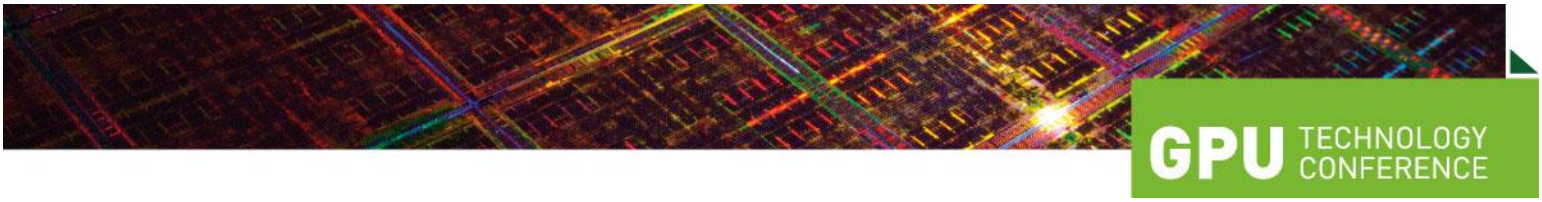

GPU Technology Conference, May 14-17, 2012
McEnery Convention Center, San Jose, California
www.gputechconf.com

Sessions on Ray Tracing (subject to change)

IMPORTANT: Visit http://www.gputechconf.com/page/sessions.html for the most up-to-date schedule.

TUTORIALS

S0603 - GPU Ray Tracing
Phillip Miller (NVIDIA)
Day: Monday, 05/14 | **Time:** 10:30 am - 11:50 am
Topic Areas: Ray Tracing
Session Level: Beginner
Learn the latest approaches in levering GPUs for the fastest possible ray tracing results from experts developing and leveraging the NVIDIA OptiX ray tracing engine, the team behind NVIDIA iray, and those making custom renderers. Multiple rendering techniques, GPU programming languages, out-of-core rendering, and optimal hardware configurations will be covered in this cutting-edge discussion.

S0604 - NVIDIA Advanced Rendering Solutions
Phillip Miller (NVIDIA)
Day: Monday, 05/14 | **Time:** 1:00 pm - 2:20 pm
Topic Areas: Ray Tracing
Session Level: Advanced

The full range of advanced rendering solutions and frameworks from NVIDIA will be explored in this insightful product and technology discussion and demonstration. Come learn about the latest possibilities involving advanced rendering techniques and how they integrate within commercial products – from production ray tracing to volumetric and distributed rendering.

SESSIONS

S0321 - GPU-Based Monte Carlo Ray Tracing Simulation for Solar Power Plants
Claus Nilsson (Tietronix Software, Inc.), Michel Izygon (Tietronix Software, Inc.)
Day: Tuesday, 05/15 | **Time:** 2:00 pm - 2:25 pm
Topic Areas: Energy Exploration; Computational Physics; Ray Tracing
Session Level: Beginner

Learn about real time simulations of Concentrating Thermal Solar Power using GPU technology to enable performance optimization of these utility scale plants. By leveraging the power of GPUs and the parallel aspect of the field of thousands sun-tracking mirrors, we have been successful in cutting the computation time by orders of magnitude versus the previously required minutes and hours runtime. We will present an overview of the problem domain and describe how we used the GPU to derive a Monte Carlo physics ray tracing method to simulate the flux reflected by the mirrors onto the solar receiver.

S0319 - Advanced Driver Assistance System Testing using OptiX
Erwin Roth (Technische Universitaet Muenchen), Tugkan Calapoglu (VIRES Simulationstechnologie GmbH)
Day: Tuesday, 05/15 | **Time:** 2:00 pm - 2:50 pm
Topic Areas: Ray Tracing; Machine Vision
Session Level: Intermediate

Learn in this session how the AUDI AG and its partners make use of OptiX as a unified platform for the simulation of perception sensors utilizing different physical measurement principles, e.g. Video Camera, LIDAR, Ultra Sonic, etc. The aim is to generate synthetic sensor data with realistic measurement errors for testing Advanced Driver Assistance Systems. Get details about the challenges they faced during the implementation of the necessary tools for validating the sensor models and join the discussion when they describe the upcoming challenges related to real-time Ray Tracing and advanced material descriptions, when multiple sensors are simulated simultaneously.

