A FAST FORWARD THROUGH RAY TRACING GEMS

Eric Haines, NVIDIA | July 30, 2019
There is an old joke that goes, “Ray tracing is the technology of the future, and it always will be!”

- David Kirk, March 2008
RAY TRACING GEMS

http://raytracinggems.com

Table of Contents, links, and what this talk is mostly about.

Proposed by Tomas Akenine-Möller, co-editor, in Spring 2018.

Like other “Gems” books: provide tools and case studies.

32 papers accepted, 64 authors, 652 pages.

Tight schedule: papers received October 15, finished book proof done February 12. 121 days.

Open Access: Articles can be freely redistributed (non-commercial, and attribute the source). Kindle, Google Play.
OTHER RAY TRACING (GEMS) EVENTS

Talks about seven chapters:

Wednesday 2pm - 5:15pm, Room 501AB, Ray Tracing Gems 1.1

Book signing:

Wednesday 5:30pm - 6pm, SIGGRAPH bookseller, outside Room 403

PART I
RAY TRACING BASICS
Edited by Chris Wyman
RAY TRACING TERMINOLOGY
by Eric Haines and Peter Shirley
WHAT IS A RAY?
by Peter Shirley, Ingo Wald, Tomas Akenine-Möller, and Eric Haines
A PLANETARIUM DOME MASTER CAMERA
by John E. Stone

Used in "The Birth of Planet Earth"
COMPUTING MINIMA AND MAXIMA OF SUBARRAYS

by Ingo Wald
A FAST AND ROBUST METHOD FOR AVOIDING SELF-INTERSECTION

by Carsten Wächter and Nikolaus Binder
PRECISION IMPROVEMENTS FOR RAY/SPHERE INTERSECTION

by Eric Haines, Johannes Günther, and Tomas Akenine-Möller
COOL PATCHES: A GEOMETRIC APPROACH TO RAY/BILINEAR PATCH INTERSECTIONS

by Alexander Reshetov

Will be presented Wednesday 2:30 pm, Room 501AB
MULTI-HIT RAY TRACING IN DXR

by Christiaan Gribble
A SIMPLE LOAD-BALANCING SCHEME WITH HIGH SCALING EFFICIENCY

by Dietger van Antwerpen, Daniel Seibert, and Alexander Keller

Will be presented Wednesday 2:05 pm, Room 501AB
AUTOMATIC HANDLING OF MATERIALS IN NESTED VOLUMES

by Carsten Wächter and Matthias Raab
A MICROFACET-BASED SHADOWING FUNCTION TO SOLVE THE BUMP TERMINATOR PROBLEM
by Alejandro Conty Estevez, Pascal Lecocq, and Clifford Stein

Will be presented Wednesday 2:50 pm, Room 501AB
RAY TRACED SHADOWS: MAINTAINING REAL-TIME FRAME RATES
by Jakub Boksansky, Michael Wimmer, and Jiri Bittner
RAY-GUIDED VOLUMETRIC WATER CAUSTICS IN SINGLE SCATTERING MEDIA WITH DXR

by Holger Gruen
PART IV

SAMPLING

Edited by Alexander Keller
ON THE IMPORTANCE OF SAMPLING

by Matt Pharr
IGNORING THE INCONVENIENT WHEN TRACING RAYS

by Matt Pharr
IMPORTANCE SAMPLING OF MANY LIGHTS ON THE GPU

by Pierre Moreau and Petrik Clarberg

Will be presented Wednesday 3:10 pm, Room 501AB
PART V
DENOISING AND FILTERING

Edited by Jacob Munkberg
CINEMATIC RENDERING IN UE4 WITH REAL-TIME RAY TRACING AND DENOISING
by Edward Liu, Ignacio Llamas, Juan Cañada, and Patrick Kelly

(a) Ray traced shadows
(b) Shadow maps

Will be presented Wednesday 3:55 pm, Room 501AB
CINEMATIC RENDERING IN UE4 WITH REAL-TIME RAY TRACING AND DENOISING

by Edward Liu, Ignacio Llamas, Juan Cañada, and Patrick Kelly

(a) Noisy input (1 spp)  
(b) Our spatial denoiser
TEXTURE LEVEL OF DETAIL STRATEGIES FOR REAL-TIME RAY TRACING

by Tomas Akenine-Möller, Jim Nilsson, Magnus Andersson, Colin Barré-Brisebois, Robert Toth, and Tero Karras

Will be presented Wednesday 4:25 pm, Room 501AB
SIMPLE ENVIRONMENT MAP FILTERING USING RAY CONES AND RAY DIFFERENTIALS

by Tomas Akenine-Möller and Jim Nilsson
IMPROVING TEMPORAL ANTIALIASING WITH ADAPTIVE RAY TRACING

by Adam Marrs, Josef Spjut, Holger Gruen, Rahul Sathe, and Morgan McGuire

Will be presented
Wednesday 4:50 pm,
Room 501AB
PART VI
HYBRID APPROACHES AND SYSTEMS
Edited by Morgan McGuire
INTERACTIVE LIGHT MAP AND IRRADIANCE VOLUME PREVIEW IN FROSTBITE

by Diede Apers, Petter Edblom, Charles de Rousiers, and Sébastien Hillaire
REAL-TIME GLOBAL ILLUMINATION WITH PHOTON MAPPING

by Niklas Smal and Maksim Aizenshtein
HYBRID RENDERING FOR REAL-TIME RAY TRACING

by Colin Barré-Brisebois, Henrik Halén, Graham Wihlidal, Andrew Lauritzen, Jasper Bekkers, Tomasz Stachowiak, and Johan Andersson
DEFERRED HYBRID PATH TRACING
by Thomas Schander, Clemens Musterle, and Stephan Bergmann
INTERACTIVE RAY TRACING TECHNIQUES FOR HIGH-FIDELITY SCIENTIFIC VISUALIZATION

by John E. Stone
PART VII
GLOBAL ILLUMINATION
Edited by Matt Pharr
RAY TRACING INHOMOGENEOUS VOLUMES

by Matthias Raab
EFFICIENT PARTICLE VOLUME SPLATTING IN A RAY TRACER

by Aaron Knoll, R. Keith Morley, Ingo Wald, Nick Leaf, and Peter Messmer
CAUSTICS USING SCREEN SPACE PHOTON MAPPING

by Hyuk Kim
VARIANCE REDUCTION VIA FOOTPRINT ESTIMATION IN THE PRESENCE OF PATH REUSE

by Johannes Jendersie
ACCURATE REAL-TIME SPECULAR REFLECTIONS WITH RADIANCE CACHING
by Antti Hirvonen, Atte Seppälä, Maksim Aizenshtein, and Niklas Smal
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“RT is the future of gaming, so the main focus is now on RT either way.”

- Ben Archard, *Metro Exodus* programmer

Ray Tracing Gems 2?
raytracinggems.com
THE DANGERS OF RAY TRACING

CAUTION:
OBJECT CONTAINS CAUSTICS
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QUESTIONS?
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