IRELAND Dublin

Trinity College Dublin

Image Synthesis Group
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Core Competence

Graphics and perception, real-time computer animation, Virtual Reality, photo-realistic rendering and parallel graphics

Head of the Institute
Carol O'Sullivan

History

The Image Synthesis Group (ISG) was established in 1993 by Steven Collins to pursue research in all aspects of Computer Graphics and Visual Computing. As of October 2002, we will have 15 full-time researchers. The group has been extremely successful in securing research funding for projects since it was founded. Former members of the group have founded the Irish gaming software company Havok. Members of the group have founded the Irish Chapter of Eurographics, and have been involved in the organisation of the Eurographics Ireland Workshop 2002, the ACM SIGGRAPH/Eurographics workshop on Perceptually Adaptive Graphics, Utah, 2001, The International Symposium on Virtual and Augmented Architecture (VAA01) in 2001 and the Irish Workshop on Eye-tracking 2000 and the Eurographics Rendering workshop in 1995.

Rooms and Locations

The ISG occupies the 2nd floor of Oriel House, an old building located just off campus on Westland Row. This includes 4 staff offices, a post-graduate laboratory, and a special lab for VR and eye-tracking.

Staff

2 Permanent academic staff: Carol O'Sullivan, Ann McNamara
2 Post-doctoral researchers: John Dingliana, Gareth Bradshaw
11 Research assistants: Alan Cummins, Simon Dobbyn, Thanh Giang, John Hamill, Robert Mooney, Keith O'Conor, Christopher Peters, Clodagh Rossi & 3 new researchers in Oct. 2002.

Financing

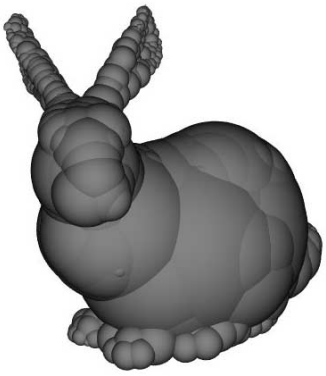
The permanent academic staff are funded by the Irish government, and the research staff are funded by research grants from the Irish Higher Education Authority and other national funding agencies.

Current Structure and Important Partners

The Image Synthesis Group is one of the research groups within the Computer Science Department in Trinity College Dublin. They cooperate closely with other departments within TCD, such as the departments of physiology and psychology, and with the High Performance Computing Centre. Outside of these, they have close links with researchers in the technical university of Aachen, CNR in Pisa, University of British Columbia, IBM TJ Watson research centre, MIT Medialab, and others.

Current Research

One major project involves the provision of a large-scale graphics and visualisation facility along with a research program involving 3 main areas: Perceptually adaptive graphics Human animation and crowd simulation Simulation of large-scale environments, including urban models and immersive interaction with complex scientific data and structures. We are interested in scalable graphics solutions to form a basis for both the planned facility and our research program. We investigate Level of Detail (LOD) techniques for real-time rendering, and related perceptual issues, on a range of computing platforms, from desktop and pocket PCs to large graphics clusters. In particular, we aim to develop perceptually adaptive techniques for plausible physical simulations. One issue that is far from resolved is the problem of realistic collision simulation in scenes where large numbers of objects are colliding, and processing must occur in real-time. We look for ways in which we can optimise the realism of such simulations and carry out psychophysical experiments that investigate different factors affecting collision perception. New techniques for building hierarchical data structures to enable this process are also being developed. We are also interested in the perception of images generated with global illumination techniques and the use of human judgements in this task. Eye-tracking and eye-movement analysis are an important component of all our research. Another project aims to build a large-scale, 3-dimensional immersive distributed simulation of the city of Dublin. This will serve both as a research test-bed, and has the potential for future long-term commercial exploitation. We also are involved in several inter-disciplinary visualisation projects, for example with bioscientists and physiologists.



Important Recent Project Participations

- MobiSym: Frameworks and Applications for Mobile Networks using Synthetic Multimedia, Enterprise Ireland ATRP project
- Program for research in Computer Graphics: Animation and Visualisation, Higher Education Authority PRTLI project
- A Virtual Reality monitoring system for cardiac infarcts – Enterprise Ireland, basic research grant
- Natural Gesture for Crowd Animation - Higher Education Authority, Multimedia Research Program grant (with J.Cassell, MIT Media Lab)
- Real-time Adaptive Animation Techniques - Enterprise Ireland, strategic research grant
- Real-Time Physically Based Character Animation - - Enterprise Ireland, strategic research grant
- Parallel Algorithms for Global Illumination - Enterprise Ireland strategic grant and Hitachi.
- Time-Critical, Adaptive Techniques for Perceptually-Sensitive, Real-Time Animation - Enterprise Ireland, basic research grant.
- Automated Acquisition and Archival of Irish Moulding Profiles – Enterprise Ireland basic research grant, the Office of Public works (with the History of Art dept. TCD)
- Crystal Design Visualisation - Waterford Crystal and Enterprise Ireland

Important Recent Industrial Partners

Havok, Hitachi, Waterford Crystal

Future of the Lab

The Image Synthesis Group will continue to perform research with particular emphasis on graphics and perception, while widening our sphere of expertise over the coming years. We also wish to strengthen our international ties with involvement in European projects, and to attract more researchers from abroad to join our growing group. The interest in graphics and visualisation research in Ireland is growing, and we will continue to contribute towards this development.