

Vertex to Pixel

A brief introduction
Textbook Chapter 12

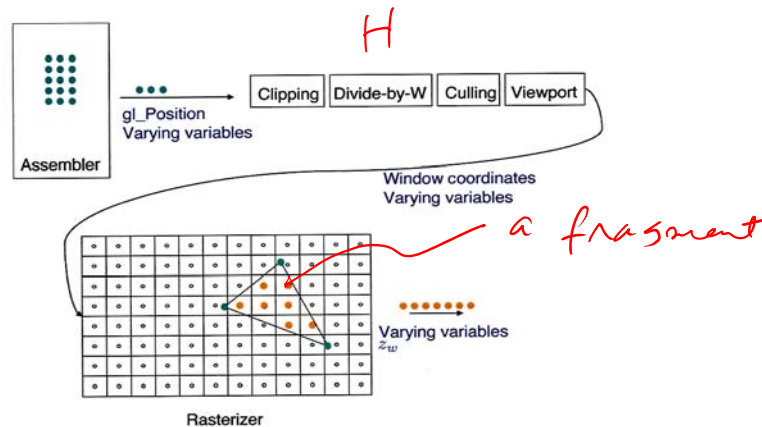
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Announcements

- Assignment 2 deadline extension to Sunday 22 (but do not expect TAs or me to respond on the weekend)
- Signup sheet will be available early next week

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Path from vertex to pixel



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Rasterization

- This is part of the fixed function pipeline
- There are very clever and sophisticated algorithms underneath the hood, but most users just set a few knobs using OpenGL function calls
- We will skip these issues for now, with the goal of getting to the fun topic of lighting asap!
- We may return to some of these issues at the end of the course, if we have time

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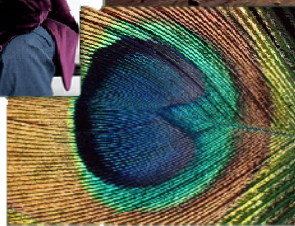
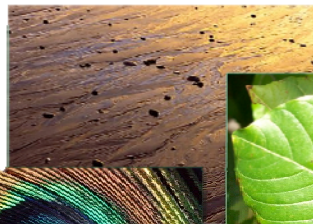
Lighting and Shading

Textbook Chapter 14
(some slides courtesy of Min Kim)

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Today: Modeling Material Appearance

- Rich variety of **materials**: characterized by surface reflectance and scattering

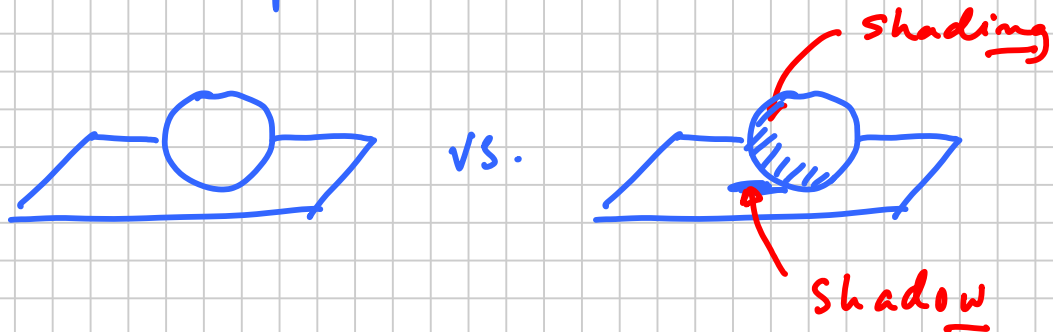


Shading and Lighting

Note Title

2015-02-13

Interaction of light with objects. Essential for perceiving 3D shape.



A simple mathematical model of reflectance

What affects the visible color of an object?



Advanced:

- participating media
- extended light sources

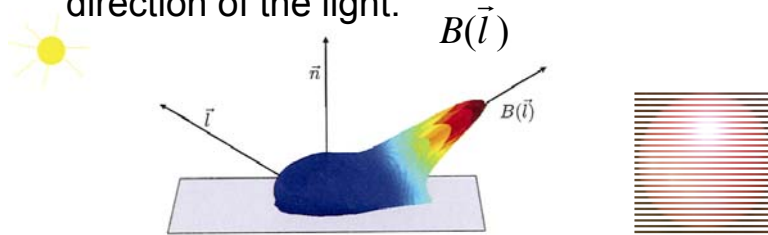
A simple representation of color. Represent in a "basis" of 3 colors

$\begin{pmatrix} \text{Red} \\ \text{Green} \\ \text{Blue} \end{pmatrix}$ each component is a float $[0, 1]$

Each color channel can be treated independently.

Light blob from PVC plastic

- PVC blob
 - Note that this figure just describes the result of light that comes in from the specific shown direction \vec{l} . For other incoming directions we would need a different blob to visualize the resulting scattering.
 - The plastic will appear brightest when observed in the directions clustered about the 'bounce' direction of the light:

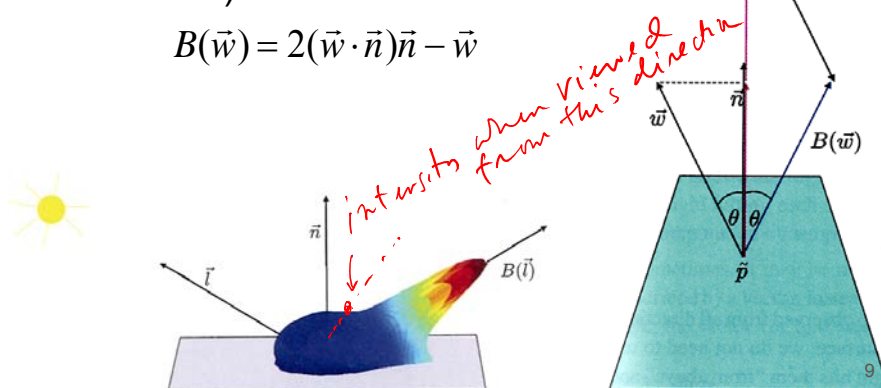


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Light blob from PVC plastic

- Recall: Given any vector \vec{w} (not necessarily of unit norm) and a unit normal vector \vec{n} , we can compute the bounce vector (mirror reflection) of \vec{w} as

$$B(\vec{w}) = 2(\vec{w} \cdot \vec{n})\vec{n} - \vec{w}$$



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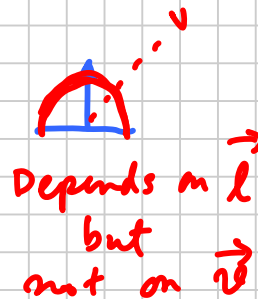
Experimental data suggest reflection depends on both \vec{l} and \vec{v} .

"Bidirectional Reflectance Function" (BRDF)

A common approximation: Phong Reflection Model

[Note: NOT same as Phong shading]

Ambient + Diffuse + Specular



Demo: experiment with different settings in this page

<http://threejs.org/docs/scenes/material-browser.html#MeshPhongMaterial>

Material →

MeshPhongMaterial

A material for shiny surfaces, evaluated per pixel.

