

3D Computer Graphics for People in a Hurry

Rendering

Professor Eric Shaffer

Rendering

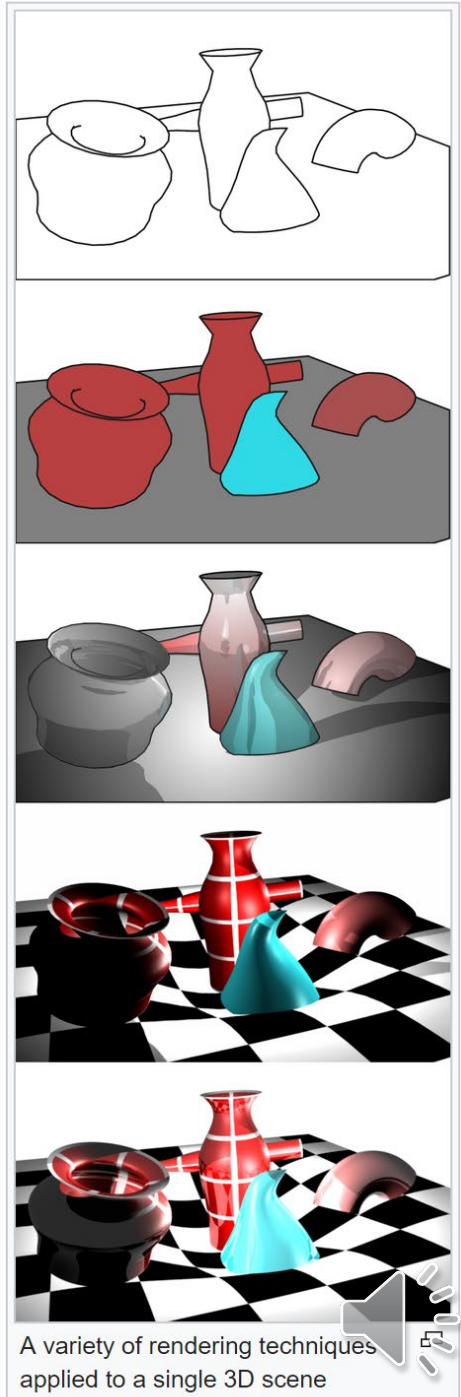
Rendering or **image synthesis** is the automatic process of generating a photorealistic or non-photorealistic image from a 2D or 3D model (or models in what collectively could be called a scene file) by means of computer programs.

Wikipedia

What is the same about each image at the right?

What is different?

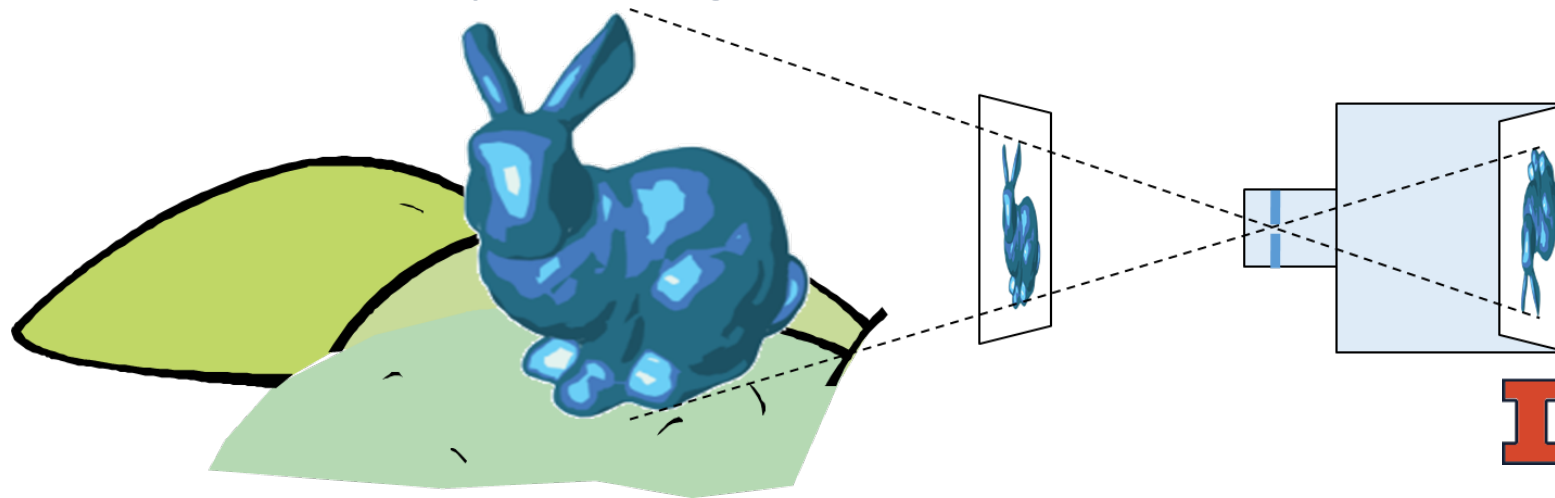
What technology enables this change in modern real-time graphics?



