Katholieke Universiteit Leuven

Computer Graphics Group
Department of Computer Science
Katholieke Universiteit Leuven
Celestijnenlaan 200A
B-3001 Leuven, Belgium
☏ +32-16-327700
🖷 +32-16-327996
✉ graphics@cs.kuleuven.ac.be
🌐 www.cs.kuleuven.ac.be/~graphics/

Core Competence

Photorealistic Rendering, Global Illumination, Monte Carlo Algorithms for Rendering, Image-based Rendering and Lighting, Complex Environments

Head of the Institute
Philip Dutre

History

Graphics activities started in the 80's, initiated by Yves Willems. In 1991, an actual graphics group was formed with just 2 Ph.D students. Since then, 4 Ph.D. theses have been completed, all about global illumination algorithms. Graduates from the group have been in positions at Cornell University, the Max-Planck Institut für Informatik in Saarbrücken, and the Limburgs Universitair Centrum, amongst others.

Staff

2 Professors: Yves Willems, Philip Dutre
1 Post-doc: Frank Suykens
4 Ph.D. students: Frederik Anrys, Vincent Masselus, Pieter Peers, Karl Vom Berge
Technical staff and *administrative staff* are organised at the departmental level and shared with other research groups.

Rooms and Locations

Office space is allocated by the Department of Computer Science depending on the number of people in the research group each year. The computer graphics group has a separate lab space for measurements and image-based techniques.

Financing

The Computer Graphics Group is part of the Department of Computer Science and rooms and infrastructure are provided by the university. Most of the Ph.D. students are paid by projects and grants from various Belgian science foundations.

Current Research

Current research of the Computer Graphics Group focuses on global illumination algorithms, photo-realistic rendering, image based rendering and relighting and accurate radiative transfer for complex environments. In the field of global illumination and photo-realistic rendering, we have developed various Monte Carlo techniques and algorithms or optimizations for existing algorithms (bidirectional ray tracing, light tracing, Monte Carlo radiosity, photon mapping). Most of these techniques are available through RenderPark, our global illumination software (www.renderpark.be). Image based rendering and relighting is a new research area for the group, and recently we developed techniques such as the Free-form light stage and an optimization-based relighting algorithm. These give fairly accurate results without the use of complex gantries to move light sources or other measuring devices.

Combining the above areas, we are also investigating goal-based illumination, in which we try to figure out where light sources need to placed in a given environment to reach a specified lighting effect on artificial or real objects.Recently, we also started to develop algorithms for radiative transfer in large forest environments, which pose their own specific problems for global illumination techniques.
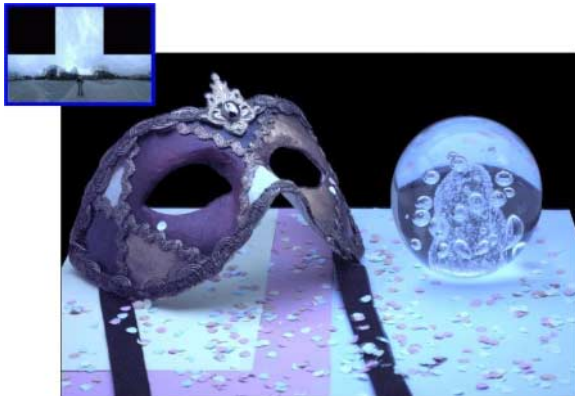
Current Structure and Important Partners
The Computer Graphics Group is part of the Department of Computer Science, and as such, many responsabilities and resources are shared with other research groups. Since the graphics group is rather small, there is no further internal subdivision. There is strong cooperation with the Computer Vision group and the Medical Imaging group within the same university, and with the Expertise Centrum +Digitale Media at Limburgs Universitair Centrum.

Important Recent Project Participations
- "Goal-based Global Illumination"
- "Consistent illumination of real objects in artificial environments"

- "Simulation of Global Illumination in Dynamical Environments"
- "Multi-resolution and Potential-driven Solutions of the Global Illumination Problem"
- "Optimisation (Performance and Higher Realism) of the Global Illumination Problem in Computer Graphics"

All projects funded by various Belgian Science Foundations.

Important Recent Industrial Partners
At this point, we are not involved in any significant contract research with industrial partners. Various contacts with Belgium-based companies (Luciad, Eyetronics) are maintained.

Future of the Lab
The Computer Graphics group aims to expand its research into the field of image-based rendering and lighting, while at the same time maintaining its expertise in global illumination algorithms. Several spin-off opportunities are also part of our future strategy.