CS148 Final Project Report

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1. Introduction

For our CS148 final project, we created a stylized sunset scene of a sailor standing at the front of a wooden boat drifting across the ocean. The image draws inspiration from an anime-style adventurer character Monkey D. Luffy, but the primary goal of the project was to demonstrate realistic lighting, reflections, soft shadows, and material interaction through Blender Cycles.

All of the important geometry in the scene was modeled from scratch. We also performed UV unwrapping and texture creation on objects. Our workflow followed the expectations outlined in the Final Project Requirements and the final project discussion slides, emphasizing physically realistic lighting, shading, and material behavior.

2. Meeting the Project Requirements

2.1 Main Geometry Created From Scratch

The main focus of our scene is the sailor character on the boat, and both were created by us.

For the character, we followed the general modeling workflow demonstrated in a simple YouTube tutorial for creating a Luffy-style figure. The tutorial did not provide any models; instead, it showed techniques for shaping simple anime-style proportions. Using only the workflow concepts, we built our own original character using primitives, extrusion, loop cuts, proportional editing, and sculpt smoothing. We shaped the torso, arms, legs, head, and hair manually to achieve our own stylized look.

The hat and clothing were also modeled from scratch. The hat was built from a cylinder and torus and shaped by hand. The shirt and shorts began as blocky meshes that we refined through sculpting and smoothing.

For the boat, we referenced a beginner "how to model a simple boat in Blender" tutorial. Similar to the character tutorial, it did not provide any assets, only the general process of building a curved hull. Using that guidance, we created our own boat model from scratch. We shaped the hull using extrusion and beveling, then added thickness with the Solidify modifier. We manually adjusted the curvature of the planks and interior seating so the final model would not be identical to the tutorial and would fit our scene.

Since both the character and boat were made entirely by us, and together form more than half of the scene's geometry, we fully met the requirement that the main geometry must be original.

2.2 UV Mapping and Texturing From Scratch

We UV unwrapped and textured some of our custom objects. The sailor's shirt was fully UV unwrapped by marking seams around the sleeves and sides, then flattened cleanly. We hand-painted the shirt's base color and added roughness variation to create a more fabric-like appearance. The hat was also UV unwrapped into a simple layout and textured with hand-painted shading and color variation. For the boat, we used a procedural wood shader but created an additional hand-painted mask texture to introduce darker strips and worn areas. This prevented the boat from looking overly uniform and gave it more realism under ray-traced lighting. By unwrapping and texturing some objects, we exceeded the minimum requirement of UV mapping and texturing at least one object from scratch.

2.3 Leveraging Ray Tracing for Realistic Lighting and Materials

We designed the scene specifically to highlight the strengths of ray tracing, following the expectations described in the CS148 slides. We used an HDRI to create physically realistic sunset lighting. This provided natural global illumination and correct color bleeding where the orange light interacts with the wood and character. To avoid flat lighting, we added a secondary warm area light that acts as a subtle rim light, a technique encouraged in the project guidelines.

The ocean uses a physically based water shader with a realistic index of refraction and transparent depth blending. Ray tracing allows the water to refract the sunset light while reflecting the sky and darkening in deeper regions due to volumetric absorption. These effects are only possible with ray tracing and help distinguish the final image from a scanline-style render.

Shading on the character and clothing also benefits from physically based lighting. Shadows are soft rather than harsh, and the materials correctly interact with the environment. Overall, the lighting and materials demonstrate reflections, soft shadows, global illumination, color bleeding, and light transmission, satisfying the ray tracing requirement.

2.4 Use of an Advanced Cycles Feature

Depth of Field was applied through the camera so that the character is in sharp focus while the ocean horizon gradually blurs. This increases realism and improves the composition of the image and allows us to satisfy the requirement to use at least one advanced Cycles feature.

3. Division of Work

Kennaissa Nabi:
Character modeling, sculpting, UV unwrapping, texture creation, boat modeling, lighting setup, water shader, HDRI environment, and final rendering.

Nicholas Donaldson:
Camera framing, Depth of Field tuning, lighting adjustments, environment placement, scene cleanup, and render polish.

4. Assets Downloaded vs. Created

Everything central to the project, as in the character, hat, clothes, and boat, was created from scratch. The only external resources used were:
• A CC0 HDRI sky from PolyHaven
• An optional normal map to add small surface detail to the water

5. Tutorials and References Used

We referenced two simple modeling tutorials only for workflow ideas. No models or assets were provided or imported.

1. Simple Luffy-style character tutorial
   https://www.youtube.com/watch?v=1sLq5OFPNwU

   Used only to understand steps such as shaping anime-style proportions, forming limbs from primitives, and applying basic materials.

2. Simple boat modeling tutorial
   https://youtu.be/rVWF9ZMqq4U

   Used only to understand how to block out a simple boat hull, adjust curvature, and structure the model. We created our own boat instead of replicating the tutorial mesh.

These tutorials served as references for modeling techniques, not sources of geometry. We also consulted the CS148 Final Project Requirements PDF and the Final Project Discussion Slides

throughout the process to ensure our scene met expectations for ray tracing, shading, lighting, and geometry requirements.

6. Conclusion

Our final project meets all requirements for the CS148 final assignment. We created the main geometry entirely from scratch, UV unwrapped and textured multiple objects, demonstrated realistic ray-traced lighting and reflections, and used advanced Cycles features such as Depth of Field. The result is a scene that blends stylized character design with physically accurate lighting and ocean rendering.

7. Citations
 YouTube Tutorial: Simple Luffy Modeling Workflow –
https://www.youtube.com/watch?v=1sLq5OFPNwU
 YouTube Tutorial: Simple Boat Modeling Workflow – https://youtu.be/rVWF9ZMqq4U
 HDRI Source: PolyHaven (CC0 License)