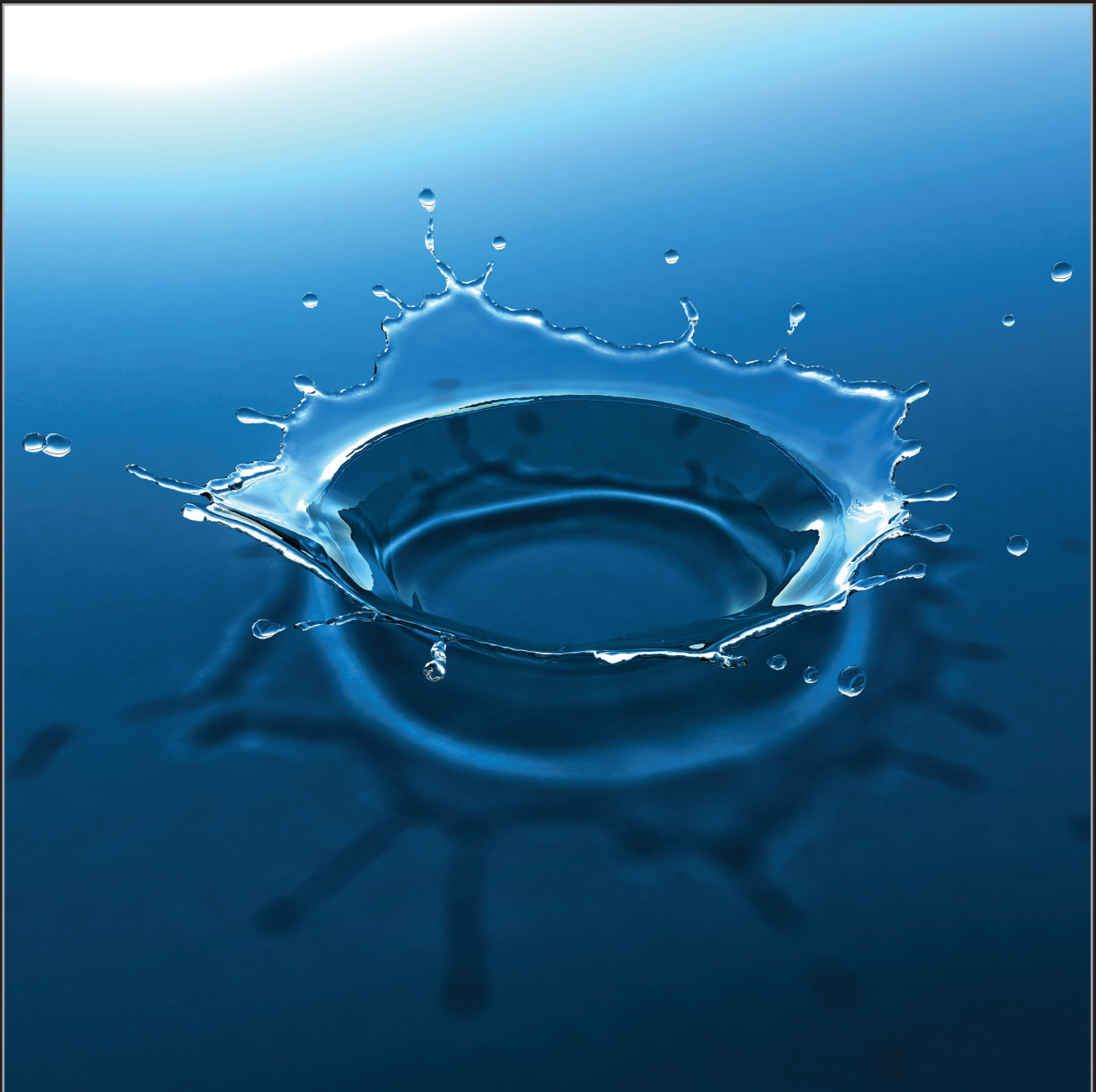


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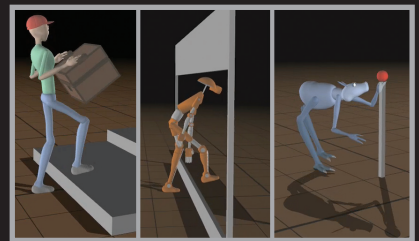
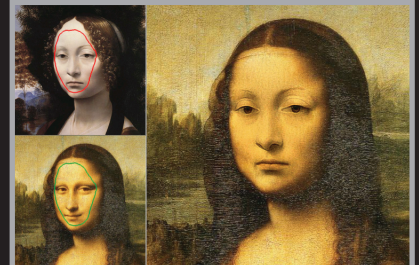
