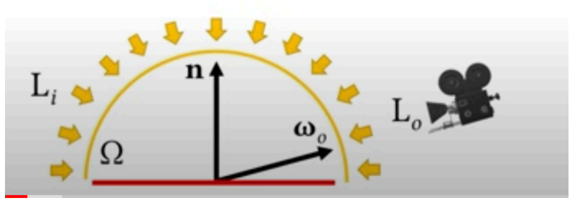
Global Illumination

Figure 23.9. A comparison between a rendering and a photo. *Image courtesy Sumant Pattanaik and the Cornell Program of Computer Graphics.*

The rendering equation and BDRF (Bidirectional reflectance distribution function)

$$L_o(\omega_o) = \int_{\Omega} L_i(\omega_i)\cos\theta_i\ f_r(\omega_i, \omega_o)\ d\omega_i$$



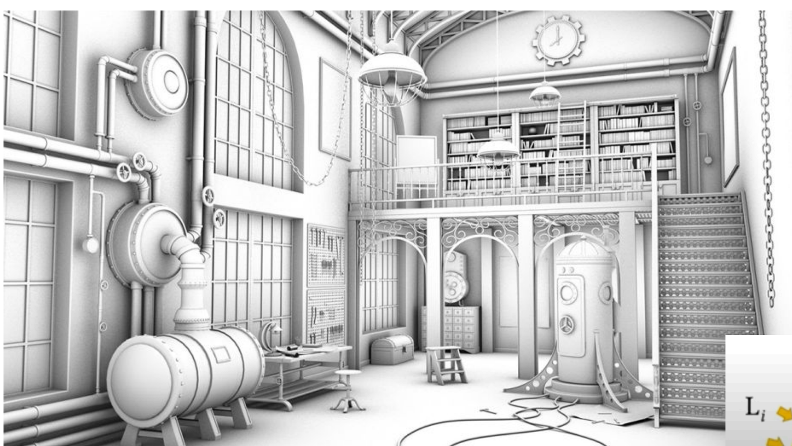
Global Illumination

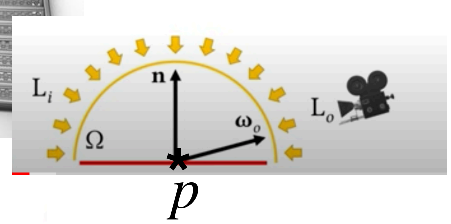
Figure 23.9. A comparison between a rendering and a photo. *Image courtesy Sumant Pattanaik and the Cornell Program of Computer Graphics.*

Ambient occlusion

https://vr.arvilab.com/blog/ambient-occlusion

Credit: Tom Goddar





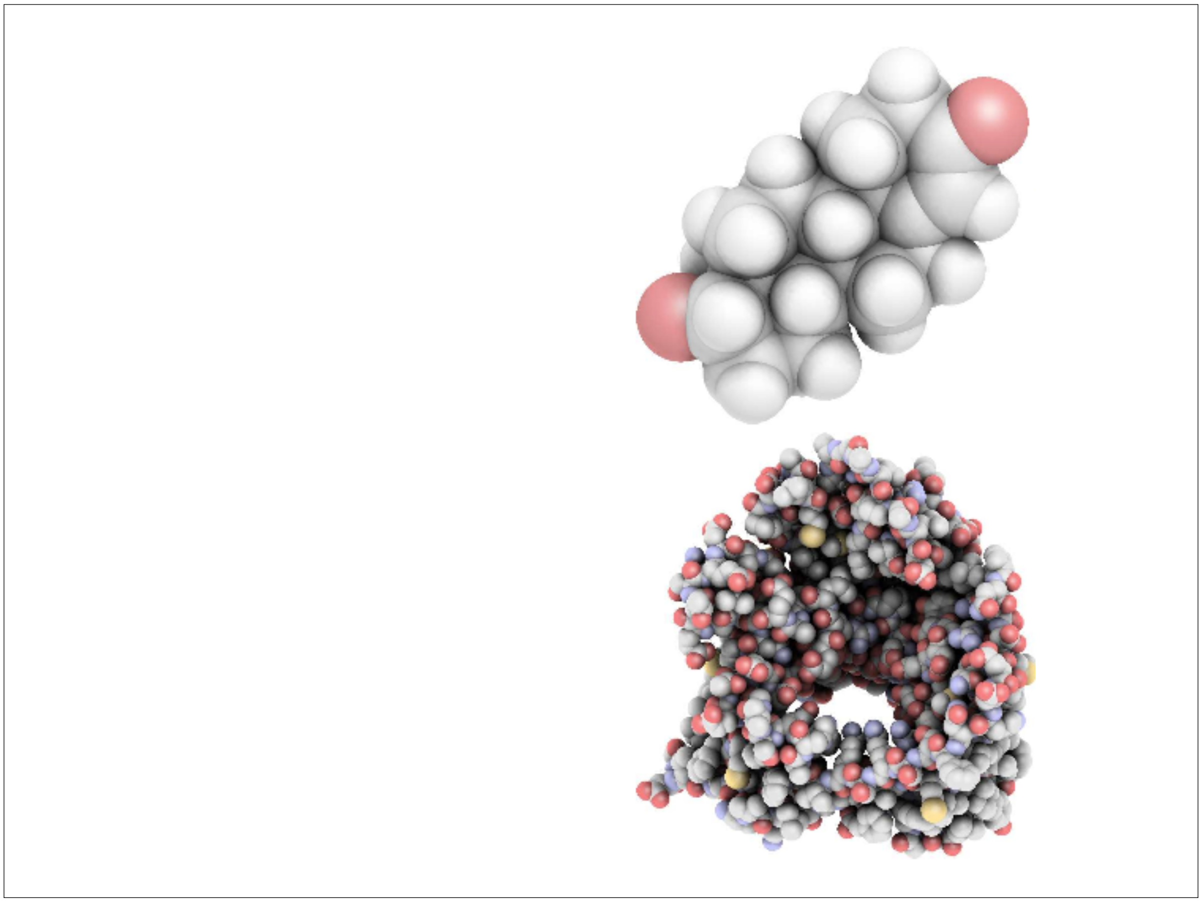
$$L_o(\boldsymbol{\omega}_o) = \int_\Omega L_i(\boldsymbol{\omega}_i) \cos\theta_i \; f_r(\boldsymbol{\omega}_i, \boldsymbol{\omega}_o) \; d\boldsymbol{\omega}_i$$

