

CS 148 Report

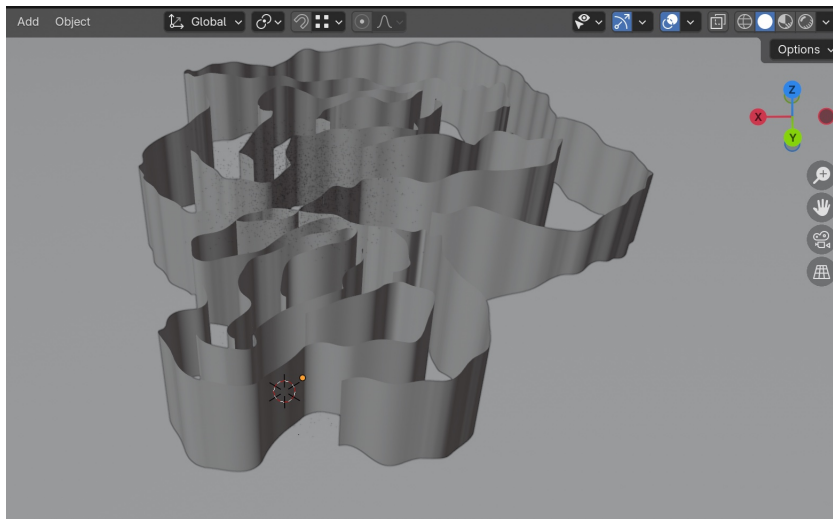
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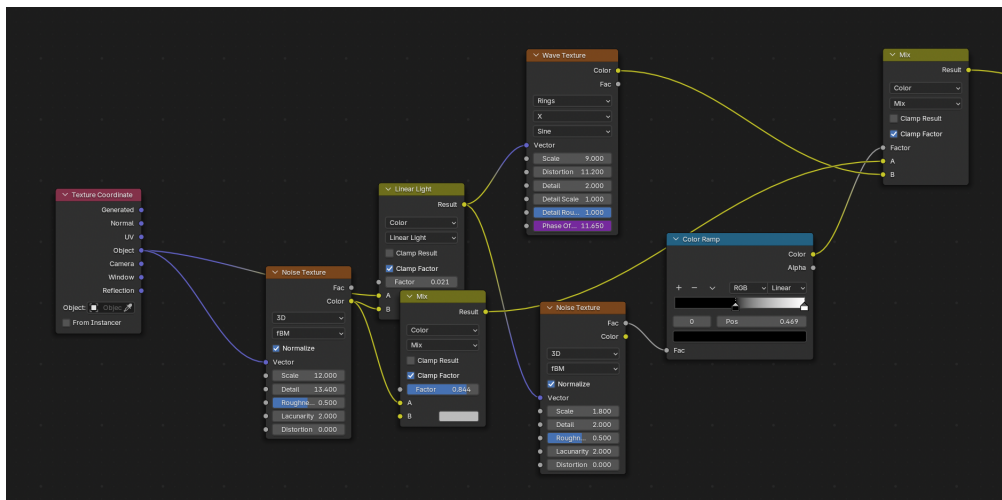
1 Project Requirements

1.1 Main Geometry from Scratch

1. All geometry in this project was created by both of us. No geometry was downloaded or imported.
2. The Winter House, including its geometry, windows, doors, roof, etc., was made from scratch. Trees were generated using Blender's built-in Sapling Tree Generator, and the ground was created using a plane and subdivision. The basic geometry of the house was extruded and created from basic Blender meshes (with the cartoonish effect using inspiration from (1)). Significant changes were made to the materials and textures of the house to achieve our own intended effect.
3. The aurora borealis effect was created using Bézier curves, spline parameters, noise textures, color ramps, and the UV node provided by Blender. Used a bit of math I learned from robotics to create beautiful splines that could then be extruded to simulate the Aurora! The process was inspired by combining several features from the different sources in (2).



- The water was simulated using a plane and wave textures (along with a little Fresnel).



- The ornament was created with UV mapping and following the video tutorial (3).