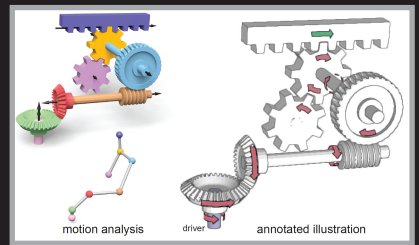
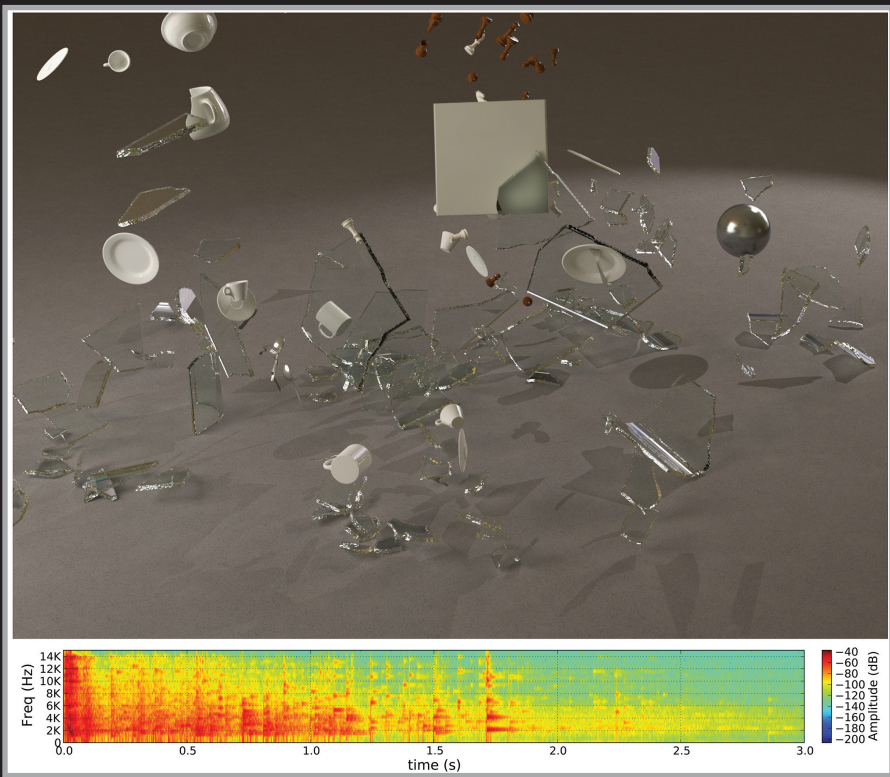
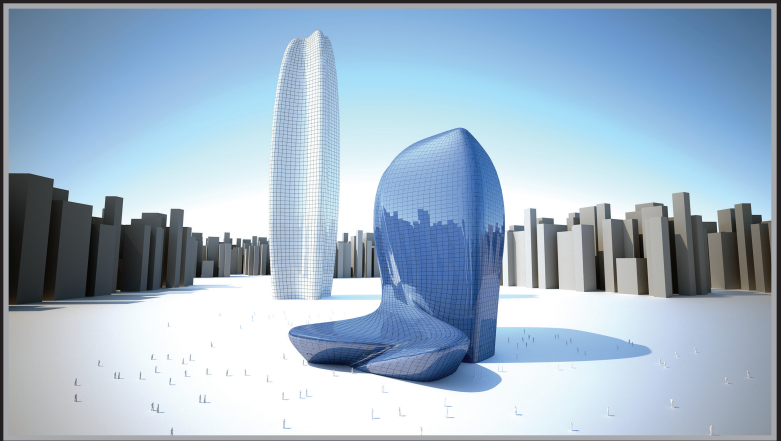
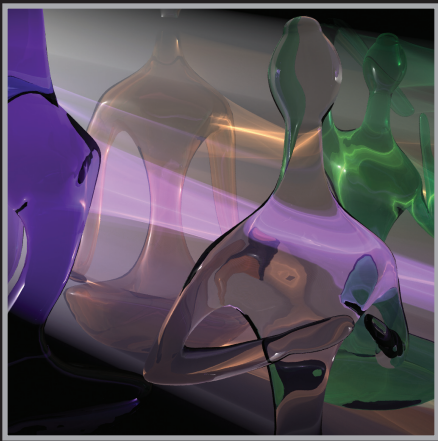


