03

Achleshwar Luthra: achleshl

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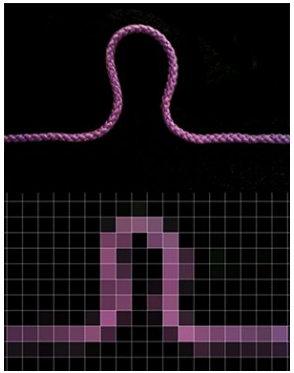
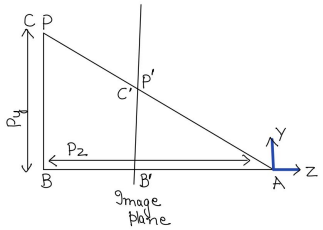


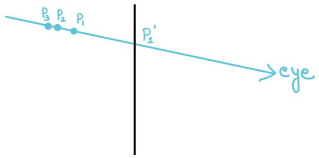
Fig: 1

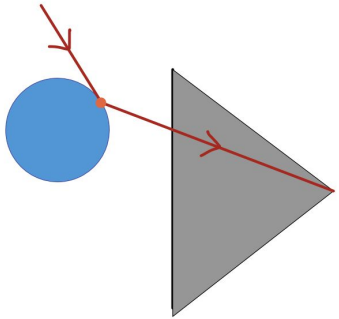
1. 3D scene (geometry)
2. Camera
3. Light

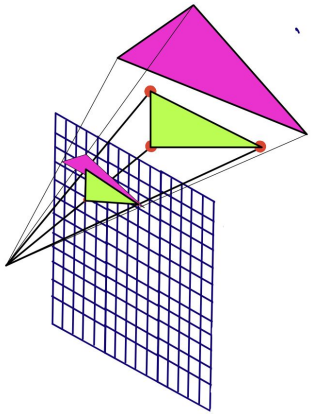
Photorealistic images

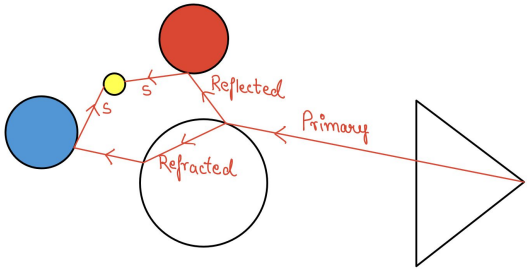
1. Foreshortening effect → Perspective projection
2. Visibility problem → Ray tracing and rasterization
3. Light simulation → Shading reflection and refraction(light transport); Fresnel equations











