

Eric Knapik Demo Reel found at <https://github.com/EKnapik/DemoReel>

First Clip:

GLSL ray tracer created using the online program shadertoy. Created the entire shader from concept to implementation. Learning from online articles about how ray tracers work, a majority written by Inigo Quilez. I created the projection matrix for transformation of pixel position into a ray direction that is shot into the virtual world. Using distance functions and ray marching to walk along the ray into the scene determining which geometric object is hit. All objects in the scene are transformed geometric distant functions.

The water effect is achieved using a sinusoidal wave function displaced along a plane primitive. Then using domain warping and fractal brownian motion the water was displaced to achieve the final result. Parametric trochoidal waves could achieve a better result but require more processing time. Using the height of the water the color is given a slight white appearance to achieve the final result.

The moon is textured using fractal brownian motion and a different texture that specifically has round rocks to give the crater effect.

A bidirectional reflectance distribution function is used to compute the amount of light each object receives. The scene uses two spotlights for illumination; one on the moon then the other facing the scene to resemble moonlight.

The overall scene uses exponential distance fog done after all coloring is completed then is mixed in using the internal GLSL mix function which is linear interpolation. Using the same idea of fog I created a ghost cone object that is ray marched to check for intersection as it rotates about the y-axis. If a ray intersects the ghost cone the distance is mixed with the current scene color and a yellow fog color to achieve the lighthouse spotlight effect.

First Picture:

Traditional black and white photography taken outside of Cleveland's Museum of Contemporary Art. No additional post processing was done to the image besides the enlarger and printing process.

Second Picture:

Traditional black and white photography with slight contrast adjustment done in the printing process.

Final Picture:

Digital photography with gamma correction in Photoshop.