S0046 - Application of the GPU to a Two-Part Computational Electromagnetic Algorithm
Eric Dunn (SAIC)
Day: Tuesday, 05/15 | **Time:** 2:30 pm - 2:55 pm
Topic Areas: Computational Physics; Algorithms & Numerical Techniques; Ray Tracing
Session Level: Beginner

The shooting and bouncing ray (SBR) method is one way to simulate electromagnetic field radiation. Like all methods, there are certain problems where it does not yield accurate results. In this presentation, we will explain one such case that consists of an antenna resonating between two metal plates. We will discuss how we used the graphics processing unit (GPU) to separate the problem into two parts. Each part is simulated individually with SBR producing an improved result. Such a GPU-accelerated, two-part approach can be applied to other more general hybrid simulations.

S0366 - OptiX Out-of-Core and CPU Rendering
David McAllister (NVIDIA, OptiX group)
Day: Tuesday, 05/15 | **Time:** 3:30 pm - 4:20 pm
Topic Areas: Ray Tracing; Computer Graphics
Session Level: Intermediate

OptiX has broken some major barriers recently by enabling out-of-GPU-core memory rendering and by adding a CPU rendering back-end when an OptiX-capable GPU is not present in the system. OptiX users and CUDA developers will be interested in how we accomplished these feats within the existing GPU architecture. This talk will provide a brief introduction to OptiX and then dive into what the new features provide. We will then go under the covers and show how we pulled it off.

S0261 - Scalable GPU Computing Service Architecture
Henrik Høj Madsen (LEGO), Michael Schøler (LEGO)
Day: Tuesday, 05/15 | **Time:** 4:00 pm - 4:50 pm
Topic Areas: Cloud Computing; Computer Graphics; Ray Tracing
Session Level: Intermediate

In this session we describe our GPU accelerated computing service which supports several internal business processes in a large scale company setup. The service supports diverse computational needs such as on-demand rendering, mesh optimization, a Massive Multiplayer Online Game (MMO), product visualizations and other demanding computational tasks. We present the architectural considerations for a service-oriented computational framework and the practical learning's and opportunities encountered during development a enterprise system using NVIDIA technologies such as CUDA, OptiX, OpenGL and OpenCL. Our aim is to share

knowledge and present LEGO's vision for a GPU accelerated computational platform as a business-driven technology.

S0021 - OptiX for DirectX Programmers - EVE Online's GPU-Raytraced Portraits
Bert Peers (CCP Games)
Day: Tuesday, 05/15 | **Time:** 4:30 pm - 4:55 pm
Topic Areas: Ray Tracing; Computer Graphics; Application Design & Porting Techniques
Session Level: Intermediate

By integrating NVIDIA's OptiX system for real-time GPU raytracing into a DirectX9 based engine, CCP Games enables high-quality raytraced player portraits for the single shard MMO Eve Online, reusing the game's assets and pipeline. We selectively add stochastic effects while closely maintaining the look of the DX9-based renderer that Art Direction aimed for. In this talk we approach OptiX from the point of view of a programmer familiar with DirectX, discuss integrating these two systems, and show how we reproduced some DirectX-based effects like transparency and subsurface scattering within OptiX.

S0311 - Teaching Applied Parallel Computing with GPUs
Chris Lupo (California Polytechnic State University)
Day: Wednesday, 05/16 | **Time:** 5:30 pm - 5:55 pm
Topic Areas: General Interest; Ray Tracing
Session Level: Intermediate

Learn how the next generation of HPC developers are learning hands-on skills with GPUs, and how GPU computing is being incorporated into Computer Science courses. We will discuss how GPUs are being used to enhance student learning of parallel computing concepts through a cross-teaching approach, where students with different domain expertise are grouped into teams and tasked with parallelizing an application such as ray tracing. We'll show that student projects that emphasize optimization of architectural resources and performance tuning allow students with no prior experience to parallelize a large-scale application with significant performance improvement in as little as six weeks.

S0129 - A Monte Carlo Thermal Radiation Solver in GPU/CPU Hybrid Architecture
Gaofeng Wang (Laboratoire E.M2.C, Ecole Centrale Paris), Oliver Gicquel (Laboratoire E.M2.C, Ecole Centrale Paris)
Day: Thursday, 05/17 | **Time:** 9:00 am - 9:25 am
Topic Areas: Computational Fluid Dynamics; Computational Fluid Dynamics; Computational Physics; Ray Tracing
Session Level: Intermediate

A Monte Carlo ray-tracing code is developed to predict radiative heat transfer behaviours in CFD simulation of combustion phenomena. Using emission-reciprocal method, each random ray casting of each node could be independently conducted for parallel computations. The code is efficiently implemented in hybrid GPU/CPU HPC resources using a dedicated dynamic load balancing strategy. A linear speedup scaling of hybrid HPC resources has been shown in demonstrating calculation of radiative heat transfer of a helicopter engine's combustion chamber, while adding one GPU in HPC resources pool is in sense of nine CPU cores supplements.