A variety of rendering techniques applied to a single 3D scene

3D Graphics: Image Formation

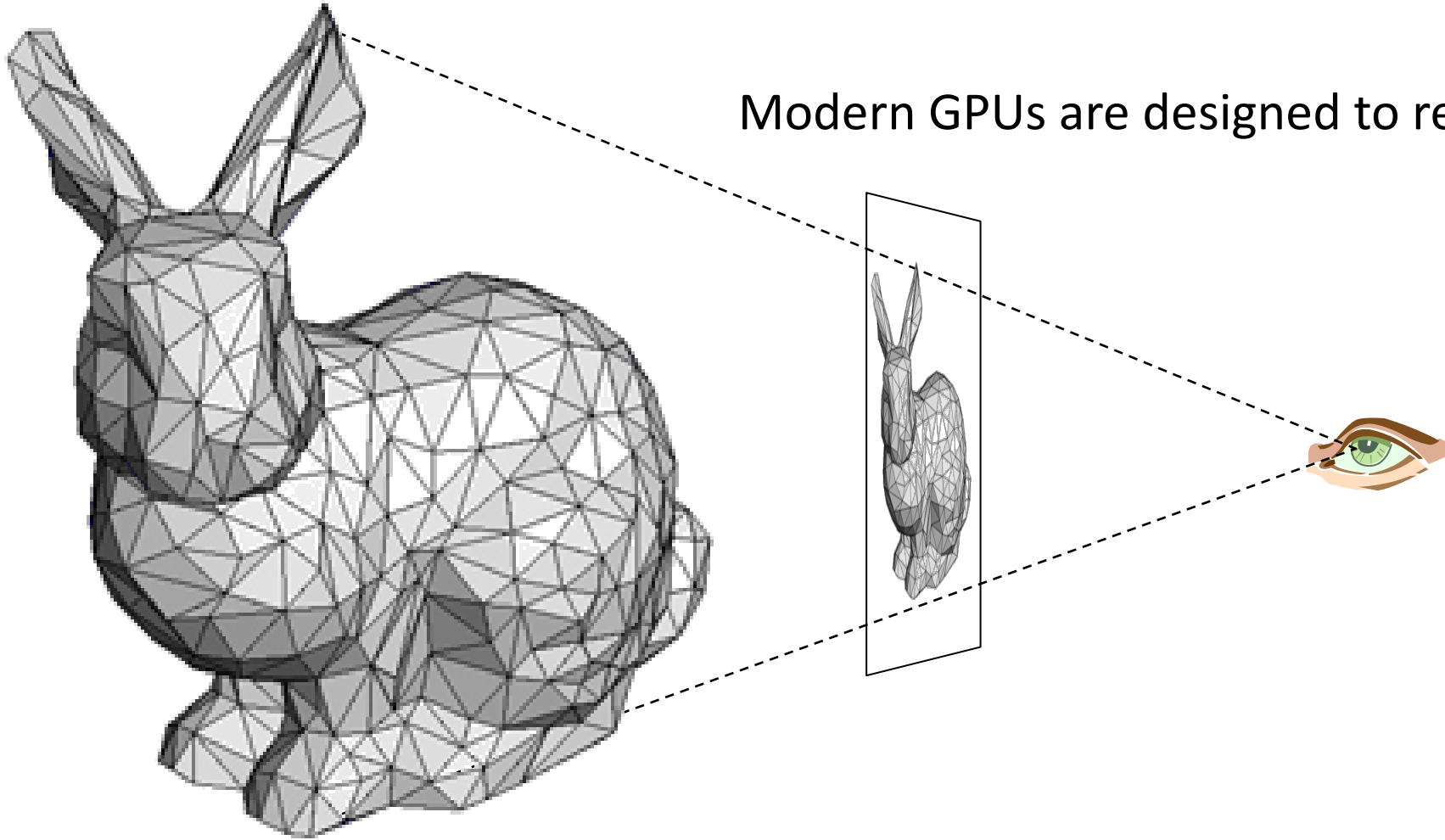
- Goal in CG (usually) is to generate a 2D image of a 3D scene...
 - The input data is a scene description
 - Output is an image
- To achieve this we computationally mimic a camera or human eye
- In the scene...there are objects...lights...and a viewer