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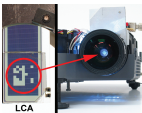
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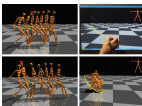
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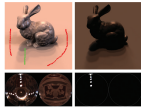
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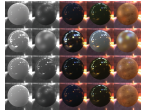
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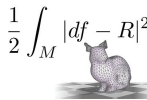


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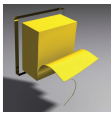
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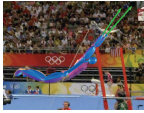
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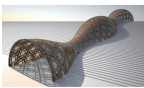


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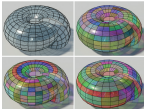
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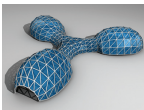
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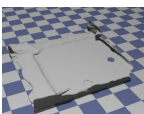
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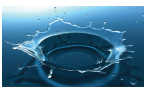
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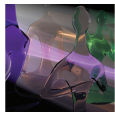
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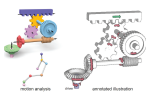
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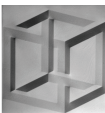
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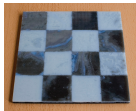
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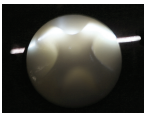
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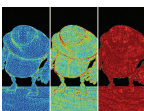
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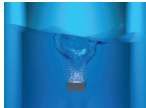
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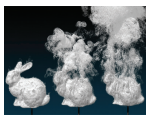
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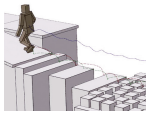


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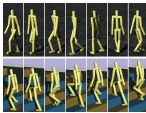
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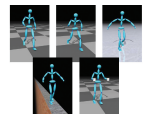
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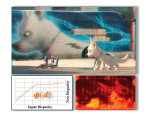


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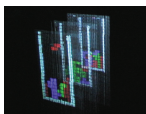
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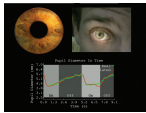
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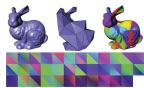
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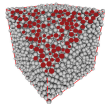
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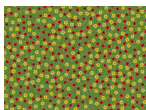
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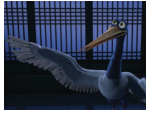
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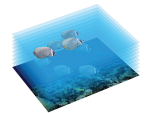


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 ACM TOG 28(2), article 12. <http://doi.acm.org/10.1145/1516522.1516523>

**9:00am – 10:30am**

**Boundaries, Edges & Gradients**

*Session Chair: Sylvain Paris*



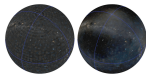
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 ACM TOG 29(2), article 14. <http://doi.acm.org/10.1145/1731047.1731052>

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**Video**

*Session Chair: Rick Szeliski*



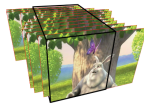
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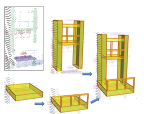


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 ACM TOG 29(2), article 19. <http://doi.acm.org/10.1145/1731047.1731057>

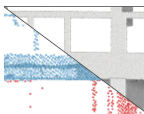
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*Session Chair: Brian Curless*



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**2:00pm – 3:30pm Urban Reconstruction & Explanation**

*Session Chair: Brian Curless*



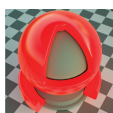
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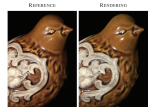
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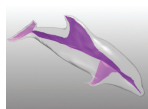
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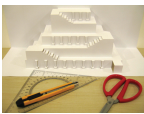
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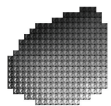


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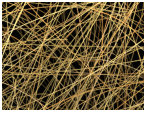
*Session Chair: Adam Finkelstein*



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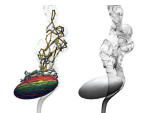
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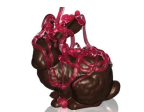
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*Oktar Ozgen, Marcelo Kallmann, Lynnette E.S. Ramirez, Carlos F.M. Coimbra*

ACM TOG 29(3), to appear.