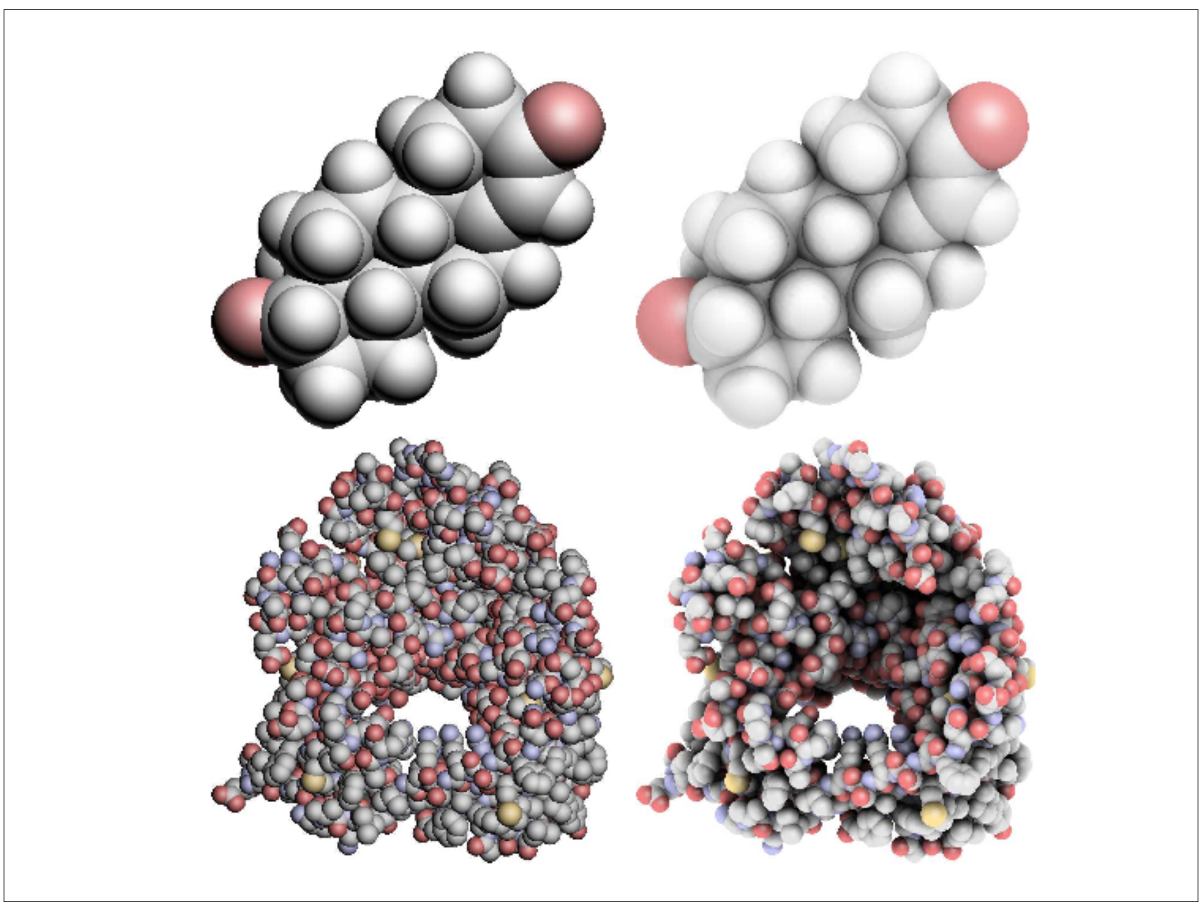
We repeat this equation for R, G, B

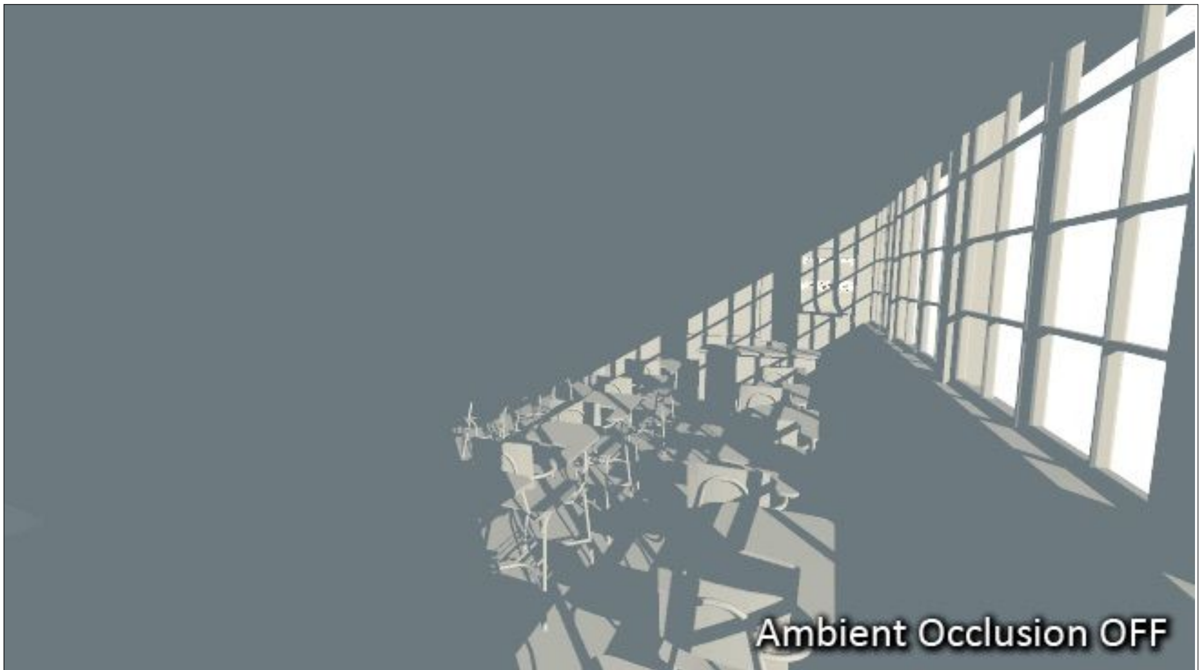
Ambient occlusion: Simplify to $\frac{1}{\pi}\int_\Omega V(p, \omega_{\mathbf{i}}) \; \cos\theta_i \; d\omega_i$ where V is either 0/1

