GERMANY Saarbrücken

Saarland University

Computer Graphics Group
Saarland University
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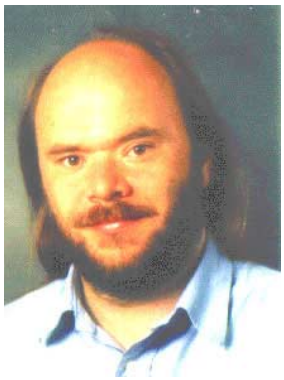
Core Competence

Realtime Ray Tracing, Realtime Global Illumination & Lighting Simulation, Hardware Architecture for Ray Tracing, Virtual and Augmented Reality, Virtual Studio, Network-Integrated Multimedia, E-Teaching



Head of the Institute
Philipp Slusallek

History

The Graphics Lab at Saarland University was founded in October 1999 and already has established itself as a center for research on interactive ray-tracing and lighting simulation. Recent highlight include the development of an efficient hardware architecture for ray tracing and the release of an open network-integrated multimedia middleware for Linux. The main Eurographics conference in 2002 is jointly organized by our group and the graphics group of the Max-Planck-Institute for Computer Science in Saarbrücken.

Staff

1 Professor: Philipp Slusallek
7 Research assistants: Carsten Benthin, Georg Demme, Andreas Dietrich, Marco Lohse, Andreas Pomi, Jörg Schmittler, Ingo Wald
1 Secretary: Hanna Schilt

Rooms and Locations

The group operates on roughly 500 square meters on the ground floor of the main computer science building. This includes special labs for virtual and augmented reality as well as for multimedia.

Financing

Funding for the group come in roughly equal shares from the university as well as through research grands from industry (Motorola, Intel, AMD, EADS/Airbus, DaimlerChrysler, BMW, AUDI, VW, ...) as well as state and federal agencies.

Current Structure and Important Partners

The group is loosely structured around five main research areas:
- Realtime Ray-Tracing and Lighting Simulation
- Hardware for Ray Tracing
- Virtual and Augmented Reality
- Network-Integrated Multimedia
- E-Teaching

Our recent research has resulted in a number of high-profile industry cooperations including companies from the automobile and airplane industry as well as Intel and AMD.

Current Research

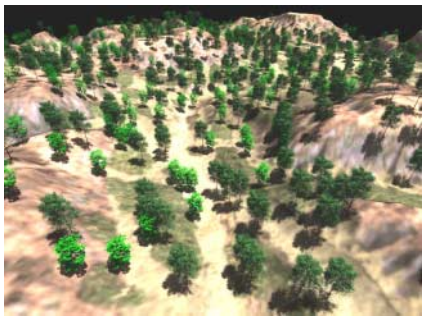
The major research activities are centered around realtime ray-tracing and real-time lighting simulation where the first interactive ray tracing system and the first interactive global illumination system on PCs have been

COMPUTER GRAPHIK UNIVERSITÄT DES SAARLANDES

realized. The system implements an extremely fast and distributed software ray tracing engine, support for dynamically changes to scenes, efficient and interactive display of scenes with many millions of primitives, dynamically loaded shaders, and an new OpenRT ray tracing API similar to OpenGL for easy porting of existing interactive applications. Recently the engine has been extended to efficiently support interactive global illumination (OpenRT: I. Wald, C. Benthin, A. Dietrich). We recently developed an efficient hardware architecture for interactive 3D graphics using ray-tracing. It provides similar performance as current 3D graphics chips at a lower complexity and dramatically reduced memory bandwidth requirements (SaarCOR: J. Schmittler). Our research on virtual and augmented reality is focussed on providing consistent illumination between virtual and real environments and is partly based on the OpenRT system (V+AR: A. Pomi). The goal of the Network-integrated Multimedia Middleware (NMM) project is to create a middleware that supports transparent use and control of devices and software modules distributed across the network. The system already supports all functionality of a home entertainment system (DVD, CD, MP3, DVB, TV, time-shift, transcoding, ...) and is available as OpenSource (NMM & MM-Box: M. Lohse) Within the German ULI consortium we develop an e-curriculum and web-based study material for computer graphics as well as a SW & HW system for capturing, storing, and streaming live lectures (CGL & V-CORE: G. Demme).

Important Recent Project Participations

- OpenRT: Interactive Ray-Tracing and Lighting Simulation (www.openrt.de)
- SaarCOR: A Hardware Architecture for Efficient Ray-Tracing
- NMM: Network-integrated Multimedia Middleware (www.networkmultimedia.org)
- V-CORE: Virtual Course-room Environment
- CGL: Online Computer Graphics Library



Important Recent Industrial Partners

Motorola, Intel, AMD, EADS/Airbus, BMW, DaimlerChrysler, Volkswagen, Audi,…

Future of the Lab

Realtime ray tracing will continue to a major topic of the group as we explore the role of this technology for the future of 3D graphics. In addition we will extend our search for better and faster realtime lighting simulation algorithms and on hardware support for ray tracing based algorithms. Another important thread of our research will deal with consistent lighting in mixed reality applications.