# Lab & Project Presentations

## Projects Presentations

*Session Chair: Nicolas Holzschuch*

| | |
|---|---|
| Time : | Friday 3rd, 13h30 - 14h00 |
| Room : | Main Auditorium |

AIM@SHAPE

**Keywords**: shape modelling, shape semantics.

**Description**

Advanced and Innovative Models And Tools for the development of Semantic-based systems for Handling, Acquiring, and Processing knowledge Embedded in multidimensional digital objects

Network of Excellence project - EU Sixth Framework Programme

**Consortium**

- CNR – Istituto di Matematica Applicata e Tecnologie Informatiche- Dept. Genova
- Università di Genova / Dipartimento di informatica e Scienze dell Informazione
- École Polytechnique Federale de Lausanne
- Fraunhofer Institut für Graphische Datenverarbeitung
- Institut National Polytechnique de Grenoble
- Institut National de Recherche en Informatique et Automatique
- Informatics and Telematics Institut / Center for Research and Technology Hellas
- Université de Genève
- Max-Planck Institut für Informatik
- Stiftelsen for industriell og teknisk forskning ved Norges Tekniske Høgskole
- Technion / Israel Institute of Technology
- Technische Universität Darmstadt
- Utrecht University
- Weizmann Institute of Science

**Project summary**

The mission of AIM@SHAPE is to foster the development of new methodologies for modelling and processing the knowledge related to digital shapes. The scientific innovation sought by AIM@SHAPE is to move towards digital representations of shapes able to model not only the visual appearance of objects but also their meaning or functionality in a given knowledge or application domain.

This new approach in shape research is to be created by:

- the formalization of shape knowledge and the definition of shape ontologies in specific contexts;
- the definition of shape behaviours which formalise the interoperability between shapes;
- the delineation of methods for knowledge-based design of shapes;
- the definition of tools for semantics-dependent mapping of shapes.

The AIM@SHAPE Consortium of 14 excellent research institutions aims at integrating research on digital shapes modelling and processing with Knowledge Technologies and Semantic Web tools,

for developing an e-Science framework for reasoning about and sharing knowledge related to digital shapes (Digital Shape Workbench).

The shift towards semantically capable digital representations of shapes imposes a new perspective on the digital shape lifecycle design, in order to understand where and how the semantics can be encapsulated in the digital representation of shapes. The research programme of AIM@SHAPE focuses on the three basic levels of shape-knowledge representation: geometric, structural and semantic. A purely geometry-based representation of a digital shape can be used to view the shape; a structural view can give hints and show how the shape components are linked together; a semantic view is able to propose an interpretation or meaning of the digital shape. The research activities address the development of methods and tools for switching from one level to another, trying to preserve, extract and code shape knowledge during acquisition and reconstruction phases, analysis and structuring processes, interpretation and mapping stages.

**Contact**

Bianca Falcidieno, IMATI-CNR, Dept. of Genova
http://www.aimatshape.net

---




## FOVEA

**Description**

Human Paleontology or Paleo-Anthropology is the science that aims to study the Evolution of human species by analyzing the fossil remains found on an excavation site. This is a science at the crossroad of many disciplines: geology, anatomy, biochemistry, physics, botany, ethnology, etc., that requires to compile the three following sources of data: the geology of the site, the environment of the fossils and the fossils.

By comparing all these data with the ones of other excavation sites, it becomes possible to place the fossil in the Human Evolution scheme and to try to understand its mechanism. Nevertheless, currently, the processing and the compilation of these data remain incomplete since most of them are not digitized and their processing is often performed in 2 dimensions only. There is then a large requirement of 3D digital modeling.