Polygonal Models

Surfaces are most often modeled using triangles

Modern GPUs are designed to render triangles



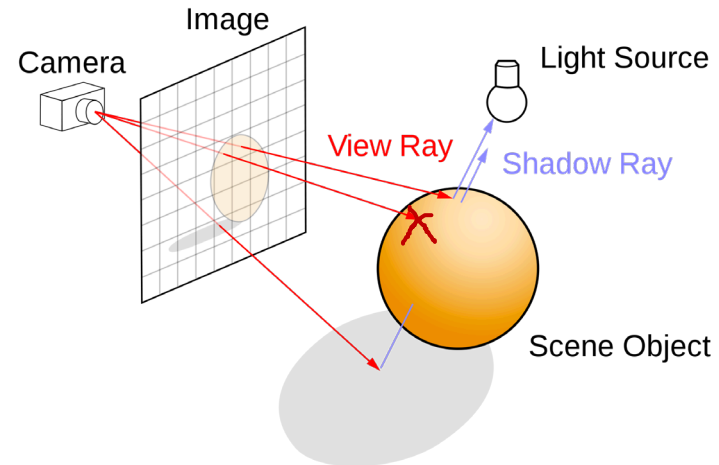
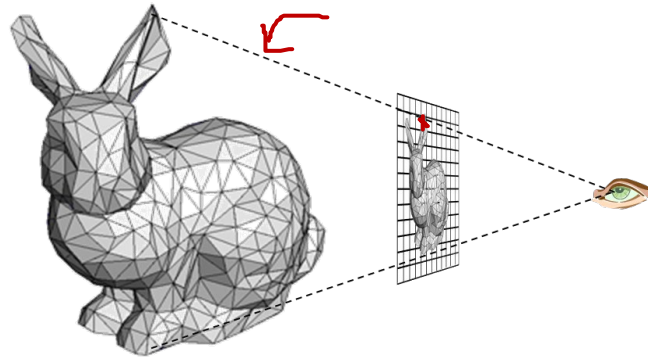


Rendering generally uses one of two approaches

- Rasterization
- Ray tracing
- Sometimes both....
- ...and there are other methods like radiosity

Rasterization versus Ray Tracing

- To oversimplify....
- In rasterization, geometric primitives are projected onto an image plane and the rasterizer figures out which pixels get filled.
- In ray-tracing, we model the physical transport of light by shooting a sampling ray through each pixel in an image plane and seeing what the ray hits in the scene



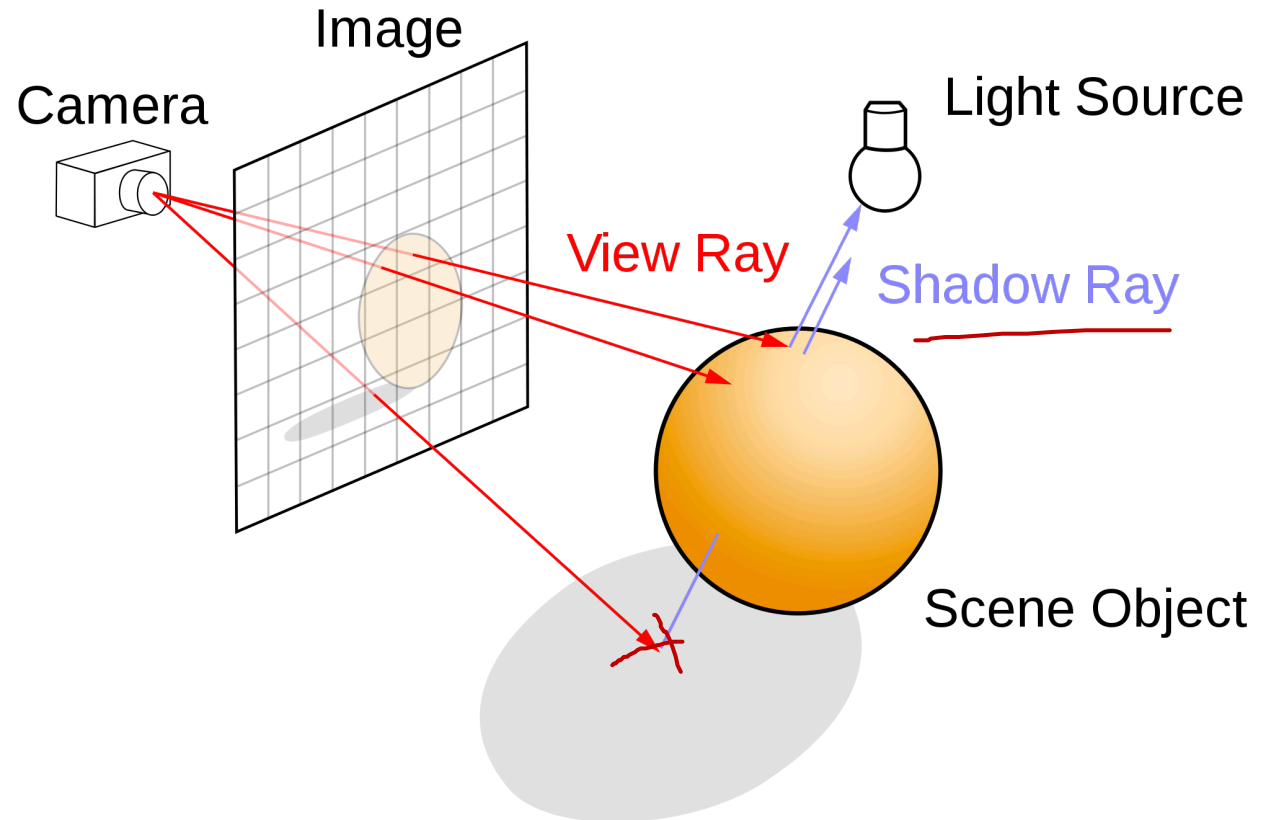
Ray Tracing

Follow ray of light....

Can trace from an
eyepoint through a
pixel

See what object the ray
hits...

How would you check to
see if the object is lit or
in shadow?



Rasterization

