GERMANY Dortmund

University of Dortmund

Informatik (LS VII) (Computer Graphics)
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Core Competence

Computer-aided Geometric Design, Computer-vision-based Human-computer Interaction, Image-based Medical Diagnosis and Treatment, Visualization

Head of the Institute
Heinrich Müller

History

The unit Informatik (LS VII) was established in 1992. At that time, Heinrich Müller and some first members of the group moved from Freiburg to Dortmund. Since then, lectures, projects, seminars, and diploma theses have been offered allowing the students to specialize in the field of computer graphics. Up to now, more than 200 students have written their diploma thesis in computer graphics, and 14 PhD-theses have been finished. LS VII is involved in several interdisciplinary projects, for example in a DFG-funded research group "Free Form Surfaces in Production", and in a research initiative "Modeling and Simulation" at the University of Dortmund.

Staff

1 Professor: Heinrich Müller
8 Research assistants: Claus-Peter Alberts, Jörg Ayasse, Peter Bollweg, Christian Brockmann, Christian Leubner, Gabi Peters, Martin Wawro, Frank Weichert
1 Secretary: Marion Holm

Rooms and Locations

LS VII occupies about 300 square meters and is located in the building Otto-Hahn-Strasse 16 in the technology park close to the university. It includes special labs for VR and vision-based human-computer interaction.

Financing

The basic stuff of LS VII (6 people) is financed by the state. Half of the research assistants are funded by the German Science Foundation (DFG) and the German Ministry of Education and Research.

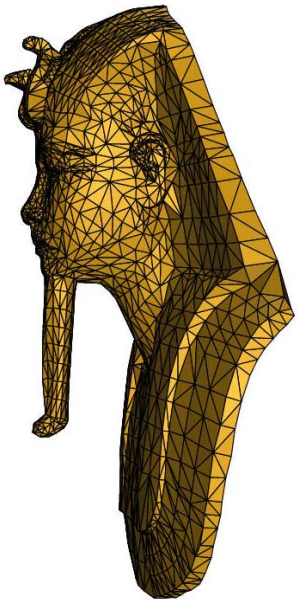
Current Structure and Important Partners

LS VII currently has three main working areas: computer-aided geometric design and simulation in computer-aided production, computer-vision-based human-computer interaction, and image-based diagnosis and treatment in medicine. The groups cooperate with partners from other departments of the University of Dortmund, from other universities, and from different research labs.

Current Research

Current research takes place in the fields of computer-aided geometric design and simulation in computer-aided production, computer-vision-based human-computer interaction, and image-based diagnosis and treatment in medicine. Computer-aided geometric design and simulation in computer-aided production: Currently there are three projects main projects: "Surface reconstruction from scattered and structured data", "Voxel-based geometric modeler", and "Simulation of milling and grinding processes by discrete displacement fields". The second and the third project are at least partly based on rasterized data which turn out to be a powerful form of

representation with today's algorithmic knowledge and computing power. The simulation in the third project combines discrete data structures with conventional FE-technology, with the future goal, however, to find less computation-intensive approximations to FE-based simulation. Computer-vision-based human-computer interaction: The projects in this field have the goal of including human motion into human-technique interaction by optical sensors (color video cameras, black-and-white cameras with infrared filters) and methods of image processing. In many fields the application of optical recognition of human motions can lead to a higher acceptance of technique by the user. Innovative input and control techniques like body detection, gesture recognition, and recognition of human motion open new possibilities for the design of the human-technique interface. We develop basic software for computer-vision-based human-computer interaction which can be adapted to various scenarios of applications. Examples are hand gesture recognition in a local environment, and pointing to projection walls for the purpose of direct interaction with the projected application. Image-based diagnosis and treatment in medicine: The work in this field is directed by application projects. Currently there are three projects: "Guiding trans-bronchial needle aspirations without a computer in the operation room", "Model-based segmentation and visualization of IVUS images for radiological treatment planning in cardiovascular brachytherapy", and "Object-oriented FEM-based simulation of knee-Joint biomechanics on parallel architectures".

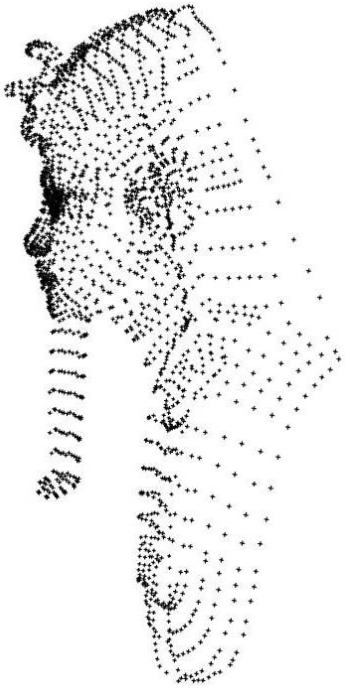


Important Recent Project Participations

- "Efficient Algorithms and Data Structures", DFG Program HOME - "Home applications optimum multimedia/multi-modal environment, EU-TIDE DE 3003 INVITE, BMBF-project
- "Free-Form Surfaces", DFG Research Group The Virtual Knowledge Factory, research consortium funded by the state North-Rhine-Westfalia.

Important Recent Industrial Partners

Small local companies.



The Future of the Lab

The goal of LS VII also in the future is to solve problems of application in computer graphics and image processing with advanced and sophisticated algorithmic methods. Currently, the applications are mainly in human-computer interaction, mechanical engineering, and medicine, but we are open for other fields, too, if there are interested partners of cooperation.