A Secluded Forest Shrine

CS 148 Final Project Writeup

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1. Project Overview

Our project recreates a secluded forest shrine scene inspired by a torii gate and a long stone stairway leading upward through a cedar forest to a shrine building, based on our original proposal. The final composition centers on a strongly backlit staircase with volumetric light shafts cutting through the trees (a Tyndall / god-ray effect), preserving the quiet, slightly mysterious mood described in our proposal. Compared with the initial proposal, the terrain evolved to include a real elevation drop of approximately 12 m from the torii to the base of the stairs, with the terrain rotated 20.862 degrees on the X-axis to physically match the staircase geometry. Lighting also shifted toward a strong single directional backlight supplemented with targeted fill lights rather than more even illumination.

2. Requirement Checklist

Requirement	How We Met It
UV Mapping	Jiahang performed UV unwrapping on the stone staircase and stone torii gate using Blender's Smart UV Project tool. The resulting UV layouts were used to prepare the corresponding surface textures.
Texture from Scratch	Jiahang created the aged copper roof and wood materials for the shrine from scratch using Blender shader nodes, without downloaded image textures.
Advanced Feature (Volumetrics)	A dedicated volumetric fog mesh (density 0.004) combined with a Sun Light (Strength 120) produces the visible Tyndall / god-ray effect. The volume was shaped as a thin, elongated rectangular region rather than filling the whole scene, so it intersects only the light path the camera actually sees.
At least 50% of geometry modeled from scratch	The large majority of visible foreground geometry - terrain, tree trunks, rocks, the plaque, shimenawa rope, torii, staircase, shrine building, and stone lantern - was modeled by the two of us. Downloaded or AI-generated assets were used mainly for supporting foliage, ground textures, and midground/background depth filler; see Section 4 for the detailed breakdown.
Cycles rendering, no compositing	The entire scene was rendered in Cycles. No Compositor nodes or external photo-editing software were used to alter lighting, shadows, or the volumetric effect after rendering.
Variant A / Variant B	Variant A is a fully textured render from an alternate camera angle. Variant B is an untextured geometry render made with a neutral clay material override, allowing the modeled geometry to be inspected without texture support.

3. Division of Labor

Sze Wang Hong - Terrain, Vegetation, Ground Detail, Plaque

- Terrain modeling: 35 x 80.2 m base plane, sculpted and rotated 20.862 degrees on the X-axis to form the staircase slope; local mound sculpting around lantern bases.
- Appended additional Poly Haven tree species to supplement the four self-made trunks and better match the reference photo.
- Rock modeling: four variants using Ico Sphere / Cube bases with Noise Displace for weathered surfaces.
- Ground material: procedural Noise + Color Ramp mixing of downloaded moss and mud diffuse textures.
- Vegetation scattering with a Particle System using downloaded grass assets for ground cover.
- Shimenawa (sacred rope) on the torii: three circles joined and shaped with Simple Deform Twist/Bend.
- Plaque geometry: frame modeled by tracing a reference image; "熊野宮" lettering built as a Text object using a Google Fonts calligraphy font, extruded and converted to mesh.
- Plaque frame and lettering shader node setup.
- Leaf-clump foliage on self-made trees was downloaded from Poly Haven rather than hand-modeled; a planned second shrub prototype was not used in the final scene.

Xu Jiahang - Architecture, Lighting, Camera, Scene Integration, Background

- Stone staircase (~60 steps, ~9 m x 6 m): rectangular meshes scaled and arranged sequentially; UV unwrapped with Smart UV Project.
- Four self-modeled tree trunk prototypes using cylinders with displaced bark texture, plus branch curves built with Bezier curves, bevel, and tapered radius.
- Stone torii gate: cylindrical/elongated meshes; upward beam curvature created with Loop Cut and Proportional Editing; UV unwrapped with Smart UV Project.
- Shrine building: four columns, rear wall, and curved roof shaped with Proportional Editing and mirrored on the X and Y axes for symmetry; hand-built aged copper roof and wood shader materials.
- Stone lantern (one prototype): stacked/scaled rectangular meshes; hollow chamber created with Inset Faces + Extrude; roof built from a mirrored quarter section.
- Lighting: Sun Light (Strength 120, Rotation X -0.8 degrees, Y -40 degrees, Z -40 degrees) for strong backlighting; two supplementary Spot Lights to restore readability on the torii and plaque.
- Volumetric fog: thin elongated volumetric cube with density 0.004, shaped to intersect only the visible light path and produce god rays without excess haze.
- Midground and background depth: AI-generated transparent PNGs of individual trees and forest clusters placed on image planes in the midground, plus a denser forest PNG for the distant background.
- **Camera composition: 45.92 mm focal length for the main render**, positioned near the base of the stairs and offset slightly left for a layered, non-symmetrical composition.
- Final scene assembly: appended Sze Wang Hong's assets from a separate .blend file into master_scene.blend.

