Muppets Crossing the Delaware

CS 148: Introduction to Computer Graphics, Fall 2021 - Final Project Report

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Final Image (4096 × 2160, 8192 spp)

Project Proposal

We propose to create an image motivated by the painting *Washington Crossing the Delaware*, but with Muppets instead of the historical figures. We aim to lighten the serious mood of the painting with familiar childhood characters. There will be Kermit as Washington, plus four other crew members from the Muppets and Sesame Street ensemble, such as Bert and Ernie, Animal or the Count. They will be wearing their regular attire, but the surrounding scene will emulate the meteorological ferocity of the source material.

References

Variant A (1920 x 1080, 256 spp, denoised) - Different Angle

Variant B (1920 x 1080, 256 spp, denoised) - Gray Diffuse BSDF

Cloud volume was removed

What Each Person Did

Vinita
- Modeled and textured Kermit
- Modeled boat, imported textures

Samuel
- Modeled, textured, rigged, posed Ernie and Bert
- Textured, rigged, and posed remaining Muppets
- Ran cloth simulation for flag
- Created background elements
- Arranged scene objects
- Set up lighting for scene

Assets

Object	Model	Texture	Rig	Pose
Ernie	S	S	S	S
Bert	S	S	S	S
Cookie Monster	I	S		
Count von Count	I	S	I	S
Animal	I	S	S	S
Kermit	V	V	S	S
Big Bird	I	I	I	S
Boat & Oars	V	I		
Flag	S	S		
Ice	S	S		
Water	S	S		
Distant Mountains	S	S		
Clouds / Fog / Sky		S		

Key: S - Samuel, V - Vinita, I - Imported

Animal model: https://blendswap.com/blend/11240

Cookie Monster model: https://www.thingiverse.com/thing:4785781

Count von Count model: https://www.blendswap.com/blend/10866

Big Bird model: https://www.blendswap.com/blend/10761

Fabric texture maps:
https://store.chocofur.com/free-fabric-shaders/blender_model/blender-3d-cycles-shaders-materials-free-fabrics-textiles

Betsy Ross flag texture: https://en.wikipedia.org/wiki/Betsy_Ross_flag#/media/File:Betsy_Ross_flag.svg

Project Requirements

- **Main Geometry from scratch**
  - 7 created: Kermit, Bert, Ernie, Water, Ice, Boat, Flag
  - 4 imported: Animal, Count von Count, Cookie Monster, Big Bird
- **UV mapping and Texturing from scratch**
  - Bert and Ernie's sweaters have striped textures. I had to UV project portions of the sweater from front, top, and side view onto the texture to keep the lines straight. The sweater pattern was created in Photoshop using reference images and a knit texture. Also, it can't be seen from the camera angle, but Ernie is wearing jeans which I UV unwrapped to have fabric seams in the texture.
  - The flag was UV unwrapped to have a colonial print. It was later deformed by cloth physics.
- **Create a custom/procedural material**
  - Ice - variable roughness based on viewing angle, Voronoi noise displacement
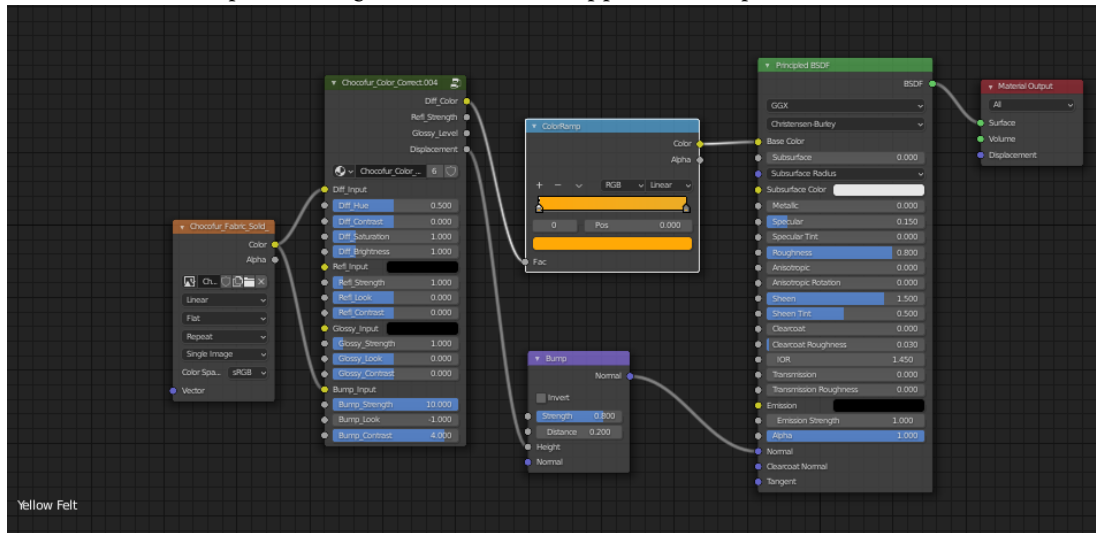

