

Graphics and Imaging Lab

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Figure 1: Some of our recent projects. From left to right: Graphics and Imaging Lab logo, Femto-photography [VJM*13] (in collaboration with the MIT Media Lab), physically-based simulation of rainbows [SML*12] and realistic virtual humans [JSB*10].

Abstract

Established in Spain in the year 2008, the Graphics and Imaging Lab carries out research in the fields of computational photography, computational imaging, computer graphics and applied perception (Figure 1 shows representative recent work). Given its multidisciplinary nature, each new project is approached from several points of view in the search for new exciting lines of research. We also encourage external collaborations to benefit from knowledge exchange with other universities or industry, and put a especial emphasis in the internationalization of our research.

1. Staff

Our team is currently composed by 14 members in total. Given the location of the lab at the engineering faculty, all the staff have a practical engineering background (computer science, industrial or telecommunications):

- *Faculty*
 Diego Gutierrez (director). Associate Professor
 Adolfo Muñoz. Assistant Professor
- *Post-doctoral researchers*
 Jose A. Iglesias
- *Visiting Post-doctoral researchers*
 Angeles Lopez, Universitat Jaume I (Castellon, Spain)
 Jose Ribelles, Universitat Jaume I (Castellon, Spain)
- *PhD students*
 Belen Masia, Adrian Jarabo, Elena Garces, Jose I. Echevarria
- *Master and undergraduate students*
 Carlos Aliaga, Patrick Moosbrugger, Paz Hernando,
 Daniel Osanz, Julio Marco

2. Projects and Collaborations

Main sources of funding come from our ongoing European and National projects

- *GOLEM: Realistic Virtual Humans* (Marie Curie Programme)
- *VERVE: Vanquishing fear and apathy through Exclusion: Personalised and populated Realistic Virtual Environments for clinical, home and mobile platforms* (7th Framework Programme)
- *MIMESIS: Low-Cost Techniques for Appearance Model Acquisition of Materials* (Spanish Ministry of Science and Technology)

We also get support from our industry partners via contracts, industrial collaborations or donations. Recent partnerships include Adobe Systems, NVIDIA and Nokia.

Some of our current academic collaborations with other labs include: MIT Media Lab (USA), Adobe Advance Technology Labs: Seattle and San Jose (USA), University of Tsinghua (China), Universitat Jaume I (Spain), Yale University (USA), Cornell University (USA), INRIA Bordeaux and Sophia Antipolis (France), Trinity College Dublin (Ireland),

Sapienza University of Rome (Italy), Vanderbilt University (USA), Universitat de Girona (Spain), UC San Diego (USA), Disney Research Zurich (Switzerland)...

3. Research topics

We are a computer graphics group; our research focuses on classic computer graphics topics such as illumination or rendering, but also expands to other related areas. We combine our four main lines of research for finding new approaches to classic and new problems alike:

Computational photography We tackle the different steps in the photographic pipeline: from the capture and processing of raw data, to the final display. We exploit specific characteristics of the human visual system to produce pleasing results, be it during capture and processing [MPCGar] or during display [MAF*09, WLGHI2].

Computational imaging The combination of the scientific and artistic background of some of our members has yielded an emerging line of research where the aim is to overcome the limitations of 2D digital photography enabling novel manipulations like depicting procedural caustics [GLMF*08], light detection and relighting [LMJH*11], or intrinsic image decomposition [GMLMG12]. We have also developed new techniques for visualizing light in slow motion as part of the Femto-photography project [VJM*13].

Computer graphics and applied perception When generating results, our work focus not only on achieving realism in our simulations of rainbows [SML*12], scattering [MESG11, GJN*09] or human skin [JSB*10]; but also on sparing as much calculations as possible. We do that by taking into account how the human visual system works to produce compelling physically-plausible results when capturing complex materials [MES*11], performing image retargeting [RGSS10] and anti-aliasing [JESG12], rendering motion blur [NCSG11] or lighting crowded scenes [JVES*12].

4. Future of the lab

Despite being a very young group, the *Graphics and Imaging Lab* has already established itself and produced quality research in all its areas of interest. Its former students have all found good jobs either in academia or in top companies such as *Activision* or *SolidAngle*. We have strong links and working relationships with companies and institutions worldwide, which we hope to maintain and expand.

In the future we hope to continue this trend, and secure the necessary funding by means of European Projects and private sponsorships from industry. We would like to maintain the group agile enough so we can tackle a diversity of problems related to our area of knowledge, while providing our students a good platform from which to reach their professional goals.

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