4. Assets: Self-Made vs. Downloaded / AI-Generated

4.1 Self-Made

Asset	Made By	Source / Method
Terrain (35 x 80.2 m base, X-rotation 20.862° slope)	Sze Wang Hong	Sculpted mesh, proportional editing, local mound sculpting at lantern bases
Tree branches	Sze Wang Hong	Bezier curves, Bevel + tapered radius control
Rocks (4 variants)	Sze Wang Hong	Ico Sphere/Cube base + Displace (Noise) for weathered surface
Ground material node setup	Sze Wang Hong	Layered Noise Textures + Color Ramp mixing downloaded moss/mud diffuse maps
Shimenawa (sacred rope) on torii	Sze Wang Hong	3 circles arranged in a triangle, joined, Simple Deform (Twist/Bend), per-segment radius adjustment
Plaque geometry (frame + relief lettering)	Sze Wang Hong	Reference-image tracing for the carved frame; Text object (Zhi Mang Xing, "熊野宮") extruded and converted to mesh
Plaque frame & lettering shader	Sze Wang Hong	Hand-built shader node graph applied to the frame and text geometry
4 tree trunk prototypes	Xu Jiahang	Cylinder + Displace (Marble texture) for bark ridging
Stone torii gate	Xu Jiahang	Cylinders/elongated meshes; upward curvature via Loop Cut + Proportional Editing
Stone staircase (~60 steps, ~9 m x 6 m)	Xu Jiahang	Rectangular meshes, scaled and arranged sequentially
Shrine building (columns, rear wall, roof)	Xu Jiahang	Roof curvature via Proportional Editing; Mirror modifier (X and Y) for symmetry
Stone lantern (1 prototype)	Xu Jiahang	Stacked/scaled rectangular meshes; hollow chamber via Inset + Extrude; mirrored roof quarter
Shrine roof (aged copper) & wood materials	Xu Jiahang	Hand-built Blender shader node graphs (no image textures)
Sun Light, Spot Lights, volumetric fog setup	Xu Jiahang	Sun Strength 120 (Rot X -0.8°, Y -40°, Z -40°); thin volumetric cube (density 0.004); 2 fill Spot Lights on torii and plaque
Camera composition & scene assembly	Xu Jiahang	45.92 mm main camera, offset-left framing; appended Sze Wang Hong's assets into master_scene.blend

4.2 Downloaded or AI-Generated with Our Commands

The following assets were not modeled or painted from scratch and are disclosed here with their source:

Asset	Source / Method
Two additional tree species	Poly Haven - https://polyhaven.com/a/tree_small_02 ; https://polyhaven.com/a/fir_sapling_medium
Grass ground cover (Particle System scatter)	Poly Haven - https://polyhaven.com/a/celandine_01 ; https://polyhaven.com/a/grass_bermuda_01
Mud diffuse texture (ground material)	Poly Haven - https://polyhaven.com/a/brown_mud_leaves_01
Moss texture (ground material)	Vecteezy (free license) - https://www.vecteezy.com/png/46908977-moss-image-on-transparent-background
Oak bark PBR material (tree trunk texture pass)	Poly Haven - https://polyhaven.com/a/jolcham_oak_bark_01
Stone lantern concrete/stone texture	Poly Haven - https://polyhaven.com/a/concrete_floor_02
Staircase & torii surface textures	AI-generated with ChatGPT to match the desired stone appearance for the mapped UVs; not downloaded stock textures
Plaque surface texture (weathered wood/frame look)	AI-generated with ChatGPT based on a photographic reference of the original plaque
Calligraphy font for plaque lettering	Zhi Mang Xing, Google Fonts (free-use license)
Midground tree PNGs (2 images, 2-3 trees)	AI-generated with ChatGPT; transparent PNGs placed on image planes through the midground to add density without additional high-poly models
Distant background forest PNG (1 image)	AI-generated with ChatGPT; a denser forest backdrop used in the far background

5. Tutorials / References

Xu Jiahang: No specific YouTube tutorial or written Blender tutorial was followed step-by-step. Most technical questions on modeling, shading, UV mapping, volumetric lighting, and scene construction were resolved with the assistance of ChatGPT, used both for technical troubleshooting/workflow guidance and for generating several image assets. This included surface textures for the staircase, torii, and plaque, as well as environmental PNG assets for the midground and background. The midground PNGs were placed on transparent image planes, while the larger forest image was used as a distant backdrop.

