CS174A Lecture 15

Announcements & Reminders

- *Final exam study guide and book questions posted in Canvas*
- *Confirm that your grades in Canvas are accurate*
- ~~*11/22/22*~~ *11/28/22: Team project proposals due, final version*
- *11/24/22-12/03/22: Student evaluations of course/instructors/TAs*
- *11/29/22: Prof Demetri's talk*
- *12/02/22 (Discussion Sessions): Team project presentations*
- *12/05/22-12/06/22: Office hours for final exam, see Canvas*
- *12/06/22: Final Exam, 6:30-8:30 PM PST, in class, in person*

Last Lecture Recap

- ***Hidden Surface Removal***
  - Ray casting

Next Up

- ***Ray Tracing***
  - Issues: speed, shadows, aliasing
  - Stochastic ray tracing
- ***Prof Demetri: Biometric Human Simulation***
- ***Transparent Objects, Compositing***
- ***Particle Rendering***
- ***Volume Rendering***

Prof Demetri Terzopoulos

Demetri Terzopoulos is Distinguished Professor and Chancellor's Professor of Computer Science at the University of California, Los Angeles, where he directs the UCLA Computer Graphics & Vision Laboratory. He is also Co-Founder and Chief Scientist of VoxelCloud, Inc. He is or was a Guggenheim Fellow, a Fellow of the Association for Computing Machinery (ACM), a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), a Fellow of the Royal Society of London, a Fellow of the Royal Society of Canada (RSC), and a member of the European Academy of Sciences (EAS), the New York Academy of Sciences (NYAS), and Sigma Xi.

Prof Demetri Bio

Ray Tracing: Issues

- *Self shadowing due to numerical precision (surface acne)*
- *Shadow rays not refracted through transparent medium*
- *Shadow rays not reflected off of reflective surfaces like mirror*
- *Specular illumination on backface polygons*

Ray Tracing: Aliasing

- ***Aliasing in RT***
  - Spatial aliasing
  - Temporal aliasing: for small objects

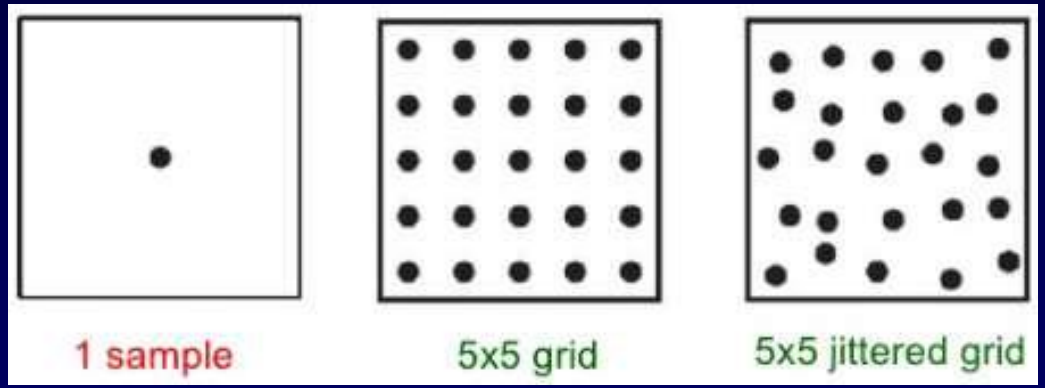
- ***Anti-Aliased Ray Tracing***
  a. Super-sampling (eye has 1.44M photoreceptors)
  b. Adaptive super-sampling (along edges of objects)
  c. Statistical super-sampling
  d. Stochastic RT

