Visual Computing Laboratory, ISTI-CNR

Roberto Scopigno

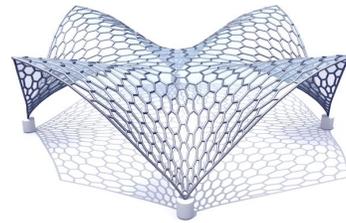Visual Computing Lab, ISTI-CNR

Abstract

The mission of the Visual Computing Lab is to design new visual media technologies, which include 3D graphics and some advanced 2D media. We focus our work in the design of new algorithms and tools for digitization, geometric processing and visualization, most of them disclosed to the community. Our main application domain is Cultural Heritage, but the technologies developed have much wider application opportunities

3D Graphics for Cultural Heritage

Design of new algorithms and tools for processing sampled geometric and color data, to build optimized digital models for local and/or remote graphics applications. We have skills on both active 3D scanning and passive acquisition (SfM), focusing our work on the design of algorithms and software tools which should make the production of sampled 3D models cheaper, faster and nearly automatic. Most of the research activity in this field is related to the Cultural Heritage domain.

Geometry Processing

Design of methodologies for shape analysis and characterization, mesh parametrization and its applications, re- meshing, compression, quadrilateral mesh generation, and advanced techniques for texture mapping. More recently, we have investigated the domain of 3D printing, with recent results concerning the pro- duction of deformable models on common 3D printers

Interactive Graphics and Visualization

Interactive visualization algorithms and applications for Computer Graphics, mainly focus- ing on real-time rendering constraints, with the term rendering in- tended in a broad sense (photorealistic, massive data management, ad-hoc solutions for specific presentation purposes). Solutions are de-

signed for both desktop and mobile devices; the design of mul- tiresolution data management solutions is a basic resource for many projects in this strand. Research concerns the design of efficient data structures to represent very complex datasets (including data simplification, multiresolution representation, and external memory techniques) and new rendering methodologies to support interactive visualization of complex data, including urban contexts (up to the scale of an entire 3D city) and efficient navigation on mobile platforms.

Main research projects

"Harvest4D - Harvesting Dynamic 3D Worlds from Commodity Sensor Clouds" EC 7FP FET project no: 323567 (2013-2016)

The main goal of Harvest4D is to design a new pipeline for 3D acquisition, able to fully employ the potential of ubiquitous commodity sampling devices, exploiting this huge amount of data and being able to process and integrate data coming from multiple sampling actions occurring in different times and with different sensors.

"ARIADNE - Advanced Research Infrastructure for Archaeological Dataset Networking in Europe" EC INFRA-2012-1.1.3 (2012-2016)

ARIADNE brings together and integrates existing archaeological research data infrastructures so that researchers can use the various distributed datasets and new and powerful technologies as an integral component of the archaeological research methodol- ogy.

"VASCO - Virtual Studio for Security Concepts and Operations" EC FP7- SEC-2013 (2014-2017)

The VASCO project addresses the design, implementation and evaluation of an innovative IT tool that will enable security professionals and administrators to jointly formulate, test, and adjust security concepts and measures in a virtual environment; second, it will produce a knowledge and best practice database, which captures dynamic and visual reference scenarios created with the VASCO system.

Other CH-related activities: we often contribute to projects concerning CH restora- tion or virtual presentation, in collaboration with major restoration institutions (Opificio delle Pietre Dure, Florence; Istituto Superiore per la Conservazione ed il Restauro, Rome) and museums or conservation authorities (Florence, Pisa, Rome, Napoli, Venice).

Software Tools

VC lab developed and distributed many prototypal software packages, since mid 90s. Among those, a success story is MeshLab, a GPL tool for mesh process- ing, downloaded by more than 1.300.000 users worldwide. Recent resources are 3DHOP, a platform for the easy publication and visualization of 3D content on the web, Piccante, an open-source HDR imaging library, and the technology for presenting RTI images on the web.

Awards

- R. Scopigno Eurographics "Distinguished Career Award 2014"
- Scopigno Eurographics "Outstanding Technical Contributions Award 2008"
- M. Tarini Eurographics "Young Researcher Award 2006"
- P. Cignoni Eurographics "Young Researcher Award 2004"

People

Andrea Baldacci	gf	Francesco Banterle	rs
Marco Callieri	rs	Paolo Cignoni	rs
Massimiliano Corsini	rs	Francesca De Mitry	a
Matteo Dellepiane	rs	Marco Di Benedetto	rs
Fabio Ganovelli	rs	Valeria Garro	gf
Luigi Malomo	ra	Gianpaolo Palma	rs
Gaia Pavoni	gf	Nico Pietroni	rs
Paolo Pingi	rs	Federico Ponchio	rs
Marco Potenziani	gf	Guido Ranzuglia	rs
Roberto Scopigno	Head	Eliana Siotto	rc
Marco Tarini	ra		

gf	Graduate Fellow
rs	Research Staff
rc	Research Collaborator
ra	Research Associate
a	Administrative Staff