Technical Papers Fact Sheet

Chair: Alyn Rockwood, InterNext Graphics Institute, USA
Conference: Tuesday 19 November – Friday 22 November
Exhibition: Wednesday 20 November – Friday 22 November

Fast Facts

- The SIGGRAPH Asia 2013 Technical Papers program received a total of 273 completed submissions, a healthy submission number across the years.
- A total of 66 papers were accepted from over 19 countries and regions around the world, making this an acceptance rate of 24.2 percent and similar to that of SIGGRAPH's average acceptance rate.
- This year, the highly-revered platform for presenting the latest technical research findings on computer graphics and interactive techniques will see a focus on both video applications and computational photography, alongside a wide variety of topics.
- All accepted papers will be presented at SIGGRAPH Asia 2013, as well as included in the conference proceedings, ACM Transactions on Graphics (ToG).

A Quote from the SIGGRAPH Asia 2013 Technical Papers Chair:

"As the world's premier international forum for disseminating ground-breaking academic research findings in the field of computer graphics and interactive techniques, the SIGGRAPH Asia 2013 Technical Papers program will offer presentations introducing the newest ideas that will stimulate future trends. This year we saw an increase in submissions relating to video applications and computational photography, indicating strong interest within the international academic research field in these areas. Leading experts from all over the world will offer in-depth insights to results in peer-reviewed research spanning across a plethora of core topics such as modeling, animation, rendering, imaging, and human-computer interaction. Other related areas to look out for include: computer games, scientific visualization, information visualization, computer-aided design, computer vision, audio, and robotics. "

SIGGRAPH Asia 2013 Technical Papers Program Highlights

- **Inverse Volume Rendering with Material Dictionaries**
  Joannis Gkioulekas and Todd Zicklet, Harvard University
  Shuang Zhao and Kavita Bala, Cornell University
  Anat Levin, The Weizmann Institute of Science

  This paper will introduce an optimization framework that makes measuring bulk scattering properties of homogeneous volumetric material samples (phase function, scattering coefficient, and absorption coefficient) more accurate, and more applicable to a broad range of materials. The optimization combines stochastic gradient descent with Monte Carlo rendering and a material dictionary to invert the radiative transfer equation, and it offers several advantages over existing approaches: (1) it does

not require isolating single-scattering events; (2) it allows measuring solids and liquids that are hard to dilute; (3) it returns parameters in physically-meaningful units; and (4) it does not restrict the shape of the phase function using Henyey-Greenstein or any other low-parameter model.

- **Joint Path Importance Sampling for Rendering Low-Order Anisotropic Scattering**
  Iliyan Georgiev, Saarland University
  Jaroslav Křivánek, Charles University in Prague
  Toshiya Hachisuka, Aarhus University
  Derek Nowrouzezahrai, University of Montreal
  Wojciech Jarosz, Disney Research Zurich

  In this paper, new Monte Carlo techniques for importance sampling low-order scattering in anisotropic participating media will be introduced. These techniques can be plugged into various rendering algorithms and significantly reduce the variance of rendered images at the same computation cost.

- **Near-Eye Light Field Displays**
  Douglas Lanman and David Luebke, NVIDIA Research

  Near-eye light field displays depict sharp images by synthesizing light fields corresponding to virtual scenes located within a viewer's natural accommodation range. This paper will discuss the establishment of fundamental trade-offs between resolution, field of view, and form factor and demonstrate a thin, lightweight HMD prototype, containing a pair of microlens-covered OLEDs.

- **Inverse Bi-scale Material Design**
  Hongzhi Wu, Zhejiang University
  Julie Dorsey and Holly Rushmeier, Yale University

  This paper will examine and discuss a major shortcoming of existing bi-scale material design systems – the lack of support for inverse design. A novel computational framework for inverse bi-scale design will be presented, where the key idea is to convert the challenging problem into efficient search in two pre-computed large libraries of materials and geometry.

- **Designing and Fabricating Mechanical Automata from Mocap Sequences**
  Dugyu Ceylan and Mark Pauly, EPFL
  Wilmot Li, Adobe Research
  Niloy Mitra, University College London
  Maneesh Agrawala, University of California Berkeley

  In this paper, an automatic algorithm that can convert a motion sequence of a humanoid character into a design plan for a physical automaton and thus recreate the input motion will be presented. As designing and realizing automata require highly-technical skills in motion planning, mechanical understanding and accounting for various fabrication constraints, this skill set is limited to a handful of experts. The presented algorithm has since been tested on a range of input humanoid motions and

a design plan has been fabricated as a representative example of what the algorithm can achieve.

- **Halftone QR Codes**
  Hong-Kuo Chu, Chia-Sheng Chang, and Ruen-Rone Lee, National Tsing Hua University
  Niloy Mitra, University College London

  This paper will propose an approach to producing high quality visual QR codes, also known as halftone QR codes that are not only visually pleasant as well as void of random collections of black/white modules but are also machine-readable. This approach will also be demonstrated to show that the final product is able to achieve high quality results on a range of inputs and under different distortion effects.

- **3-Sweep: Extracting Editable Objects from a Single Photo**
  Tao Chen, Zhe Zhu, and Shi-Min Hu, Tsinghua University
  Ariel Shamir, The Interdisciplinary Center (IDC) Herzliya
  Daniel Cohen-Or, Tel Aviv University

  This paper will introduce an interactive technique for manipulating 3D simple shapes by extracting them from a single photograph. Under conventional circumstances, the extraction process requires an in-depth understanding of the components of the shape, their projections, and relations, all of which are difficult for automatic algorithms but simple cognitive tasks for humans. This technique uses a combination of the cognitive abilities of humans with the computational accuracy of the machine to solve this problem, thus providing users with the means to quickly create 3D editable parts. Several examples and case studies will be presented to illustrate the usefulness of this technique.

Full information about the Technical Papers program can be found on http://sa2013.siggraph.org/en/attendees/technical-papers.html.

For more information about SIGGRAPH Asia 2013 program updates, please visit http://sa2013.siggraph.org.