Ice (Warped)
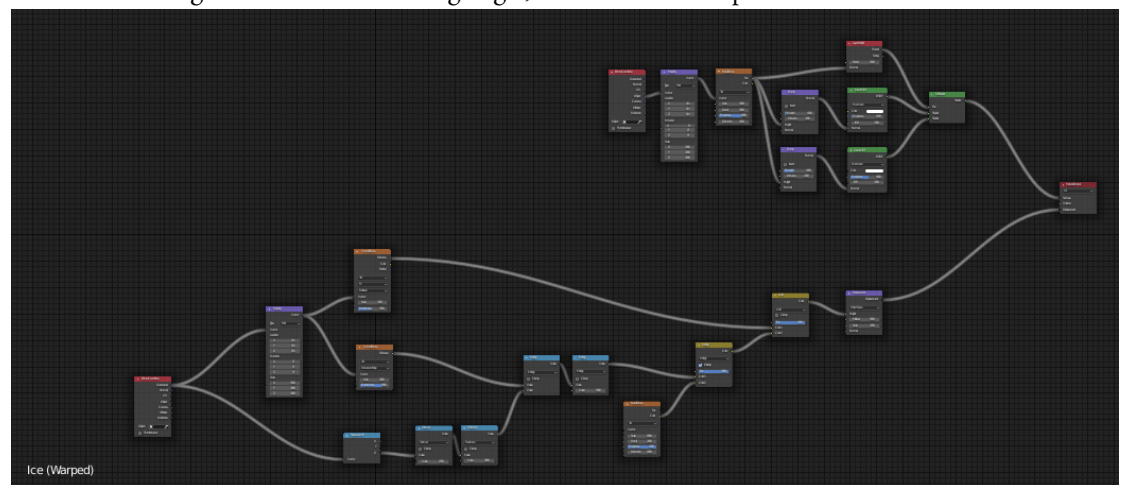
- Water - image texture for roughness, mixed glass and translucent BSDFs according to fresnel factor
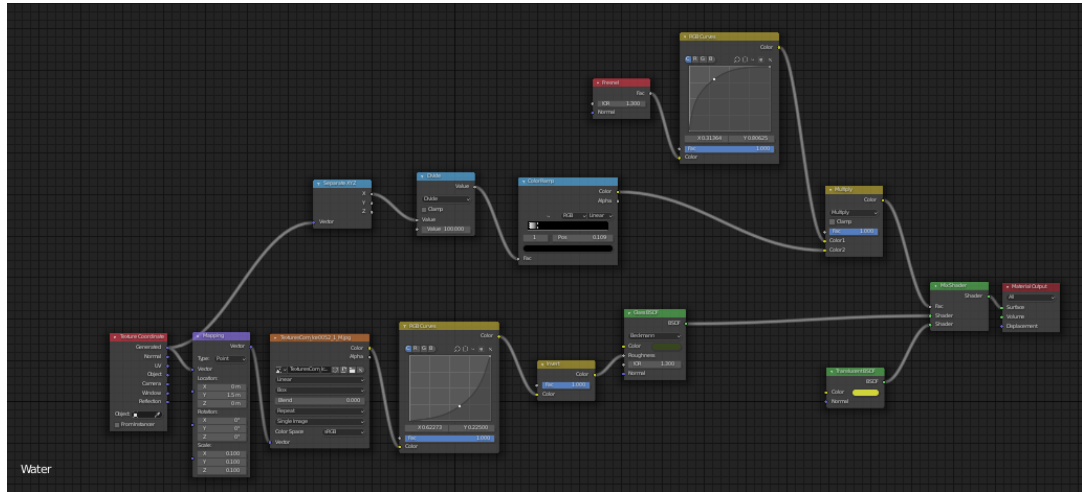
- Clouds (volume) - density controlled by position - a weak inner noise and an arched, strong outer noise; also controls volume color
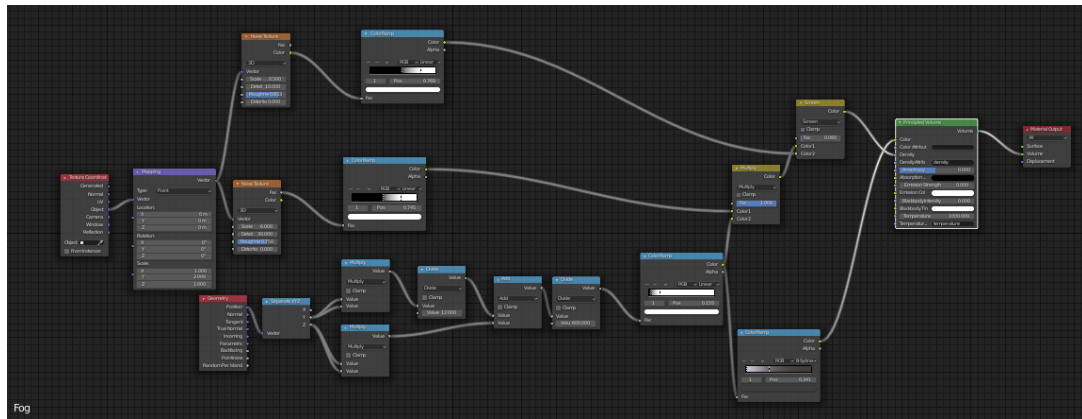
- Felt - color and bump from image texture, then remapped to multiple colors

- **Blender/Cycles feature**
  - Denoising - compositing node
  - Volumetrics - clouds/fog with custom density map generated from position and noise
  - Post processing - color correction and compositing background sky image

Referenced tutorials

Ice shader: https://www.youtube.com/watch?v=-wVG7a8vQPI

Vornoi displacement: https://www.youtube.com/watch?v=d-zpR1E84nQ

Character rigging:
https://www.youtube.com/watch?v=f2pTkW-1JkE&list=PLa1F2ddGya_-UvuAqHAksYnB0qL9yWDO6&index=35

Weight painting: https://www.youtube.com/watch?v=4fICQmBEt4Y

Ripple effect in water: https://www.youtube.com/watch?v=0RFZO6v8ZUA

Technical contributions

N/A (Cycles)