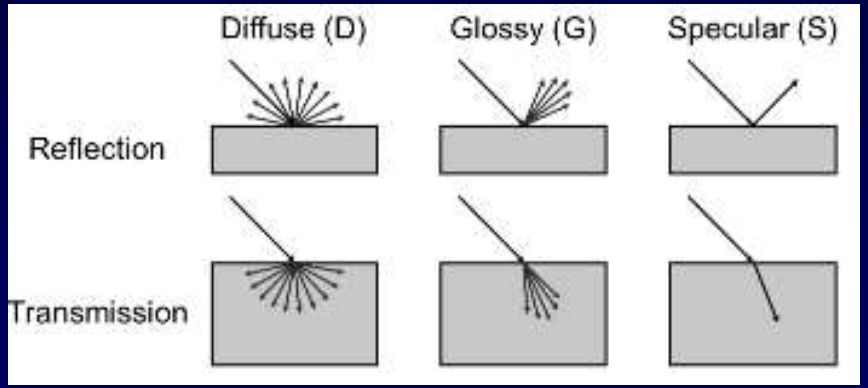
Stochastic Ray Tracing

AKA Distributed Ray Tracing

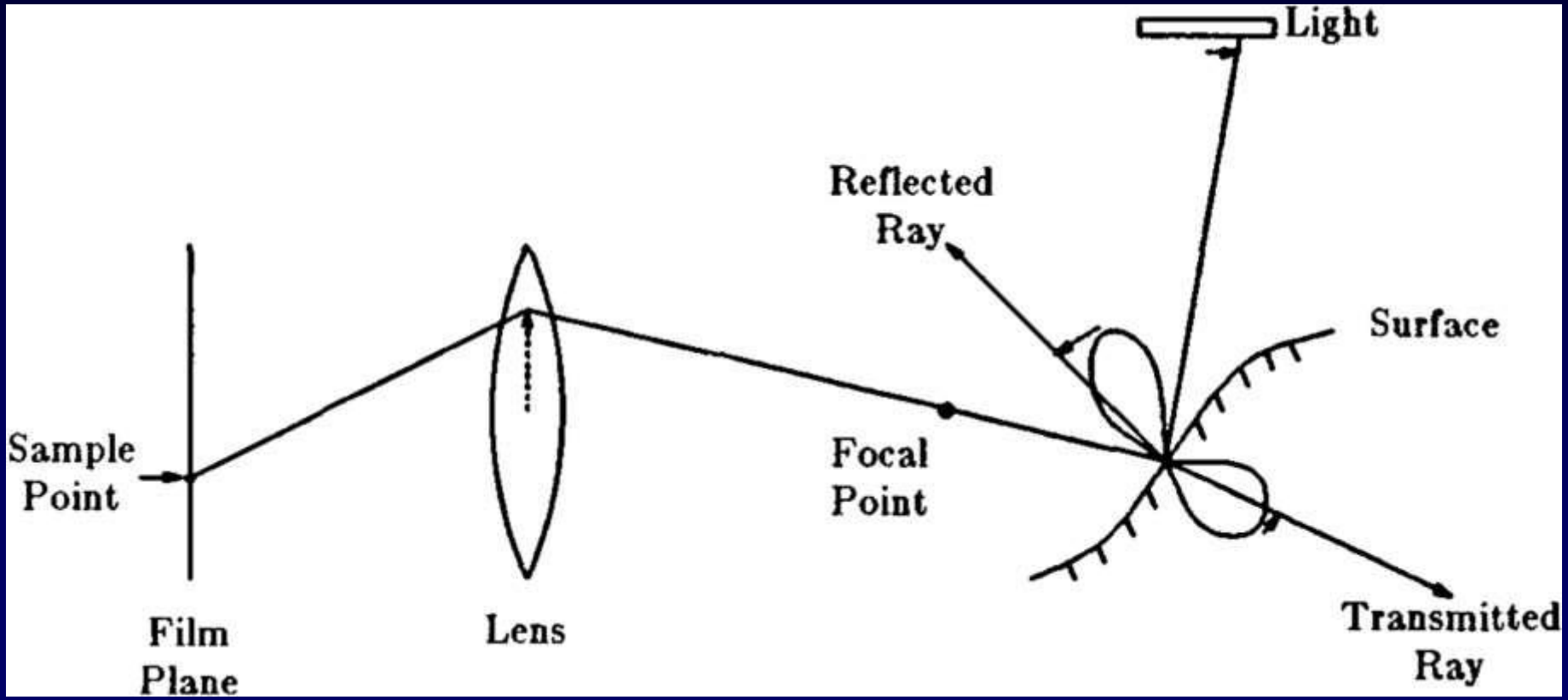
- *Antialiasing: distribute over pixel sampling area*
- *Gloss: distribute reflected ray*
- *Translucency: distribute refracted ray*
- *Penumbra: distribute shadow rays*
- *Depth of Field: distribute over lens diameter*
- *Motion Blur: distribute across frames*

Stochastic Ray Tracing



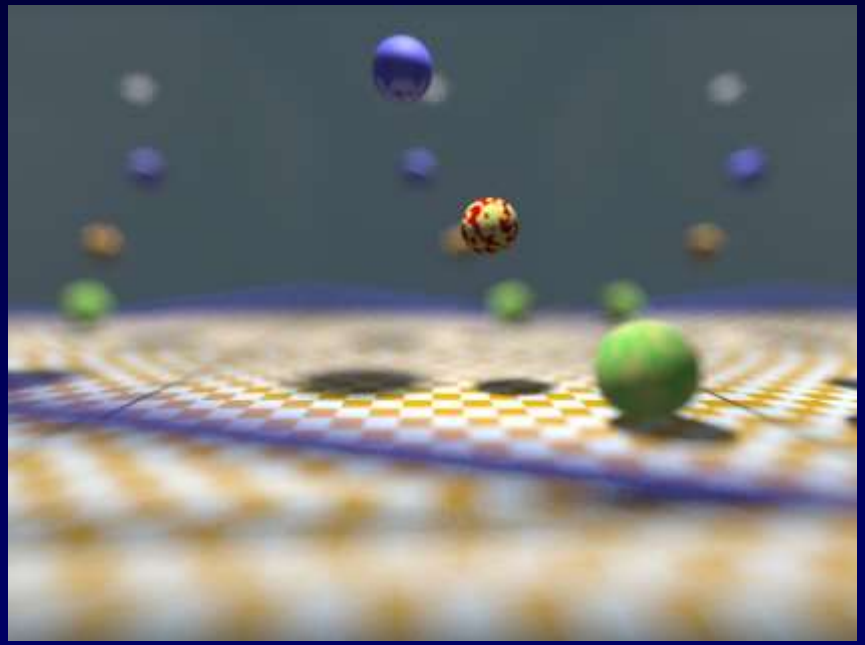


Stochastic Ray Tracing



Stochastic Ray Tracing

Stochastic Ray Tracing: Depth of Field



Stochastic Ray Tracing: Motion Blur