The goal of this project is to lay the foundation for ubiquitous image-based appearance capture systems. By developing tools that exploit common visual phenomena, we hope to build image-based appearance capture systems that are simultaneously accurate and practical.

Sponsored by US National Science Foundation under Career Award IIS-0546408

Light-weight Appearance Capture

An appearance model of an object (or scene) is a representation that allows it to be virtually rotated, relit and seamlessly composited with other imagery. For opaque and non-refracting surfaces, such a model typically comprises the three-dimensional shape of the object along with a reflectance function defined on that shape.

Appearance capture is the process of creating an appearance model. Traditionally, accurate appearance capture requires rather specialized equipment: laser scanners, projectors for structured-lighting, and/or complex imaging systems that capture hundreds or thousands of images per object.

What if appearance capture required only web-cams and LED light-sources? What if it could be readily accomplished by the average PC user? This might fundamentally change the way in which we exchange and display visual information, and finally move us beyond fixed, two-dimensional imagery.

The goal of this project is to lay the foundation for ubiquitous image-based appearance capture systems. Our approach is based on a simple observation: although the world contains a wide variety of materials, there are common reflectance properties (isotropy, reciprocity, spatial coherence, etc.) that are exhibited by broad classes of these materials. By developing tools that exploit these properties, we hope to build image-based appearance capture systems that are simultaneously accurate and practical.