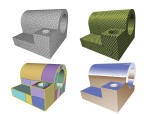
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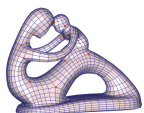
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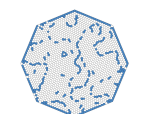
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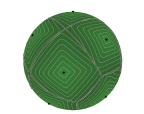
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*Yang Liu, Wenping Wang, Bruno Lévy, Feng Sun, Dong-Ming Yan, Lin Lu, Chenglei Yang*

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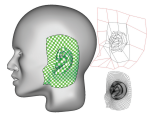
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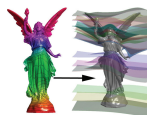
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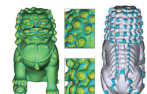
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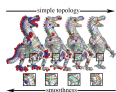
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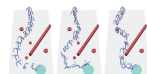


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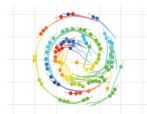
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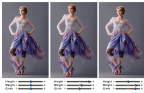
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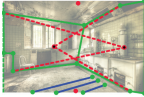
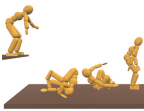


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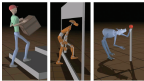
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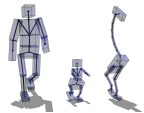
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# Preface

It has been an incredible honor and privilege to have chaired the process leading to these proceedings. As in past years, the papers contained herein represent the most exciting and diverse recent research in the area of computer graphics and interactive techniques. I thank the authors for choosing to send their work to SIGGRAPH 2010, I thank the hundreds of reviewers for all their effort, and I especially thank the Technical Papers committee – 49 of the wisest, hardest working, and most devoted individuals in the field.

This year a total of 390 complete submissions were received. This is down somewhat from the record of over 500 submitted to SIGGRAPH 2008 and 440 submitted to SIGGRAPH 2009. The reason is that SIGGRAPH Asia is having the desired effect of spreading out the submission load across two conferences. In fact, the total number of submissions continues to climb. Taken together, more than 650 papers have been submitted to SIGGRAPH and SIGGRAPH Asia over the last 12 months. The spreading of submissions across conferences is helpful in several ways. First, authors missing a deadline or having a paper rejected do not have to wait an entire year before resubmitting, and second, each committee can be smaller and more cohesive, leading to more informed and consistent decisions.

In building the committee this year I felt it was particularly important for committee members to help keep SIGGRAPH fresh and vibrant by being expansive in their definition of what is appropriate for publication at SIGGRAPH, and by looking for the inspiring work that will stimulate future research and propel the field forward as quickly as possible. Doing so is crucial if SIGGRAPH is to remain a fertile breeding ground for new research areas. I also asked the committee to select their tertiary reviewers with these goals in mind, and I'm happy to report that they responded enthusiastically. One measure is that the acceptance rate was up this year, as we accepted 103 papers, or just over 26%.

The creation of SIGGRAPH Asia is but one of the changes that has affected the technical community in recent years. Many of these changes were made in consultation with the Papers Advisory Group, a group of former and future chairs of the Technical Papers program. The PAG was formed in 2007 to provide advise the organization on matters that affect the papers community.

The PAG, the TOG editor-in-chief and the Technical Papers chairs have worked together to combine the benefits of traditional academic journal publication (in journals such as TOG) with the benefits of SIGGRAPH conference publication. Specifically, journal publications are beneficial because papers can be submitted anytime during the year, and the reviewing process guarantees that a consistent set of reviewers provides feedback on each of the revisions. On the other hand, conferences like SIGGRAPH are high profile and fast turnaround events where authors can present their latest work to their peers, the media, and the public.

With the creation of SIGGRAPH Asia, authors now have three roughly evenly spaced conference submission deadlines per year: SIGGRAPH in January, SIGGRAPH Asia in May, and Eurographics in the early Fall. This comes close to the year-round submission advantage of journals. By allowing reviews and reviewers from a previous conference submission to be forwarded upon resubmission (starting with SIGGRAPH Asia 2009), greater continuity in feedback is achieved. By allowing authors of TOG papers to present at SIGGRAPH (starting with SIGGRAPH 2008), TOG papers are given the same high visibility as SIGGRAPH papers. Another step in this direction has been taken this year: for the first time TOG papers and SIGGRAPH papers have been combined to create sessions with more coherent themes. There will very likely be future changes designed to move us closer to a hybrid publication model that combines the benefits of journal and conference publications.

