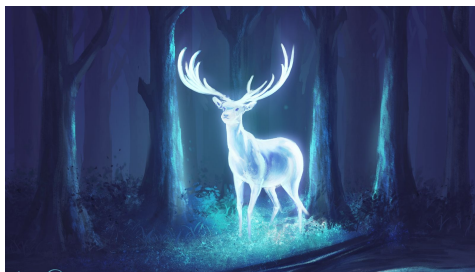


CS 148 Project



Motivation



The goal for our project was to create a Patronus in a very natural landscape. We were inspired by numerous images, including the ones above, and we wanted to replicate these scenes in a photorealistic setting.

Our image depicts a deer Patronus by the water, with a forest backdrop. We purposefully set our scene at night, with little global illumination. The Patronus provides the primary light for the scene; it's reflected in the water and allows us to see the rest of the scene.

Assets

Deer

We downloaded a rigged deer model online¹ and then positioned the head of the deer to look like it is facing the camera. We also positioned the feet to look like it is slowly walking along the

¹ <https://www.blendswap.com/blend/15997>

shoreline of the river. The deer is colored with an emission shader to make it appear as though it is glowing. This is the only light source in our scene, and the water and fog help with the illumination.

Landscape

We created the landscape from scratch. We sculpted the ground to give it some dips and bumps and then applied a forest floor texture. The grass is actually hair with brownian forces that provide variety in the direction of the grass. The water is a plane with a mixture of glass, glossy, transparent, and diffuse BSDFs, and we also add noise and voronoi textures to give the water a slight ripple effect.

Other Objects

We created all the other objects in the scene from scratch as well.

The rocks were created from spheres and subdivided cubes, with a voronoi texture displace modifier to reshape the meshes. We added a rock texture and also added a random color ramp so that the colors of the rocks are slightly different when duplicated. We made three rocks with different geometries, including round and flat rocks.

The mushrooms were created from a cylinder and a circle. The cylinder was extruded to create the stem, and a sky texture was applied to give the stem of the mushrooms slight bumps. The head of the mushroom was created from a circle that was extruded. The bottom side of the head of the mushroom was sculpted to mimic the gills on a mushroom, while the top side of the head was slightly sculpted to make it look rugged. We then applied textures to both the stem and head, using different textures for the top and bottom of the mushroom head.

We experimented with several methods for modeling the trees. First, we tried to model low-poly trees from scratch by extruding from a hexagonal prism; for this, we manually UV unwrapped the tree by marking seams along the trunk and branches, and we created leaves using a particle system. Although we were able to create somewhat photorealistic trees with this method, it was difficult to create complex branch geometries and to place the leaves properly among the branches. We also tried drawing a tree shape with vertex placements and adding a skin modifier, with the leaves still as a particle system. However, this method made it difficult to UV unwrap the tree because converting the skin to a mesh resulted in an unclean geometry.

Finally, we learned about the sapling tree generator add-on² in Blender. This add-on provides a nice framework for creating a variety of trees, so we used the small maple preset to create the trees. We made two tree models so that our scene would have a variety of trees beyond just scaling and rotating a single model.

² https://docs.blender.org/manual/en/latest/addons/add_curve/sapling.html

Blender Cycles Requirements

For our project, we used Blender's Cycles.

- **Main Geometry from Scratch:** Aside from the deer model, all of the objects in our scene are modeled from scratch, including the water and ground.
- **UV Mapping and Texturing from Scratch:** We UV unwrapped the mushrooms ourselves. We also procedurally generated the texture for the water by adding Noise and Voronoi Texture nodes.
- **Create a Custom/Procedural Material:** Our ground, rocks, mushrooms, and trees all use non-shader, and specifically texture and vector, nodes. The rocks, mushrooms, and trees also use converter nodes (Color Ramp and Math).
- **Blender/Cycles Feature:** We use volumetric absorption (fog), depth of field, and denoising (NLM) when rendering our image.

Technical Contributions

Our primary technical contribution is a procedural texture for the water, which we achieved using noise and voronoi textures.

Contributions

We broke down the project by components:

- Deer: emission (together), placement/position (Tassica)
- Landscape (ground, grass, water): Tassica
- Mushrooms: geometry (Tassica), texture (Tatiana)
- Rocks: Tatiana
- Trees: Tatiana
- Fog: Tassica

We worked together on scene composition and tweaking other aspects of the scene and objects.

Resources / References

Resources

We used the following resources to help us construct our scene:

<https://youtu.be/jMDRc4hJwvA>

<https://blender.stackexchange.com/questions/89440/make-object-emit-light-be-reconizable>

<https://www.youtube.com/watch?v=8gNKFpf9a4A>

<https://www.youtube.com/watch?v=Oq0q8AmTnDU>

<https://www.youtube.com/watch?v=pbSzAg1r9TM>

Models

- Deer: <https://www.blendswap.com/blend/15997>

Textures

- Ground: https://texturehaven.com/tex/?c=terrain&t=dry_ground_rocks
- Rocks: <https://cc0textures.com/view?id=Rock020>
- Tree:
 - Bark: https://texturehaven.com/tex/?c=wood&t=bark_brown_01
 - Leaves: <https://cc0textures.com/view?id=Leaf001>
- Mushrooms: <https://www.filterforge.com/filters/11718.html>