

Introduction



SIGGRAPH2008

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Course #16: Practical global illumination with irradiance caching - Intro & Stochastic ray tracing

Our Topic: Irradiance Caching

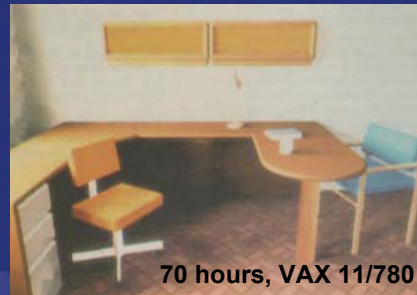
- Global illumination – Diffuse Interreflections
- Converge to physically correct results
- No image artifacts
- Smooth integration with a ray tracer
- Efficient (often)



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Our Topic: Irradiance Caching

- Ward et al. *A ray tracing solution for diffuse interreflection*. SIGGRAPH '88.
- 20 years ago!
- Reincarnation with
 - photon mapping
 - faster computers



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Course on Irradiance Caching: WHY?

- Widely used in practice
- Recent research on
 - making it faster
 - making it more general
- Surprisingly, people liked the course last year 😊



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Course Overview

1. (08:30 – 08:35 / 05 min) **Introduction** (*Křivánek*)
2. (08:35 – 08:55 / 20 min) **Stochastic Ray Tracing** (*Křivánek*)
3. (08:55 – 09:20 / 25 min) **Irradiance Caching Algorithm** (*Ward*)
4. (09:20 – 09:35 / 15 min) **Irradiance Caching in RADIANCE** (*Ward*)
5. (09:35 – 09:55 / 25 min) **Implementation Details** (*Křivánek*)
6. (09:55 – 10:15 / 20 min) **Photon Mapping** (*Jensen*)
(10:15 – 10:30 / 15 min) **Break**



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7. (10:30 – 10:45 / 15 min) **Glossy Reflections** (*Křivánek*)
8. (10:45 – 11:05 / 20 min) **Hardware Implementation** (*Gautron*)
9. (11:05 – 11:20 / 15 min) **Temporal Caching** (*Gautron*)
10. (11:20 – 11:55 / 35 min) **IC at PDI/DreamWorks** (*Tabellion*)
11. (11:55 – 12:15 / 35 min) **IC at Pixar** (*Christensen*)
12. (12:15 – 12:30 / 15 min) **Discussion** (*All*)





The term “global illumination” embraces many lighting effects encountered in real world. Some of them are shown on this slide.

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Why Compute Global Illumination?

- Visual richness of real-world
- Simulations for architecture and illumination engineering
- ...



Direct illum. only Global illum.




Simulating global illumination can reproduce the visual richness of real world. It is also useful for predictive rendering, such as architecture or illumination engineering. In these applications, it is essential to simulate light transport accurately so that the simulation results can be predictive of what the actual construction would look like.

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Diffuse Interreflections with Irradiance Caching

- Purpose: faster computation
- Means: sparse sampling & interpolation



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The focus of this course is on irradiance caching – an algorithm for fast computation of global illumination on diffuse surfaces. The algorithm gains its efficiency by performing the costly global illumination computation on a sparse set of locations, caching the results and using them to interpolate illumination elsewhere.