In closing, there a number of other people that I'd like to thank for their help this year:

- Terrence Masson for offering me the job of papers chair.
- Ed Catmull and Eben Ostby for granting me the time to serve.
- My advisory board: Jessica Hodgins, Marc Levoy, Hugues Hoppe (SIGGRAPH 2011 Technical Papers chair), and George Drettakis (SIGGRAPH Asia 2010 Technical Papers chair). I relied on them far more often than I intended to.
- Tom Funkhauser, SIGGRAPH 2009 Technical Papers chair, for helping to prepare me for the work, and for sage advice on numerous occasions, often on very short notice.
- Adam Finkelstein for producing the Technical Papers video trailer.
- Robert Bridson, Julie Dorsey, Peter Schröder, and Rick Szeliski, for help with the sort.
- Ryan Kuba, Börje Karlsson, and Victor Sojo for assembling the Fast-Forward program.
- Jason Fondran from Opal, for always being available to answer my questions and to address issues with SIS.
- Francesca Regan from Talley Management, without whom we would not have a program. It is impossible to list all the things that Fran has done over the past two years.
- Finally, a huge thank you to my wife Cindy who has been so understanding and supportive during my time as chair.

Sincerely,

Tony DeRose

SIGGRAPH 2010 Technical Papers Chair

## Editorial: The Year in TOG

The Transactions on Graphics (TOG) journal has continued to strengthen its close synergy with the SIGGRAPH conferences. Here are some of the changes this year:

- The decision at the SIGGRAPH papers committee to refer a submission to TOG has been renamed "Accept with major revision to TOG." This small change helps emphasize that such papers must already demonstrate key contributions and novelty, comparable to that of SIGGRAPH papers. As before, the motivation for this referral process is to accept papers that require more extensive revision than can be expected in one month.
- Starting with SIGGRAPH 2010, authors of rejected SIGGRAPH submissions can request reviewer continuity when submitting revised manuscripts to TOG. The benefit is that all original reviewers (typically five) are invited to evaluate the changes, to allow strong work to be shepherded toward publication. This continuity option is appropriate if the reviewers provide encouraging feedback with respect to scope and contributions but require major rewriting or additional results.
- TOG authors continue to have the opportunity to present at the next SIGGRAPH or SIGGRAPH Asia conference, and this year the TOG papers are interspersed with the conference papers into common cohesive sessions. This reinforces the goal that the journal and conference aim for the same high level of quality.

The second SIGGRAPH Asia conference was held last December in Yokohama, Japan. Under the oversight of papers chair Nelson Max, the SIGGRAPH Asia 2009 papers committee accepted 70 papers out of 275 submissions, and these were published in special issue 28(5) of TOG. The plan this year is to have 4 regular quarterly TOG issues, in addition to the two special issues associated with the SIGGRAPH and SIGGRAPH Asia conferences.

Ongoing budget constraints have affected both the SIGGRAPH conference and the TOG journal. As a consequence, we must now pay closer attention to total page count in the regular TOG issues. To address this, we have modified the TOG submission template to 2-column format, to encourage authors to create tighter diagrams and fewer full-width figures. We also encourage authors to move lengthy content to supplemental material, which is accessible in the ACM Digital Library.

The SIGGRAPH conference is moving towards digital distribution of its proceedings to reduce printing costs (although printed proceedings are still available in limited quantities). The digital publications are convenient for ease of access, search, portability, hyperlinks, and especially annotation. I hope that TOG regular issues can also move to electronic distribution. This would relieve cost concerns, so that TOG can also be the home for longer, more in-depth publications.

The TOG Web site (<http://tog.acm.org/>) has undergone a major redesign, to more closely match the appearance of the journal, and to provide clearer navigation.

In a moment of temporary insanity, I agreed to be the SIGGRAPH 2011 technical papers chair in addition to my TOG duties. I want to thank Tony DeRose for inviting me to participate on the SIGGRAPH 2010 advisory board. This has allowed me get a clearer picture of the many issues that arise behind the scenes, and thus be better prepared for next year. I look forward to this challenging responsibility.

Please join me in welcoming several new TOG associate editors: Aseem Agarwala, Pierre Alliez, Philip Dutré©, Steven Gortler, Ramesh Raskar, John Snyder, and Kun Zhou. I thank them in advance for their service.

