

ProCams'07

4th IEEE International Workshop on Projector-Camera Systems

There continues to be growing interest in systems that combine projection technology with computer vision. Examples include automatically calibrated display walls, interactive display surfaces, intelligent environments and performance art. A characteristic of these systems is their ability to passively sense an environment in support of real-time control of projected light. Research in this area spans a number of disciplines including computer vision, computer graphics, HCI, and display technologies. In particular, the theory and techniques used by researchers in the area are related, sometimes complementarily, to traditional computer vision techniques employed in stereo-camera and gesture recognition systems. The goal of this workshop is to bring researchers from these different areas together and continue fostering a common research community by examining common research problems and open issues.

The IEEE International Workshop on Projector-Camera Systems (ProCams) series explores systems that combine projection technology with computer vision. ProCams 2003 was collocated with ICCV in Nice, ProCams 2005 was held with the IEEE Conference on Computer Vision and Pattern Recognition (CVPR) in San Diego, and ProCams 2006 was held with CVPR in New York.

The 4th workshop is held in conjunction with CVPR on Monday, June 18, 2007, in Minneapolis, MN. It consists of ten high-quality technical papers organized into sessions on calibration and measurement, real-time applications, and image quality improvements. The workshop also includes ten outstanding posters and three exciting demo presentations to further stimulate for in-depth discussions and on-hands experiences. Finally, we are extremely honored to have Paul Debevec (University of Southern California Institute for Creative Technologies) and Christopher Jaynes (University of Kentucky) give the keynote and capstone talks, respectively.

In addition to the program committee and the reviewers, we would like to thank in particular our posters chair (Ruigang Yang, University of Kentucky, USA), our demo chair Rahul Sukthankar (Intel Research and Carnegie Mellon University, USA), our online activities chairs (Mark Ashdown, Massachusetts Institute of Technology, USA and Adrian Ilie, University of North Carolina at Chapel Hill, USA), as well as the co-sponsors of ProCams 2007 (Hewlett-Packard, Vioso, and the INI-GraphicsNet Foundation). They all helped to make this workshop a success again.

Oliver Bimber, Bauhaus-University Weimar, Germany
Nelson L. Chang, Hewlett-Packard Laboratories, USA

IEEE ProCams 2007 General Chairs

Keynote Talk

Procams for Fast 3D Reflectance Capture and Display

Paul Debevec, University of Southern California Institute for Creative Technologies

About the speaker

Paul Debevec is a research associate professor at the University of Southern California and the associate director of graphics research at the USC Institute for Creative Technologies. Debevec's Ph.D. thesis (UC Berkeley, 1996) presented Facade, an image-based modeling and rendering system for creating photoreal architectural models from photographs. Using Facade he led the creation of virtual cinematography of the Berkeley campus for his 1997 film "The Campanile Movie" whose techniques contributed to the "bullet-time" shots in the 1999 film "The Matrix". Subsequently, Debevec pioneered techniques for illuminating computer-generated scenes with real-world lighting captured through high dynamic range photography, demonstrating new image-based lighting techniques in his films "Rendering with Natural Light" (1998), "Fiat Lux" (1999), and "The Parthenon" (2004); he also led the design of HDR Shop, the first widely-used high dynamic range image editing program. At USC ICT, Debevec has led the development of a series of Light Stage devices for capturing and simulating how objects and people reflect light, recently used to create realistic digital actors in films such as "Spider Man 2 and 3" and "Superman Returns". He is the recipient of ACM SIGGRAPH's first Significant New Researcher Award and a co-author of the 2005 book "High Dynamic Range Imaging" from Morgan Kaufmann.

Capstone Talk

Ultra-resolution display and the next revolution in computing

Christopher Jaynes, University of Kentucky

About the speaker

Christopher Jaynes is an adjunct professor in the Department of Computer Science and founding research director of the Center for Visualization and Virtual Environments at the University of Kentucky. He received his B.S. degree at the University of Utah in 1994 and his Doctoral degree at the University of Massachusetts, Amherst in 2000. He was awarded the NSF CAREER award in 2001 for work related to wide-area video surveillance and human-computer interaction technologies. He is the founder of Mersive Technologies, a company that is commercializing multi-projector display systems and is actively conducting research related to interactive media beyond standard resolutions.

Christopher's core research is related to visual information processing, its role in mixed reality and novel display technologies, object recognition and tracking, and intelligent environments. He is the author of over 70 scientific articles, and is the editing author of the book *Computer Vision for Interactive and Intelligent Environments* (IEEE Press, 2003). He has been the keynote speaker at events ranging from the IEEE Conference on Virtual Reality and Cluster Computing to the Architectural Design conference ACADIA. His research related to multi-projector display systems lead to the formation of Mersive Technologies (www.mersive.com) in 2004 where he currently serves as Chief Technical Officer.

Sponsors

Platinum-level sponsor



Silver-level sponsors



ProCams 2007 Program

June 18th, 2007

Breakfast, 7:45-8:30

Welcome, 8:30-8:45

Keynote Talk, Paul Debevec (University of Southern California), 8:45-9:30

Poster/Demo Session, 9:30-10:00

Inter-Reflection Compensation for Immersive Projection Display (Poster)

Hitoshi Habe, Nobuo Saeki, Takashi Matsuyama

Analysis of Light Transport based on the Separation of Direct and Indirect Components (Poster)

Osamu Nasu, Shinsaku Hiura, Kosuke Sato

Cordless portable multi-view fringe projection system for 3D reconstruction (Poster)

C. Munkelt, I. Schmidt, C. Bräuer-Burchardt, P. Kühmstedt and G. Notni

High-Speed Visual Tracking of the Nearest Point of An Object Using 1,000-fps Adaptive Pattern Projection (Poster)