The FOVEA Project gathers two research teams in Paleontology - the Department of Prehistory of the French Museum on Natural History (CNRS FRE 2677) and the European Center of Paleontological Research of Tautavel - and two research teams in Computer Science - the Department Virtual Reality of the Research Institute in Computer Science of Toulouse (CNRS UMR 5505) and the EPIDAURE Project of the French National Institute of Research in Computer Science and Automatics (INRIA) in Sophia Antipolis, all of them being internationally recognized, in an ambitious research program that has the following goals:

- to build a 3D complete digital model of a paleo-anthropological excavation site,
- to archive exhaustively the discoveries,
- to assist the paleo-anthropologists in their research, in particular, by allowing them to test hypotheses on the evolution of the site thanks to 4D modeling tools,
- to favour scientific collaborations,
- to broadcast the results over Internet.

and to combine Information and Human Sciences, as high-technologies with our oldest Past.

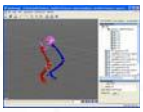
The FOVEA Project is supported and partially funded by the

Interdisciplianry Program "Information Society Archivage et patrimoine documentaire - Apports des sciences de l'information et de la cognition" of the French Center for Scientific Research (CNRS) for the period mid-2003 / mid-2005.

**Contact**

http://foveaproject.free.fr/
Gerard.Subsol@wanadoo.fr

---


## MULTIMOD - *A Multimodal application framework for the development of Computer Aided Medicine Applications*

The MULTIMOD project is an European Project funded under the IST programme during the framework V. The project lasted three years and is closing at the end of September 2004.

**Consortium**

The project consortium is composed by CINECA the most important Italian Computing Centre, the computer graphics group at the University of Luton, Istituti Ortopedici Rizzoli the largest Italian Orthopaedic Hospital, the functional anatomy group at the Universitè Libre de Bruxelles, ESI software, VICON motion systems.

**Results**

The major result of the project is the Multimod Application Framework (MAF), an open source freely available framework for the rapid development of applications based on the Visualisation Toolkit and other specialised libraries.

The framework allows the development of multimodal visualisation applications where different views of the same data are synchronised and when the position of an object changes in one view it is updated in all the other views. Moreover the framework is designed to support 3D interaction and the development of 3D and multimodal interfaces.

MAF is entirely developed in C++ and is based on wxWindows for the GUI elements.

The framework provides high level components that can be easily combined to develop a vertical application in different areas of computer aided medicine. In particular the hierarchical representation of the data allows an easy registration between the anatomical data and the motion analysis data of the patient. Currently the framework in fact extends VTK to support time variant data, it provides the ability to read and display medical images in DICOM format, it provides an interface to Vicon Motion Capture system and a C3D file importer. The most important features currently provided consist in a 3D landmarking environment, a point based and surface based registration method, realtime Dynamic Reconstructed Radiographs and realtime Isosurface generation.

**References**

For more details refer to the following sites:

- http://www.tecno.ior.it/research/biomechcomp/projects/multimod/
- http://www.cineca.it/B3C/MAF/
- http://www.kitware.com/

---

# RealReflect - *Real-Time Visualization of Complex Reflectance Behaviour in Virtual Prototyping*

**Keywords**: Photorealistic Rendering, Virtual Reality, Global Illumination, Tone Mapping, Material Representations

**Description**

Conventional Virtual Reality (VR) is already being used in the design process for styling reviews on a daily basis, but until now only object shape can be assessed in a meaningful way, and neither the look and feel, nor the quality of surface materials can be adequately reproduced. Therefore, most interior design decisions in the automotive industry are still performed on expensive real prototypes. Apart from being costly and wasteful, this practice also significantly increases the time to market of the overall end products.

The RealReflect project is an endeavor to increase the realism of VR technology to levels where it can be used for meaningful qualitative reviews of real objects. The technology developed in the project covers all stages of an advanced image synthesis process, ranging from the acquisition and further processing of reflectance data over texture synthesis and compression of the measurement data to high quality light simulations and real-time image-based rendering. The resulting improved quality especially provides a considerable benefit to those VR users groups - such as the automotive industry or architecture - who routinely have to make important design decisions about object appearance long before the actual product is first assembled.

In this presentation, we intend to provide details both on the project's goals and the results that were achieved by the various participants - representing industry as well as research institutes - of the RealReflect project already.

**Contact**

www.realreflect.org
meseth@cs.uni-bonn.de