

Technical Papers Fact Sheet

Chair: Kavita Bala, Cornell University

Conference: Monday 12 December – Thursday 15 December

Exhibition: Tuesday 13 December – Thursday 15 December

Fast Facts

- The SIGGRAPH Asia 2011 Technical Papers program is a premier international forum for presenting new research results in computer graphics and interactive techniques.
- Leading international experts from all over the world present the best results in peer-reviewed research spanning a wide range of research areas including new imaging hardware, acquisition devices, stereoscopic displays and systems; illustration and artistic tools for rendering and animation; light transport, material editing, and GPU rendering; computational photography and imaging; architectural modeling and reconstruction; as well as animation of hair, crowds, traffic and fluids.
- The Technical Papers were reviewed and selected by a committee of 39 members, 10 of whom are from Asia.
- This year, the Technical Papers program saw a 19.5 percent increase in the number of submissions, reaching a record-high of 330. The submissions came from over 33 countries across the globe, with over 40 percent from Asia.
- Sixty-eight papers were finally selected to be presented at SIGGRAPH Asia 2011. These papers will be published in the December 2011 issue of ACM Transactions on Graphics, which will be available online at the ACM Digital Library in early December.

A Quote from the SIGGRAPH Asia 2011 Technical Papers Chair:

"The SIGGRAPH Asia 2011 Technical Papers program received a total of 330 submissions, the highest-ever number of submissions in SIGGRAPH Asia's history. Of these, a total of 68 papers were accepted. This is an acceptance rate of 20.5 percent, which is similar to SIGGRAPH's average acceptance rate. These papers were chosen by the Papers Committee based on the importance of the problem being solved, the impact and potential of each paper, and its technical strength and rigor. The record number of submissions this year demonstrates the recognition of the Technical Papers program at SIGGRAPH Asia and SIGGRAPH as a premier venue to demonstrate scientific excellence, innovation and novelty in graphics and interactive techniques. The Papers Committee has selected an exciting program of papers that will contribute significantly to advancing the field."

SIGGRAPH Asia 2011 Technical Papers Program Highlights

- **A Hybrid Iterative Solver for Robustly Capturing Coulomb Friction in Hair Dynamics**
Gilles Daviet, Florence Bertails-Descoubes and Laurence Boissieux, Institut national de recherche en informatique et en automatique (INRIA)

This paper will present a new, robust and generic solver for capturing Coulomb friction in large assemblies of tightly packed fibers such as hair. Previous mechanical models for hair either neglect friction or use an approximate, smooth, friction model, thus losing important visual features. This new solver is robust and scalable enough to handle up to a few thousands of

densely packed fibers subject to tens of thousands of frictional contact, at a reasonable computational cost.

- **Sketch-based Dynamic Illustration of Fluid Systems**

Bo Zhu, ERATO

Michiaki Iwata, Ryo Haraguchi and Kazuo Nakazawa, National Cerebral and Cardiovascular Center Research Institute

Takashi Ashihara, Shiga University of Medical Science

Nobuyuki Umetani and Takeo Igarashi, University of Tokyo

This paper will present a lightweight sketching system that enables interactive illustration of complex fluid systems. Users can sketch on a 2.5-dimensional (2.5D) canvas to design the shapes and connections of a fluid circuit. These input sketches are automatically analyzed and abstracted into a hydraulic graph. A new hybrid fluid model is then used in the background to enhance the illustrations. The system allows users to edit the fluid system incrementally, and the new internal flow patterns can be simulated in real time. It was tested by pediatric cardiologists, who could use such systems to communicate information about operators to their patients.

- **Multiscale Vector Volumes**

Lvdi Wang, Tsinghua University

Yizhou Yu, University of Illinois at Urbana-Champaign and University of Hong Kong

Kun Zhou, Zhejiang University

Baining Guo, Microsoft Research Asia

This paper introduces multiscale vector volumes, which are compact vector representation for volumetric objects with complex internal structures spanning a wide range of scales. The representation will help break an object into components, with each component modeled as a signed distance function (SDF) tree. The vector representation aims to support fast random access. Additionally, arbitrary cross sections of complex volumetric objects can be visualized in real time.

