



**SIGGRAPH**2009

**NEW ORLEANS**

# **Computation & Cultural Heritage: Fundamentals and Applications**

# **Section I: cultural heritage landscape and techniques**

- 1:45 introduction**
- 1:55 efficient traversal of large sets of images in C.H.**
- 2:15 simple, efficient visualization of heritage objects**
- 2:40 applications of image-based synthesis and HDR imaging for heritage sites and objects**
- 3:15 (fifteen minutes)**

## **Section II: graphics resources for heritage, heritage lessons for graphics**

- 3:30** low cost resources for image synthesis and image-based modeling
- 4:00** a pipeline for efficiently reconstructing heritage objects from range data
- 4:30** frequent pitfalls and deficiencies in the use of 3D acquisition techniques for CH
- 4:50** planning a collaboration in the CH field
- 5:00** an honest review and look to the future
- 5:15** questions

# people

- . **Benedict Brown**, *Katholieke Universiteit Leuven*
- . **Kevin Cain**, *INSIGHT*
- . **Paolo Cignoni**, *CNR, Pisa*
- . **Paul Debevec**, *ICT, USC*
- . **Greg Downing**, *xRes*
- . **Mashhuda Glencross**, *University of Manchester*  
(for **Greg Ward**, *Anywhere*)

**each person completing an evaluation form for this course will be entered into a prize draw to win a SIGGRAPH 2009 mug**

**[http://www.siggraph.org/courses\\_evaluation](http://www.siggraph.org/courses_evaluation)**

**there will be one winner per course,  
e-mail notification will go out after SIGGRAPH**

# introduction

Kevin Cain

# **taxonomy of recent projects**

# lots of graphics researchers have chosen to work with data from heritage objects

- . Alan Chalmers, *University of Warwick*
- . George Drattakis, *REVES/Inria Sophia-Antipolis*
- . Carlos Esteban, *Toshiba Research Europe*
- . Deiter Fellner, *Fraunhofer Institute for Computer Graphics Research*
- . Luc Van Gool, *University of Leuven*
- . Marc Levoy, *Stanford University*
- . Pascal Mueller, *Procedural Inc.*
- . Holly Rushmeier, *Yale University*
- . Roberto Scopigno, *CNR Pisa*





# heritage and SIGGRAPH, itself, has history

ACM SIGGRAPH Campfire:  
Graphics & Archaeology

Snowbird, Utah, May 2000



# 'cultural heritage' researchers are finding their own applications within graphics

remixing Çatalhöyük

Ruth Tringham, Anthropology, UC Berkeley

## REMixING ÇATALHÖYÜK



Play Intro

Located in central Turkey, Çatalhöyük ("cha-tal-hu-yuk") is the site of a Neolithic farming community that flourished from 9,400 until 7,700 years ago. Remixing Çatalhöyük features the investigations and discoveries of the Berkeley Archaeologists at Çatalhöyük and their colleagues. Explore themed collections, create original projects, and contribute your own "remix" of Çatalhöyük.

Learn more ▶



Life Histories of People, Places & Things

Senses of Place

Explore 3D Visualizations



Archaeology at Different Scales

The Public Face of Archaeology

Upload Your Remix

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Archaeological Research Facility, The Gilbert Fund, Open Knowledge  
and the Public Interest, Multimedia Authoring Center for Teaching  
Anthropology, UC Berkeley, Office of the CIO

# EPOCH EU framework project

- . EPOCH, EU: 2004-2008
- . MeshLab
  - Visual Computing Lab
  - ISTI-CNR
- . CityEngine
  - Pascal Mueller, ETH
- . Archive Mapper for Archaeology





# visual computing lab, CNR

- . Digital Minerva 2000-2007
- . Digital Cathedral of Pisa
- . Software for heritage:
  - MeshLab
  - HPTM Browser
  - Metro

Visual Computing Lab

Home Monday, 18 May 2009 search...