(and usually repeat for RGB)

Credit: Tom Goddar

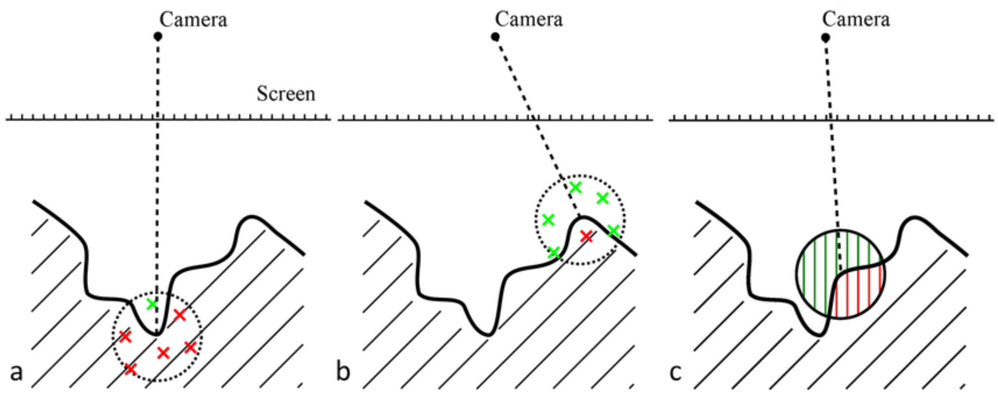





Ambient Occlusion OFF


Ambient Occlusion ON

Computing $V(p)$



Two approaches:

1. **Ray tracing - very expensive**
2. **Screen Space Ambient Occlusion (SSAO): Use Depth buffer**