GIIG: Granada Graphics Group

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Abstract

The Granada Graphics Group is one of the research groups of the Software System Department. It covers education and research activities on Comouter Graphics at the University of Granada.

1. Introduction

Computer Graphics activities started in the late 1990 within a contract. The group was formally created by 1996. Lectures on computer graphics are given since 1989.

The group organized the EG Spanish chapter annual conference in 1993 and 2005, the EG workshop on Design, Specification and Verification of Interactive System in 1997, the EG rendering workshop in 1999 and the EUROGRAPHICS annual conference in 2003. In 2010 the group set up the Virtual Reality Laboratory. Recently the group has created a spin-off company (Virtum Graphics) devoted to Computer Graphics Software development and Cultural Heritage applications.

The domain expertise of GIIG members includes:

Non-photo-realistic rendering. Stippling. Silhouettes. Stylizing.
Virtual reality. Interaction techniques. Tracking systems. Haptic interaction.
Volume Visualization. Medical and Astrophysics models. Model representation
Cultural Heritage. Information systems for cultural heritage.
3D digitization. Laser scanner. Structure from motion. Mesh processing.
Colour. Restoration of art work. Spectroscopy for colour restoration.

2. Staff

The research team is composed by six faculty members: J.C. Torres, D. Martín, V. Luzón, P. Cano, A. León, G. Arroyo and V. del Sol; and ten PhD students.

3. Facilities

The group facilities are located in 300 square meters building near Granada. The facilities at this location have several Virtual Reality installations, a research labs, a meeting room and some offices. The laboratory equipment includes:

- Powerwall. 7.5 x 2.5 m stereo display, using back projection, passive stereo and optic tracking.
- Stereoscopic table. Orientable desk passive stereo and magnetic tracking, developed by Moving group at UPC.
- Portable RV system. Use passive stereo and magnetic tracking, developed by Moving group at UPC.
- HMD, nVisor SX111 system.
- Sensegraphics 3D-IW inmersive workbench.
- Laser scanner Minolta Vivid-910.
- Time of flight laser scanner Callidus CP3200.

4. Collaborations

We have important cultural heritage sites partners including the Alhambra, Itálica and the Anadalucian Institute for Iberian Archaeology, as well as industrial partners as Secuoya group Intelligenia Dynamics and Virtum Graphics. We have done research collaborations with the University of Jaén, the Polytechnic University of Catalonia, University Paris-Sud and the Visual Computing Group at CNR. At

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Figure 1: *Digitizing the Lion's Fountain at the Alhambra.*

present, the group funding comes both from applied research projects and public basic research project. Our budget for 2012 is over 200.000 euros.

5. Projects

At this moment, the group is working on the following projects:

Cultural Heritage Information System. This project has proposed an innovative approach to Cultural Heritage Information System. This new strategy is based on the direct association of layered data with the surface of an object, allowing the management, visualization and analysis of any kind of information (spatial and non-spatial data) related to any cultural heritage artefact or archaeological site. An application has been developed following this approach, that runs on a personal computer. The application is being tested on real work at two emblematic cultural heritage sites in Andalusia: The Alhambra Palace in Granada and the Roman city of Itálica, close to Seville. The system will be distributed as open source software when the project close. At this moment it can be used freely for research purposes.

UAV-Cartograph. This project aims to generate new tools to generate cartographic information from photographs done from UAV quad-copters . We have developed a structure from motion framework that carry on the 3D reconstruction.

Adpata. This project, lead by Indra, aims to generate new technology for adaptive multimedia presentations, that recognises the user profile and presents information according to the user needs.Our group participates on this project as consultant for 3D information presentation and content generation.

Museum of the Lion Court at the Alhmabra. We are working on the development of an interactive application for the Alhambra Museum to explains the restoration process carried on the Lions sculptures of Lion Court at the Alhmabra.

3D digitizing of Heritage buildings using UAVS. The goal of this project is to adapt UAV technology and structure from motion reconstruction software to carry on 3D digitization of outdoors and inside of large buildings.

6. Publications

Recent publications cover the different research areas developed by the group: NPR [MAVI11], Cultural Heritage [TLRS12], 3D Digitizing [MMCT09], Volume Modelling [LCV08], Volume Visualization [RTLP12], Structure from Motion [TARH12], Medical applications [VVlH*07], Haptic Interaction [PST12] and Virtual Reality [RLT12]. Some recent publications are listed in the reference section.

7. Future of the lab

The group has reduced its size recently, as a result it is now a more cohesive team. We have a good PhD program on Computer Graphics that will allow to incorporate two or three new PhD students every year.

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