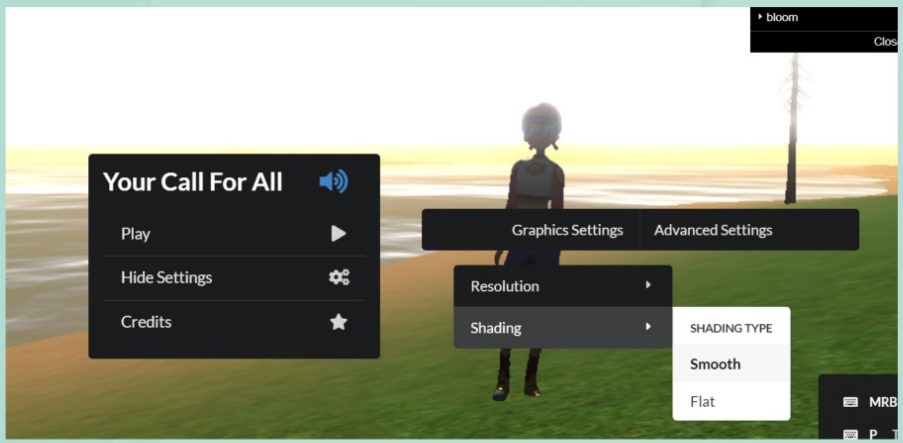
Credits for the song, models and character

Game makers

Game control descriptions

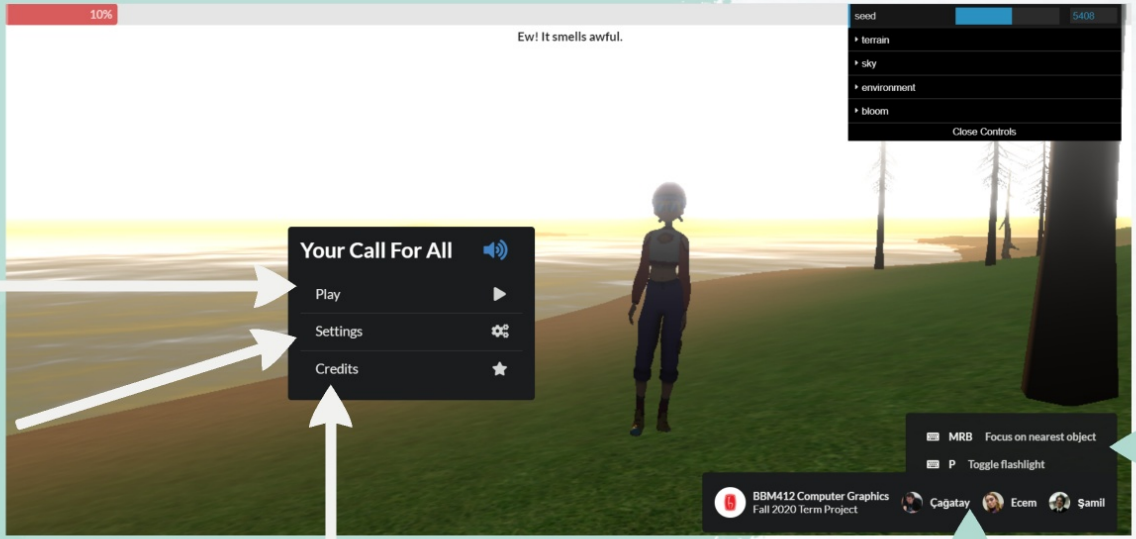


Credits and advanced settings.



Different shading options are showed in the picture above.

Game Menu



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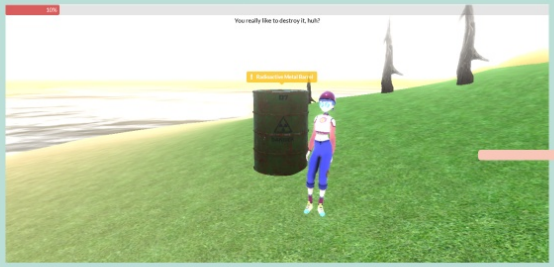

Label of Radioactive Waste

Right Click Info Message

After pressing F button

Good call!

A frightening 4,000 years is how long it takes a glass bottle to decompose in the environment. Every time we leave a recipient of this kind in the countryside, we are putting the environment and its ecosystem at risk.

Glass Bottle

Good call!

It can take up to 1,000 years for plastic to decompose in landfills. The plastic bags we use daily take 10 years to 1,000 years to decompose, while plastic bottles can take 450 years or more.

Plastic Bag

Good call!

Although nuclear energy is very environment-friendly, the nuclear waste that produced must be well handled. The time frame of radioactive waste ranges from 10,000 to 1,000,000 years. Usually it is stored deep under the soil, inside impermeable clay-reinforced concrete vaults

Radioactive Waste

Good call!

Improper segregation and disposal of biomedical waste has the potential to contaminate groundwater sources, which in turn may infect humans and animals alike.

Biomedical Waste

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Health Bar

9%
Open Controls
What did you do to butterflies?

14%
Open Controls
Not the best view I have ever seen.

21%
Open Controls
Don't you care about the sharks, trees, even yourself?

39%
Open Controls
You can do it, listen to your heart.

67%
Open Controls
Have you ever seen such a blue?It's magical.

73%
Open Controls
Look at the butterflies, they are dancing!

99%
You are our saviour! Enjoy the beautiful scenery.

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