- **Genetic Programming for Shader Simplification**

Pitchaya Sitthi-amorn, Nicholas Modly, Westley Weimer and Jason Lawrence, University of Virginia

This paper presents a framework based on Genetic Programming (GP) to automatically simplify pixel shaders. The programmability of modern graphics hardware has led to an enormous increase in the complexity of pixel shaders. Thus, there have been increased efforts to optimize the process of simplifying pixel shaders. In this session, the presenters discuss a more efficient shader simplification technique that can be applied to multi-pass shaders and different perceptual effort metrics.

- **Multi-Perspective Stereoscopy from Light Fields**

Changil Kim and Markus Gross, ETH Zurich

Alexander Hornung and Simon Heinze, Disney Research Zurich

Wojciech Matusik, MIT

This paper presents a framework that views generation from a light field. This technique can be used for efficient and flexible stereoscopic post-processing, such as reducing excessive disparity while preserving perceived depth, or retargeting of already captured scenes to various view settings. This approach provides a novel conceptual approach to stereoscopic image processing and post-production.

- **Data-driven Visual Similarity for Cross-Domain Image Matching**

Abhinav Shrivastava, Tomasz Malisiewicz, Abhinav Gupta and Alexei A. Efros, Carnegie Mellon University

Determining visual similarity in graphics and computational photography tasks has turned out to be difficult, because of the need to know which visual structures are important for a human observer and which are not. This is especially critical when matching across different visual domains such as painting, and photographs at different times. This paper proposes a method for estimating the importance of different parts of a given image based on the notion of "data-driven uniqueness". Standard tools from discriminative object detection were employed in a novel way, yielding an approach which is very generic and does not depend on a particular image representation or specific visual domain.

- **Structure-Preserving Retargeting of Irregular 3D Architecture**

*Jinjie Lin, Chen Liang and Baoquan Chen, Shenzhen Institutes of Advanced Technology
Daniel Cohen-Or, Tel-Aviv University
Hao (Richard) Zhang, Simon Fraser University
Andrei Sharf, Ben Gurion University
Oliver Deussen, University of Konstanz*

This paper will present an algorithm for interactive structure-preserving retargeting of irregular 3D architecture models. It will offer the modeler an easy-to-use tool to quickly generate a variety of 3D models that resemble an input piece in its structural style. The technique performs automatic replications and scaling of elements, while taking into account their semantics and expected geometric interrelations such as alignments and adjacency.

- **Adaptive Partitioning of Urban Facades**

*Chao-Hui Shen, Shi-Sheng Huang and Shi-Min Hu, Tsinghua University
Hongbo Fu, City University of Hong Kong*

Automatically discovering high-level facade structures in unorganized 3D point clouds of urban scenes can be challenging when the input data is of poor quality. In this paper, participants will be introduced to the concept of adaptive partitioning to automatically derive a flexible and hierarchical representation of 3D urban facades. Unlike previous automatic facade analysis works which are restricted to globally rectilinear grids, this paper proposes to automatically partition the facade in an adaptive manner, in which the splitting direction, as well as the number and location of splitting planes, are all adaptively determined.

- **Polarization Fields: Dynamic Light Field Display using Multi-Layer LCDs**

*Douglas Lanman, Matthew Hirsch and Ramesh Raskar, MIT Media Lab
Gordon Wetzstein and Wolfgang Heidrich, University of British Columbia*

This paper will introduce polarization field displays as optically-efficient constructions that realize dynamic light field displays using multi-layered LCDs. Such displays are constructed by covering a stacked set of liquid crystal panels with a single pair of crossed linear polarizers.



Each layer functions as a spatially-controllable polarization rotator, and color display is achieved using field sequential color illumination with monochrome LCDs, thereby mitigating severe attenuation and moiré occurring with layered color filter arrays.