Simple ray- tracer

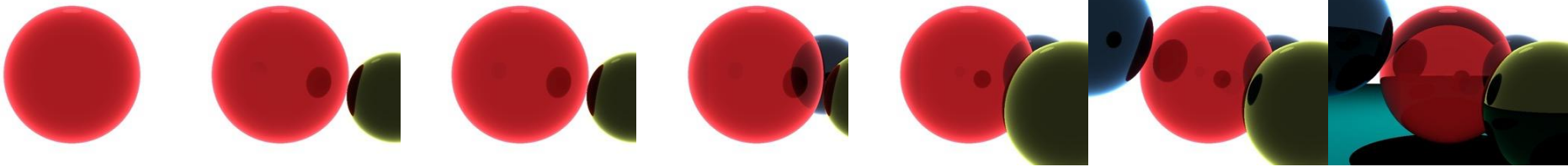
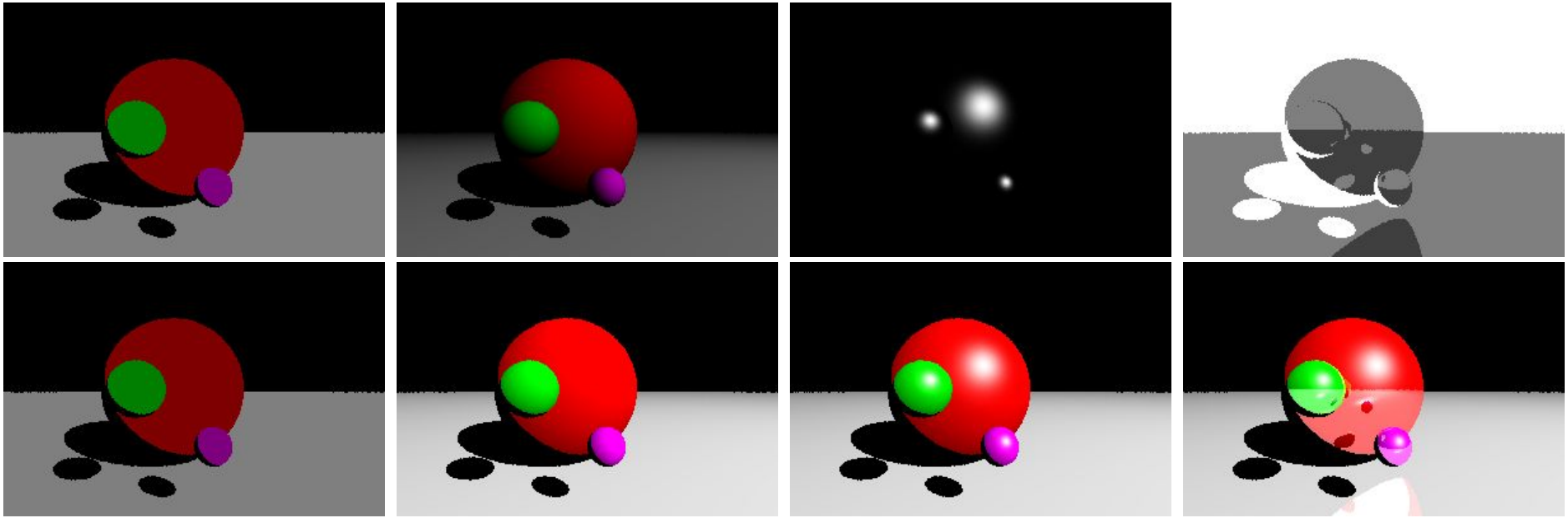


Fig1: https://www.scratchapixel.com/lessons/3d-basic-rendering/rendering-3d-scene-overview

Blinn-Phong Shading

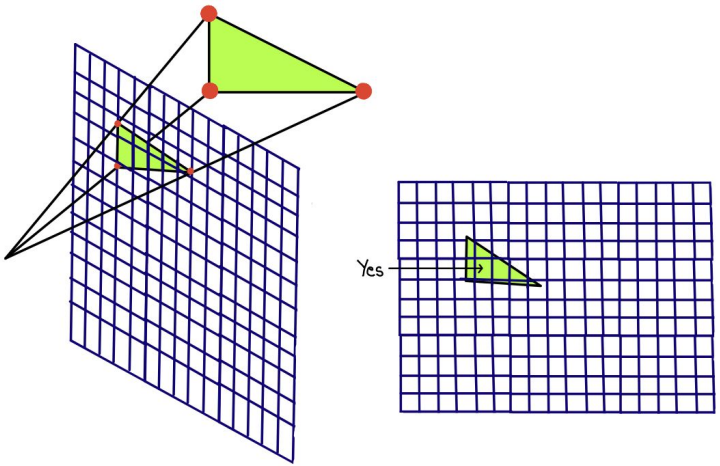


Ambient | Diffuse | Specular | Reflection

$$f(\vec{p}) = I_a K_a + \sum_{i}^{nblights} (\vec{n}(\vec{p}).\vec{l_i}) K_d I_i + \sum_{i}^{nblights} f_{spec}(\vec{l_i}(\vec{p}), \vec{v}(\vec{p})) K_s I_i$$

Rasterization & Differentiable Rendering

- **Frame-buffer**
- **Z-buffer**
- Visibility
- Shading



A. **Forward pass of rasterization**

B. **Derivative of A**

C. **Modification of A**

D. **Derivative of C**