

CS500 Project 5

Synopsis

Enhance your path-tracer with **at least two new features**. A list of suggestions is provided below, but you are invited to invent your own ideas. Since the various features cover a range from **several-lines-of-code** to **beyond-the-scope-of-a-single-semester-course**, please let me know by email what you intend to implement, and we'll negotiate from there.

Gallery

Include several of your best images to be showcased in a class specific on-line gallery. Provide a small description of each image to be used as a caption in the on-line gallery.

List of suggested features to implement

(**Green** indicates my favorite features, providing the highest value for fewest lines of code. **Red** indicates the easiest features to implement.)

- Textures
 - **2D Images**
 - Procedural textures, 2D or 3D
 - Perlin noise procedural textures, 2D or 3D
- Lights
 - Arbitrarily shaped lights instead of just spherical
 - **Image Based Lighting**, sampled proportional to texel brightness
- Camera
 - Stereo view camera
 - Panoramic view camera
 - Omni-view camera
 - Movie camera
- Path tracing enhancements
 - **Depth of field**
 - **Motion blur**
- BRDF enhancements
 - Anisotropic brdfs
 - One of the other BRDFs from *Microfacet Models for Refraction through Rough Surfaces*
 - Layered BRDFs
- **Ray marching distance estimate fields**
 - **Transformations of any model (rotates, scales, translates, others...)**
 - **CSG the **extremely** easy way**
 - Blobs, twists, tapers, super-quadrics, ...
 - Hyper textures
 - Fractals
- Modeling
 - Add a torus
 - Transformations applied to arbitrary models
 - Various mathematical and geometric objects (platonic solids ...)
- Variance measurement and reduction
 - Calculate/display variance, predict time to completion.
 - Concentrate paths on pixels with highest variance.
- Bump/Normal maps
- Participating medium
 - Air, fog, haze
 - Sub-surface scattering