GERMANY Aachen

RWTH Aachen

Department f. Computer Graphics & Multimedia
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Computer Graphics and Multimedia
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Core Competence

Geometry Processing for CAD, Simulation, and Visualization, 3D model reconstruction, reverse engineering, Handling complex geometric models and scenes in interactive, and/or networked applications, Multiresolution modeling and interactive editing

Head of the Institute
Leif Kobbelt

History

The Department for Computer Graphics and Multimedia at the RWTH was founded in the beginning of 2001. The head of the department, who worked as a research group leader at the Max-Planck Institute for Computer Science before, is currently building a new research group which as of today consists of 5 research assistants and about 10 student assistants and which is constantly growing. Our teaching curriculum includes a two-semester course for Computer Graphics (basic and advanced techniques) as well as a two-semester course for Geometric Modeling (curves and surfaces). In addition we offer specialized courses on selected topics in Computer Graphics and Multimedia which address graduate students in Computer Science, Mathematics, and Engineering.

Staff

1 Professor: Leif Kobbelt
1 Secretary: Silke Hanf
7 Research assistants: Stephan Bischoff, Mario Botsch, Abhijit Sovakar, Stephan Steinberg, Jianhua Wu, 2 vacancies
1 Technician: Christof Albrecht

Rooms and Locations

The department is located in the Computer Science Center of the RWTH. Beside office space, we have two graphics labs for our special graphics equipment (e.g. stereo projection wall, 3D laser scanner, ...)

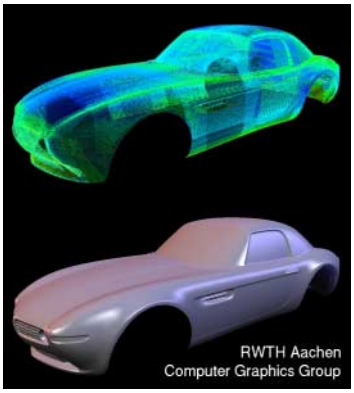
Financing

The department has a basic funding provided by the university that allows us to cover the administrative and teaching expenses. Besides this, our research projects are funded by public organizations such as the Deutsche Forschungsgemeinschaft, Bundesministerium für Bildung und Forschung, German-Israelian Foundation, and the European Union. Additional funding comes from our industry partners like the BMW AG, the Siemens AG and several regional companies.

Current Structure and Important Partners

The Computer Graphics Department at the RWTH has research interests and activities in several areas of Computer Graphics. Currently there is only one professor in this group but other research groups in related fields are being founded at the RWTH in the near future. One of these groups will be working on Multimedia Data

Exploration and a second one on Human Computer Interaction. The graphics group is a member of several interdisciplinary organizations like, e.g., the Virtual Reality Competence Center of the RWTH, the regional industry club and the Forum Informatik.



Current Research

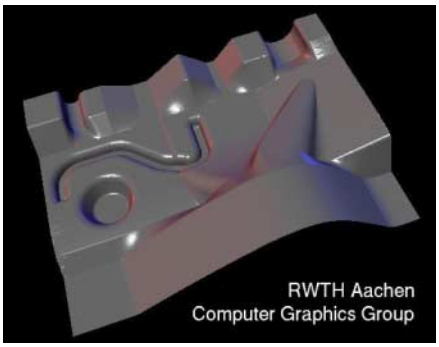
The Computer Graphics and Multimedia Group at the RWTH is mainly working on the efficient and flexible generation, modification, storage, transmission, and display of three dimensional objects and scene descriptions. The generation includes the derivation of mathematical or geometrical descriptions from raw data that is usually obtained from 3D scanners or from numerical simulation. Based on this data, 3D models are constructed that satisfy application dependent quality criteria. Typical applications of these techniques include the preprocessing of geometric models for numerical simulation and the "cleaning" of polygon models for rapid prototyping. Modification and editing means to change a given geometric shape in a controlled manner. This can be done interactively by the user (designer) or by physical simulation of deformation processes. In our research, we combine the two approaches to develop innovative computer aided modelling concepts. For the storage of 3D data we optimize file sizes and access procedures to relevant parts of the data. Here, compression can be achieved by exploiting geometric coherence and importance driven access is made possible by using hierarchical models (level-of-detail). For transmission and display we also exploit hierarchical structures which decompose the given geometric information into a global shape and detail features on different resolution levels. By this we can adjust the level of detail in a 3D model depending on the current quality requirements or on the available hardware resources. Besides the classical geometry representations (e.g. polygons and splines) we are also investigating non-standard representations that are point- or image-based. These are optimized for efficient and high quality rendering of realistic 3D objects since they can be extracted from 2D images without having to construct topologically consistent 3D models. In the context of architectural planning and prototyping we are developing software tools for interactive 3D visualization. Our current walk-through viewing software supports our semi-immersive stereo projection wall and provides features like sun-shadow simulation for outdoor scenes. For the open source initiative OpenSG (www.opensg.org) we are implementing various algorithms for the handling of complex polygon meshes with varying levels of detail.

Important Recent Project Participations

- "MINGLE", EU Research Training Network
- "OpenSGplus", BMBF Verbundprojekt (www.opensg.org, www.openmesh.org)
- "V3D2", DFG Schwerpunktprogramm
- "Processing of large triangle meshes", German-Israelian Foundation

Important Recent Industrial Partners

BMW AG, Siemens AG, Tebis AG, Zeiss AG



Future of the Lab

The Computer Graphics group will continue the theoretical investigation and practical development of techniques and algorithms for graphics and geometry applications. In addition we are planning several long term projects for the development of comprehensive software systems that integrate various stages of typical geometry processing pipelines. Example applications are Reverse Engineering (from data acquisition to segmentation and shape optimization) and Simulation (from model pre-processing to visualization of the results). Moreover, we will continue the research cooperations with our current partners and are constantly open for new contacts and collaborations.