

PART B: FINAL PROJECT OUTLINE

Part 1: Caustics

Caustics, like many aspects of rendering, require finesse. If done poorly, they stand out boldly and displeasingly. If not done at all, their absence is felt. But, if done perfectly, they fall into harmony with the rest of the scene – perhaps not distinctly noticed at all.

Caustics are the shifting patterns of light underneath liquid. They are caused by light bending as it collides with the irregular surface of wavy fluid. Calm surfaces with small waves create highly visible caustics. There are a few ways I might tackle this in Unity.

Beginning with the simplest method, there is the possibility of a caustics texture. A well-defined scrolling noise texture that resembles the wave pattern of caustics could be applied to surfaces predetermined to be underwater. This, however, is not very versatile, and requires strong specification programming.

A more dynamic approach on the other hand requires more complicated computation. If the fluid surface is generated by noise texture, the same texture could be passed into the caustic shader. Peaks in the fluid surface's texture would correspond to light convergence in the caustic shader, and then be used to create the caustics projection. The added complexity diverges after this step. The concern now is projection: How is a surface determined to be underwater, and how do caustics map to separate objects that are all underwater? In real life, the wall of a pool has noticeably less caustic activity than the flat bottom, as it is not parallel with the refracting surface of the water. To solve this, light normal can be passed through to objects, where relative intersections with the water surface are computed. Surface regions lying underwater will have caustic activity, others will not. Relative perpendicularity to the surface will then affect how the caustics behave further.

Part 2: Team members

I was pretty sick the end of last week, and was unable to attend class. I have not yet organized a team, but I will likely have one by the end of class Tuesday!