Sze Wang Hong: The plaque frame was built by tracing a reference image of an existing shrine plaque rather than following a modeling tutorial for it. Blender operations, shader-node setup, Geometry Nodes/Particle System troubleshooting, and curve/rope construction were supported by iterative AI-assisted troubleshooting with Claude. Additional video tutorials were consulted for Geometry Nodes, shimenawa construction, name-tag modeling, and wet-forest environment creation:

https://www.youtube.com/watch?v=iNU-1ORXw74

https://www.youtube.com/watch?v=_nQjYONwSgk&t=147s

https://www.youtube.com/watch?v=hnO9m1bDkSs

https://www.youtube.com/watch?v=l8LkOMU8OMg&t=732s

https://www.youtube.com/watch?v=N2OuCUmEcwU&t=900s

https://www.youtube.com/watch?v=Vpe-YOLRKbI

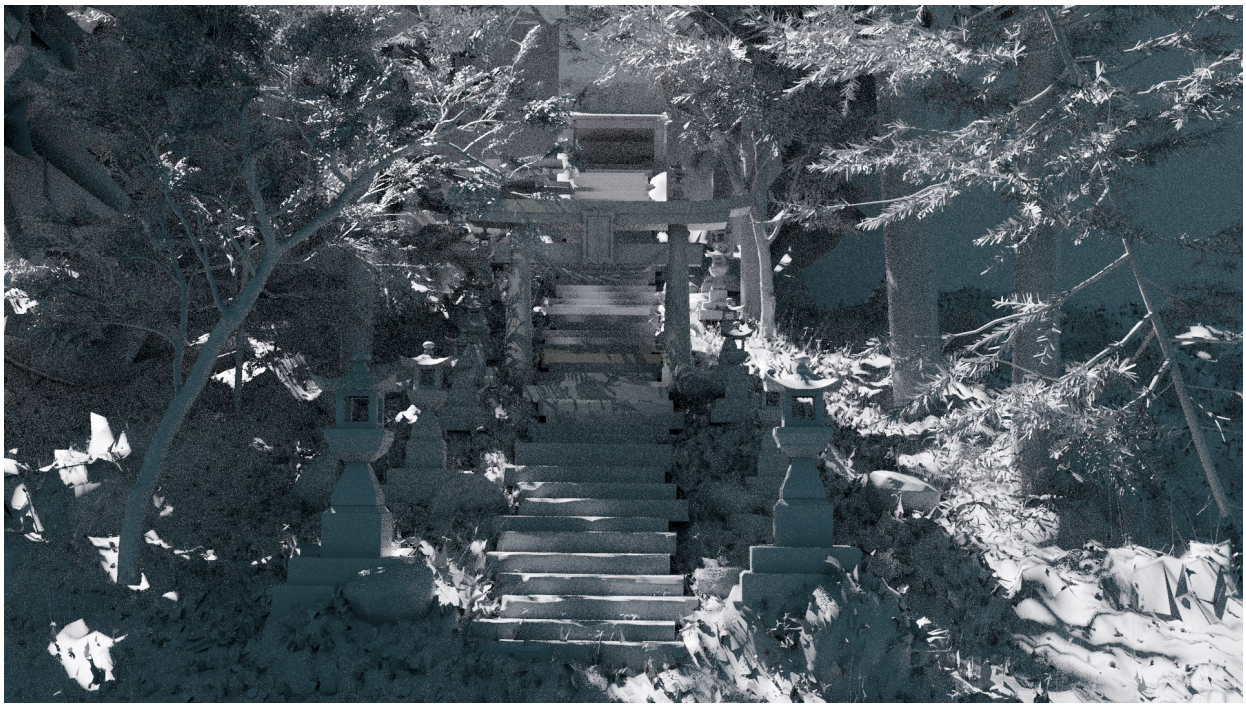
6. Final Render

Final Cycles render - 45.92 mm main camera with full materials, dappled sunlight, backlighting, and volumetric lighting.

7. Variant A - Alternate Camera Angle

Variant A - fully textured Cycles render from the original main camera angle.

8. Variant B - Untextured Geometry Render



Variant B - geometry render with surface textures replaced by a neutral clay material override.

9. Challenges & Reflections

- The most time-consuming challenge was balancing tree placement, occlusion, and lighting. We repeatedly adjusted branches and canopies so that the torii and staircase remained readable while receiving irregular, dappled patches of sunlight rather than flat or uniform illumination.
- This tree placement also had to be tuned together with the volumetric effect. The god rays needed enough unobstructed light paths to remain visible, but too much direct light or too much fog would wash out the scene. Achieving a convincing balance between dappled sunlight on the architecture, tree occlusion, and the Tyndall effect required many iterations.
- Creating convincing trees from scratch proved difficult, especially for leaves and fine branches. Plane-based leaf approaches often looked artificial, while fully hand-modeling leaves and grass was too time-consuming for the project scope.
- Finding suitable materials and a sufficiently dense forest background was also challenging. AI-generated midground and background PNGs allowed us to focus modeling time on foreground geometry while still achieving a layered forest silhouette.
- Getting scattered vegetation to sit flush against the sloped, sculpted terrain rather than floating or clipping required switching from an initial Geometry Nodes approach to a Particle System with normal-aligned rotation, which was more predictable to control.
- Balancing a strong single backlight (Sun Strength 120) against foreground readability required targeted Spot Lights on the torii and plaque rather than increasing the Sun strength further, which would have overexposed the volumetric fog.
- Shaping the volumetric fog as a thin, elongated volume rather than a scene-wide cube helped keep the god-ray effect visible without washing out contrast elsewhere in the frame.