Tomoyuki Inoue, Shingo Kagami, Joji Takeji, Koichi Hashimoto

Projector Calibration using Arbitrary Planes and Calibrated Camera (Poster)

Makoto Kimura Masaaki Mochimaru Takeo Kanade

Real-Time Projector Tracking on Complex Geometry Using Ordinary Imagery (Demo)

Tyler Johnson, Henry Fuchs

Flexible Pixel Compositor for Plug-and-Play Multi-Projector Displays (Demo)

Ruigang Yang, Daniel R. Rudolf, Vijai Raghunathan

Morning Break, 10:00-10:30

Paper Session I: Calibration and Measurement, 10:30-11:45

Geometric Modeling and Calibration of Planar Multi-Projector Displays Using Rational Bezier Patches

Ezekiel Bhasker, Aditi Majumder

High-Speed Measurement of BRDF using an Ellipsoidal Mirror and a Projector

Yasuhiro MUKAIGAWA, Kohei SUMINO, Yasushi YAGI

Photometric Self-Calibration of a Projector-Camera System

Ray Juang, Aditi Majumder

Lunch Break, 11:45-1:00

Paper Session II: Real-Time Applications, 1:00-2:40

Real-Time Projector Tracking on Complex Geometry Using Ordinary Imagery
Tyler Johnson, Henry Fuchs

Shadow Removal in Front Projection Environments using Object Tracking
Samuel Audet, Jeremy Cooperstock

DigiTable: An Interactive Multiusers Table for Collocated and Remote
Collaboration Enabling Remote Gesture Visualization
François Coldefy, Stéphane Louis dit Picard

Displaying a Moving Image By Multiple Steerable Projectors
Ikuhisa Mitsugami, Norimichi Ukita, Masatsugu Kidode

Poster/Demo Session, 2:40-3:00

Projector-Camera Guided Fast Environment Restoration of a Biofeedback
System for Rehabilitation (Poster)
Yufei Liu, Gang Qian

An Embodied User Interface for Increasing Physical Activities in Game
(Poster)
Si-Jung Kim, Woodrow W. Winchester, Yun-Bum Choi, Juck-Sik Lee

A Real-Time ProCam System for Interaction with Chinese Ink-and-Wash
Cartoons (Poster)
Ming Jin, Hui Zhang, Xubo Yang, Shuangjiu Xiao

Virtual Recovery of the Deteriorated Art Object based on AR Technology
(Poster)
Toshiyuki Amano, Ryo Suzuki

Automatic texture mapping on real 3D model (Poster)
Molinier Thierry, Fofi David, Patrick Gorria, Joaquim Salvi

Multi-Use Light Engine -- Fast Projection (Demo)
Ian McDowall and Mark Bolas

Afternoon Break, 3:00-3:30

ProCams 2007 Program (continued)

Paper Session III: Image Quality, 3:30-4:45

Realizing Super-Resolution with Superimposed Projection

Niranjan Damera-Venkata, Nelson L. Chang

Improved Legibility of Text for Multiprojector Tiled Displays

Philip Tuddenham, Peter Robinson

Focal Pre-Correction of Projected Image for Deblurring Screen Image

Yuji OYAMADA, Hideo SAITO

Capstone Talk, Christopher Jaynes (University of Kentucky), 4:45-5:30

Best-Paper Awards and Closing, 5:30-5:45

Workshop Organization

General Chairs:

Oliver Bimber, Bauhaus-University Weimar, Germany
Nelson L. Chang, Hewlett-Packard Laboratories, USA

Posters Chair:

Ruigang Yang, University of Kentucky, USA

Demo Chair:

Rahul Sukthankar, Intel Research and Carnegie Mellon University, USA

Online Activities Chairs:

Mark Ashdown, Massachusetts Institute of Technology, USA
Adrian Ilie, University of North Carolina at Chapel Hill, USA

Program Committee:

Mark Ashdown, Massachusetts Institute of Technology, USA
Paul Beardsley, Mitsubishi Electric Research Laboratories, USA
Margrit Betke, Boston University, USA
Oliver Bimber, Bauhaus University, Germany
Mark Bolas, University of Southern California, Fakespace Labs, USA
Tat-Jen Cham, Nanyang Technological University, Singapore
Nelson L. Chang, Hewlett-Packard Laboratories, USA
Han Chen, IBM Research, USA
Jeremy Cooperstock, McGill University, Canada
Niranjan Damera-Venkata, Hewlett Packard Laboratories, USA
Jan-Michael Frahm, University of North Carolina at Chapel Hill, USA
Anselm Grundhöfer, Bauhaus-University Weimar, Germany
Mark Hereld, Argonne National Laboratory, USA
Perry Hoberman, University of Southern California, USA
Masahiko Inami, University of Electro-Communications, Japan
Christopher Jaynes, University of Kentucky, USA
Kok-Lim Low, National University of Singapore, Singapore
Aditi Majumder, University of California, Irvine, USA
Claudio Pinhanez, IBM Research, USA
Ramesh Raskar, Mitsubishi Electric Research Labs, USA
Peter Robinson, University of Cambridge, UK
Yoichi Sato, University of Tokyo, Japan
Rahul Sukthankar, Intel Research, Carnegie Mellon, USA
Rajeev Surati, Scalable Display Technology, USA
Kar-Han Tan, Epson Research and Development, USA
Jeroen van Baar, Mitsubishi Electric Research Labs, USA
Luiz Velho, IMPA, Brazil
Greg Welch, University of North Carolina at Chapel Hill, USA
Gordon Wetzstein, University of British Columbia, Canada
Ruigang Yang, University of Kentucky, USA
Li Zhang, Columbia University, USA