Hugues Hoppe  
Editor-in-chief  
ACM Transactions on Graphics

## 2010 ACM SIGGRAPH Awards

# Computer Graphics Achievement Award

## Jessica K. Hodgins



ACM SIGGRAPH recognizes Jessica Hodgins for her contributions in the field of physically based animation. Her research has had a significant impact on our understanding, simulation, and animation of how people and other creatures move. She, together with her students and postdocs, has achieved this understanding by developing new techniques in simulation, control systems, and motion capture. She has also led efforts in helping us understand how people perceive motion of both simulated characters and real humans.

Hodgins is best known for her work on animating humans, particularly those performing dynamic and athletic activities. Her approach to using physics as the underlying model grew from graduate work in robotics where she developed some of the earliest agile legged robots. In computer graphics, her papers from the early 1990s on legged motion and human athletics laid the groundwork for research in using dynamics to simulate complex characters such as humans.

Hodgins once again applied ideas from physics to create realistic animations of inanimate objects, including the animation of brittle fracture, explosions, and the motion of complex media like sand, mud, and snow. This work inspired whole new lines of research, both in her lab and others; her group's recent work on viscoelastic and incompressible flow is an example.

Her work has also resulted in improved techniques for capturing and modeling the deformable elements of human motion, including not just the motion of rigid elements such as bones, but also those of soft elements like skin and muscle, and the simulation of the resulting motion of clothing.

Captured data can perfectly represent any single motion, but allowing a user to build up new motions from fragments of other captured motions – i.e., the introduction of user control – presents substantial challenges. Hodgins has made major contributions in this area; her group produced one of the original papers on motion graphs in 2002; in 2005, they developed performance interfaces that used a small number of markers to drive complex synthesized motions; they then went on to further explore markerless and accelerometer-based systems for reconstructing human motion. She has also developed algorithms for efficiently leveraging motion data by combining it with dynamics and by interpolating trajectories.

One theme throughout Hodgins' work has been careful evaluation. With her human simulations, she has compared the motion trajectories and force patterns to those captured from human subjects. In her work on passive simulations, she has compared high speed foot-

age of the phenomena being modeled to that produced by the simulations. More recently, she and her students have used user studies and perceptual studies to validate the efficacy of their approaches.

In addition to Hodgins' breadth of research, she has been a significant positive force in the graphics community, mentoring eleven Ph.D. students and postdocs who are now faculty in graphics, animation, and robotics. From her role as editor-in-chief of ACM Transactions on Graphics, to chairing the SIGGRAPH papers committee, to co-founding the Symposium on Computer Animation, her efforts have supported a wide range of educational and scientific efforts. We are proud to name her this year's Computer Graphics Achievement Award winner.

### Biographical Sketch

Jessica Hodgins is currently a Professor in the Robotics Institute and Computer Science Department at Carnegie Mellon University and part-time Director of Disney Research, Pittsburgh. She earned her Ph.D. in legged locomotion with Marc Raibert at the CMU and MIT Leglab.

Prior to moving to Carnegie Mellon in 2000, she was on the faculty in the College of Computing at Georgia Institute of Technology where she received a NSF Young Investigator award, a Sloan Fellowship, and a Packard Fellowship.

### Previous Award Recipients

2009 Robert L. Cook	1990 Richard Shoup and Alvy Ray Smith
2008 Ken Perlin	1989 John Warnock
2007 Greg Ward	1988 Alan H. Barr
2006 Thomas W. Sederberg	1987 Robert Cook
2005 Jos Stam	1986 Turner Whitted
2004 Hugues Hoppe	1985 Loren Carpenter
2003 Peter Schröder	1984 James H. Clark
2002 David Kirk	1983 James F. Blinn
2001 Andrew Witkin	
2000 David H. Salesin	
1999 Tony DeRose	
1998 Michael F. Cohen	
1997 Przemyslaw Prusinkiewicz	
1996 Marc Levoy	
1995 Kurt Akeley	
1994 Kenneth E. Torrance	
1993 Pat Hanrahan	
1992 Henry Fuchs	
1991 James T. Kajiya	

## 2010 ACM SIGGRAPH Awards

# Significant New Researcher Award

## Alexei "Alyosha" Efros



ACM SIGGRAPH is delighted to present the 2010 Significant New Researcher award to Alexei "Alyosha" Efros, in recognition of his pioneering contributions at the intersection of computer graphics and computer vision, particularly his work in texture synthesis and in leveraging huge image databases.