- Snow:

- Ground Snow:** This was done using Blender Real-Snow add on with some creative face selection.
- Snowfall in Air:** This was a bit more creative, using a plane and scattering its points based on their index. Then we applied a color

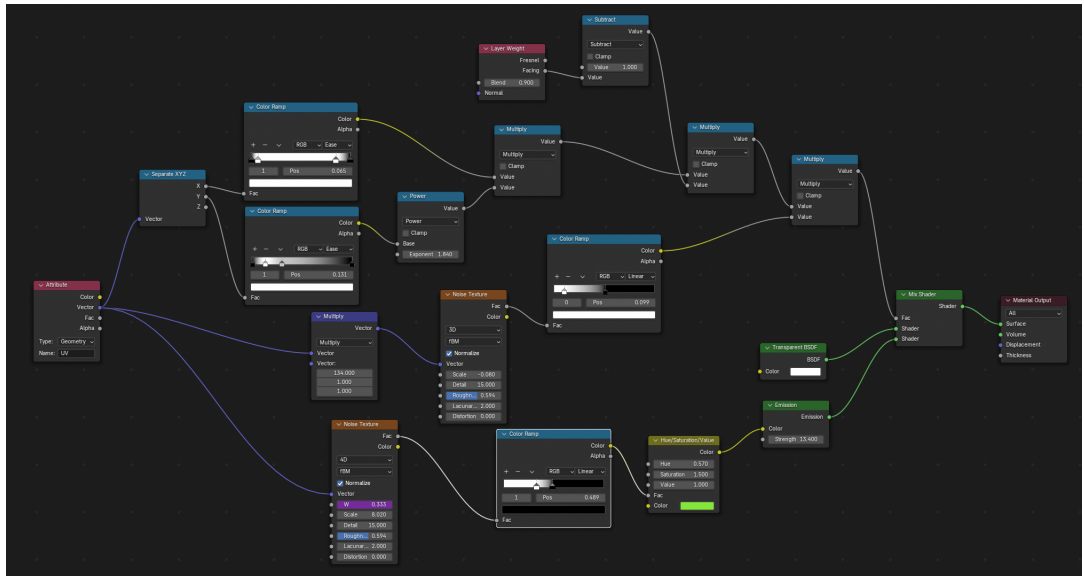
ramp and some randomized generation to create the effect of light snowfall.

1.2 UV Mapping and Texturing from Scratch

1. The `Snowflake.png` image was downloaded following a YouTube tutorial (3). The ornament was UV-unwrapped, and the snowflake was scaled to create a neat pattern of snowflakes. Shader nodes were created to blend both the snowflake image and the background metallic material of the ornament.
2. Concrete and wood PNG textures were downloaded from (4). The texture nodes were created in Blender's Shader Editor following a YouTube tutorial (5).
3. The water texture was designed using a plane and geometry nodes within Blender.
4. Snow on the ground, roof, and windows was created using Blender's snow add-on. Additionally, custom snow particles were created by fragmenting a cube using point instance scatter.
5. The transparent material for the ornament was achieved by balancing its metallic and roughness properties.

1.3 Blender/Cycles Advanced Features

- 1) **Aurora Borealis:** The aurora borealis effect was created using a combination of spline and Bézier curves to shape the light patterns. Motion blur and noise texture were both applied to the aurora to simulate the natural movement of the lights. HDRI sky mist was used to create the atmosphere around the Borealis effect, hoping to enhance the visual depth. In the below diagram, you can adjust the brightness/strength of the Aurora using emissiveness.



- 2) **Ray Tracing:** Color bleeding and using emissive materials in the aurora and windows utilized the power of ray-tracing to create a very realistic image.

1.4 Team Member Contributions

1. **Ganesh Venu:** Modeled the house geometry, including walls, windows, doors, and the roof, and applied concrete and wood textures. Created snow on the ground, roofs, and trees. Configured scene lighting, generated trees using Blender's Sapling Tree Generator, and modeled and textured ornaments with UV mapping and snowflake patterns.
2. **Josh Joseph:** Designed and textured the background geometry, including the aurora borealis using Bézier curves, noise textures, and HDRI sky mist. Created realistic water using a plane with wave and noise textures, along with a color ramp. Modeled and textured ornaments, and developed custom snow generation techniques (e.g. procedural generation via point scattering) to supplement ground snow provided through Blender's addons.

1.5 Sources

1. **Create Snowy Winter House in Blender:** <https://www.youtube.com/watch?v=jYXZYKRDj4g>
2. **Create Aurora Borealis in Blender:** <https://www.youtube.com/watch?v=iwYfrEP4JvE>
<https://www.youtube.com/watch?v=iwYfrEP4JvE&t=10s>
<https://www.youtube.com/watch?v=h8sATuqChsU>

3. **Blender Tutorial - UV Powered Christmas Ornaments:**

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

4. **Quixel Megascans:** <https://quixel.com/megascans/home?search=facadesearch=wood>

5. **Textures for Concrete and Wood:** https://www.youtube.com/watch?v=FSFL_7PC_Qs

1.6 Assets Downloaded

1. snowflake image (3)
2. HDRI skyMist image (2)
3. Concrete and Wood texture pngs (4)