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**Welcome to the Visual Computing Lab**

**New event!**  
The new version of the CENOBIUM web site is online!  
<http://cenobium.isti.cnr.it>

**Recent event**  
Innovazione Tecnologica per l'Archeologia  
**Il rilievo e la rappresentazione digitale tridimensionale**  
Convegno e Corsi  
Roma, CNR - Aula Marconi, 12-13 Febbraio 2009  
<http://vcg.isti.cnr.it/innovtecharch>



upper row: a.spinelli, g.ranzuglia, m.corsini, m.dellepiane  
lower row: r.scopigno, c.montani, v.fiorin, m.di benedetto, m.callieri  
missing: p.cignoni, f.de mitry, f.ganovelli, f.ponchio, r.scateni, m.tarini

**Who's Online**  
We have 1 guest online

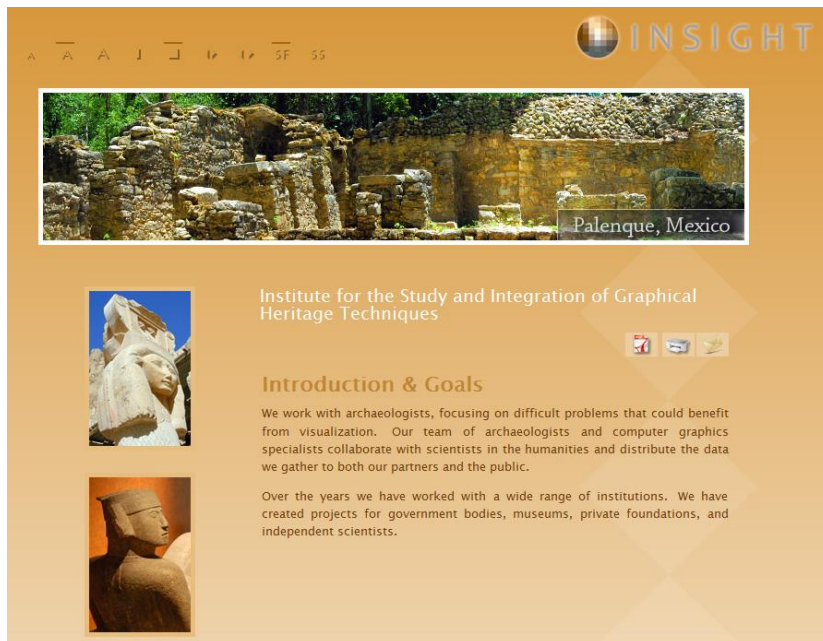
**Newsflash**  
October 08 - Scanning in Cartagena, Spain  
In the context of the Archeomed EU project, a scanning campaign has been performed in the Museum of Underwater Archeology (ARQUA).  
Several interesting objects have been acquired: the results of data processing will be shown in Naples by the end of November.  
October 2008 - America discovers MeshLab!  
MeshLab is improving every day thanks to the work of Lab staff, students and external collaborators.  
While the release of version 1.2 is approaching, we discover that MeshLab is used by a lot of people, even across the ocean!!  
Here are two examples:  
- During a 3D scanning overview on web TV Revision 3, MeshLab is extensively used and

# non-profit groups

groups receiving public and private support

public: NSF, EU, public grants

private: foundations, private donors, museums



The screenshot shows the website for the Institute for the Study and Integration of Graphical Heritage Techniques (INSIGHT). The header features the word "INSIGHT" in a stylized font. Below the header is a large image of ancient stone ruins with the caption "Palenque, Mexico". To the left of the main text are two smaller images of stone carvings. The main text reads: "Institute for the Study and Integration of Graphical Heritage Techniques". Below this is the section "Introduction & Goals" with the text: "We work with archaeologists, focusing on difficult problems that could benefit from visualization. Our team of archaeologists and computer graphics specialists collaborate with scientists in the humanities and distribute the data we gather to both our partners and the public." A second paragraph follows: "Over the years we have worked with a wide range of institutions. We have created projects for government bodies, museums, private foundations, and independent scientists."



The screenshot shows the website for CyArk, "Digitally Preserving and Sharing the World's Cultural Heritage". The header includes a search bar and navigation links: Home, Projects, Community, Education, Hazards, Partners, About, and Contribute. The main content area features a large 3D visualization of a dome structure with the text "Ancient Merv Oasis City along the Silk Road". Below this are three promotional boxes: "Projects" with the tagline "Explore Multimedia from Around the World", "New to CyArk? Take the Tour!", and "Why We Do This" with a globe icon.

# subdomains in cultural heritage

- . *archaeology*
- . *anthropology*
- . *art history*
- . *area studies*
- . *history*
- . *visual studies*

Cultural heritage ("national heritage" or just "heritage") is the legacy of physical artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations.

*wikipedia.org*



Levoy, Pulli, Curless et al, *Digital Michelangelo Project*, 2000





Debevec et al, *The Parthenon*, SIGGRAPH 2004 ET





University of Virginia, UCLA, Politecnico di Milano, *Rome Reborn*, 2008