Efros has published in a variety of areas in computer graphics and computer vision, but his work can be broadly characterized as employing data-driven approaches to solve problems that are difficult to model using parametric methods. For example his work in texture synthesis by example revolutionized an area in which previous researchers had largely employed parametric approaches with moderate success. This work inspired a body of research by other investigators who applied similar non-parametric methods to synthesize by-example in other domains within computer graphics.

More recently, Efros, together with his students and collaborators, has addressed the question of how to extract and use the vast visual resources of online image collections. He has developed many creative and novel answers to this question including: creating simple "pop-up" 3D models from single photos, completing holes in photos by searching for suitable fill-regions in millions of Flickr images, using components from photos as clip art, and even digital facial "shaving". This work demonstrates new synthesis techniques for application in computer graphics -- often by adapting methods from computer vision in completely novel ways. Moreover, it demonstrates a major insight of Efros' research agenda: that the richness and diversity of our visual world requires us to rely on vast amounts of data to understand and model it, and that online image collections provide exactly that kind of data.

Efros offers a fresh view on variety of synthesis problems and his work has already had tremendous impact in the computer graphics community. We are very pleased to recognize his talents with the 2010 Significant New Researcher Award.

### Biographical Sketch

Originally from St. Petersburg, Russia, Alexei (Alyosha) Efros earned his Ph.D. at U.C. Berkeley in 2004 under Jitendra Malik, and spent one year as a post-doctoral fellow in Oxford, England. Since then he has been an Assistant Professor at The Robotics Institute and Computer Science Department at Carnegie Mellon University. He served as a Guggenheim Fellow at the École Normale Supérieure de Paris/INRIA in 2009.

### Previous Award Recipients

- 2009 Wojciech Matusik
- 2008 Maneesh Agrawala
- 2007 Ravi Ramamoorthi
- 2006 Takeo Igarashi
- 2005 Ron Fedkiw
- 2004 Zoran Popović
- 2003 Mathieu Desbrun
- 2002 Steven J. Gortler
- 2001 Paul Debevec



## 2010 ACM SIGGRAPH Awards

# Outstanding Service Award

## Kellogg Booth



For his leadership, dedication, and expertise, ACM SIGGRAPH recognizes Kellogg S. Booth for his commitment to our community with the 2010 Outstanding Service Award.

Kellogg's first leadership role in ACM SIGGRAPH was in 1981 when he chaired an ad-hoc committee that made policy recommendations about the conference technical program. This began more than a decade of continuous service at the highest level in the organization. Kellogg served on an ACM committee that recommended comprehensive changes to how SIG conferences should be managed. In 1983 he served as co-chair for the SIGGRAPH Conference. He was then elected to the position of ACM SIGGRAPH Chair in 1985, serving in that role until 1989. He helped guide the organization and the conference through a period of extraordinary creativity and growth in the field of computer graphics and interactive techniques, working to put in place a three-year budgeting cycle to ensure financial stability.

Peer review is the mechanism by which scientific communities vet and improve research contributions. ACM SIGGRAPH has always held its sponsored conferences to the highest standards of peer review. Kellogg has contributed to this effort with service on the program committees of at least 18 conferences sponsored by ACM SIGGRAPH over the past 30 years. He has reviewed an estimated 500 papers during this time, helping to identify the best ones and providing constructive feedback for all of them.

With this award, ACM SIGGRAPH shows its pride in Kellogg Booth and his exemplary contributions to the organization, its conferences, and its tradition of scholarship.

### Biographical Sketch

Kellogg S. Booth is a Professor of Computer Science and the former Director of the Media and Graphics Interdisciplinary Centre at the University of British Columbia. He has worked in the fields of computer graphics and human-computer interaction since 1968. He received his bachelor's degree in mathematics from the California Institute of Technology, and his master's and PhD degrees from the University of California at Berkeley. Prior to UBC, he was a faculty member in the Department of Computer Science at the University of Waterloo (1977-1990), and before that a staff member at Lawrence Livermore National Laboratory (1968-1976). His research interests include human-computer interaction, visualization, computer graphics, user-interface design, and analysis of algorithms. He has co-authored more than 100 journal and conference papers. He is a Distinguished Member of the ACM.

### Previous Award Recipients

2008 Stephen Spencer  
2006 John Fujii  
2004 Judy Brown and Steve Cunningham  
2002 Bertram Herzog  
2000 Tom DeFanti and Copper Giloth  
1998 Maxine Brown