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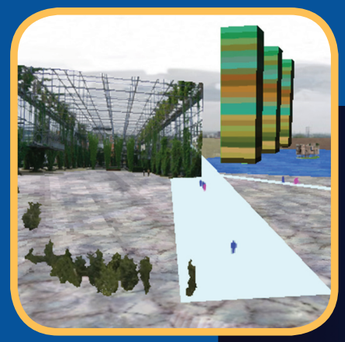

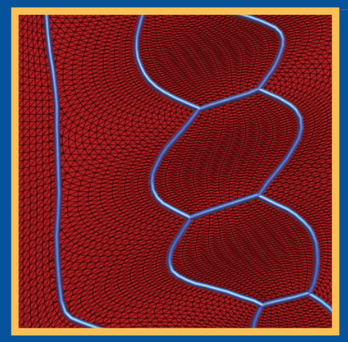

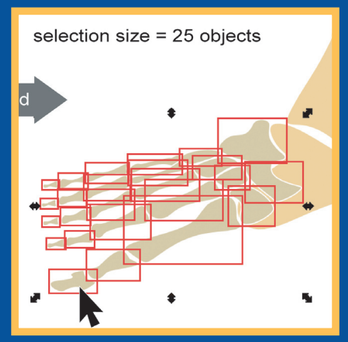

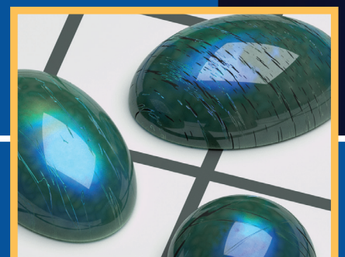

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25 - 27 May 2009
Kelowna, British Columbia, Canada

Canadian Human-Computer Communications Society/
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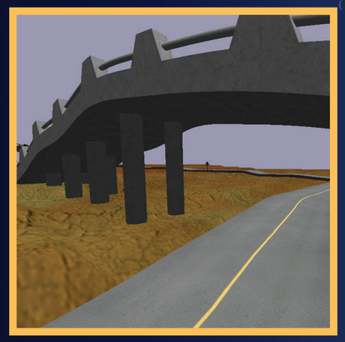

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Proceedings

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Canadian Human Computer Communications Society / Société Canadienne du Dialogue Humaine Machine

Bill Cowan
David R. Cheriton School
of Computer Science
University of Waterloo, Canada

The Canadian Human-Computer Communications Society (CHCCS) / Société Canadienne du Dialogue Humaine Machine (SCDHM) is a Special Interest Group within the Canadian Information Processing Society. It is a non-profit organization with the goal of advancing education and research in computer graphics, visualization and human-computer interaction.

Each year CHCCS/SCDHM sponsors Graphics Interface, the oldest regularly scheduled conference in interactive computer graphics. Most years it is co-located and co-organized with several other conferences: this year the AI/GI/CRV 2009 conference, encompassing Artificial Intelligence, Graphics Interface, and Computer and Robotic Vision, is being held at the University of British Columbia – Okanagan in Kelowna, British Columbia. Graphics Interface promises to be an exciting event, with a selection of high quality papers in computer graphics, visualization and human-computer interaction.

Complementing the annual conference, CHCCS/SCDHM sponsors four awards: the annual Michael A. J. Sweeney Awards for the best student papers presented at the conference; the annual Alain Fournier Ph.D. Thesis Award, presented for the best Ph.D. dissertation awarded in Canada during the previous year in an area of research supported by CHCCS/SCDH; the annual CHCCS/SCDH Achievement Award, presented to a Canadian who has made substantial research contributions to computer graphics, visualization or human-computer interaction; and the CHCCS/SCDH Service Award, presented to a Canadian who has rendered substantial service contributions to the society or to the research community. Each year the Awards Committee receives nominations and selects a winner of the Achievement Award and, from time to time, a winner of the Service Award. At this year's conference we will present an Achievement Award to Przemyslaw Prusinkiewicz, an internationally recognized researcher well known to the Graphics Interface community. I wish to thank the awards committee for their efforts this year:

- Richard Bartels, University of Waterloo (emeritus), Chair,
- Kellogg Booth, The University of British Columbia, and
- Eugene Fiume, University of Toronto

The Annual General Meeting of CHCCS/SCDHM is held every year during the Graphics Interface conference, to review the previous year's activities and elect the executive committee. Current members of the executive committee are:

- Bill Cowan, University of Waterloo, President,
- Kellogg S. Booth, The University of British Columbia, Past President,
- Pierre Poulin, Université de Montréal, Vice President,
- Stephen Mann, University of Waterloo, Treasurer,
- Ted Kirkpatrick, Simon Fraser University, Editor-in-Chief, and
- James Stewart, Queen's University, Webmaster

All Graphics Interface attendees are invited to attend the Annual General Meeting, or to contact any member of the executive committee about CHCCS/SCDHM.

On behalf of the society, and of all those who have worked to put on this year's conference, I extend a warm welcome to all the attendees of AI/GI/CRV 2009. I also wish to thank Amy Gooch and Melanie Tory, the co-chairs of the program committee, along with all of the committee members and referees who created the conference program. And most important I wish to thank all the authors who submitted their research. Without their commitment there would be no conference.

Preface

A Message from the Program Cochairs

Amy Gooch
Department of Computer Science
University of Victoria, Canada

Melanie Tory
Department of Computer Science
University of Victoria, Canada

Welcome to Graphics Interface 2009. This annual conference, now in its 35th year, is devoted to computer graphics, human-computer interaction, and visualization. Graphics Interface occupies a unique niche among conferences in that it seeks to both combine and bridge research topics in and across these areas. Beginning in 1969 as the "Canadian Man-Computer Communications Seminar" (CMCCS), it is the oldest regularly scheduled computer graphics and human-computer interaction conference. This year, Graphics Interface was held 25-27 May 2009 in Kelowna, British Columbia.

We received a total of 77 submissions, of which we accepted 28 regular papers and 4 notes (4-page papers). The final program is balanced between HCI and computer graphics, with both tracks seeing similar acceptance rates: 44% for the HCI track, and 41% for the graphics track.

Twenty-three international experts served on the program committee, solicited and managed reviews from a wide body of other experts and helped to select a very high quality set of papers for this year's conference. Most papers received four reviews, two of which were from program committee members. We particularly thank the program committee for their expertise and effort in ensuring both high standards and interesting breadth in this year's technical program. We also thank the many external reviewers for their help in this endeavor.

We would also like to extend our appreciation to this year's invited speakers, who are both outstanding leaders in their respective fields: Vidya Setlur, Nokia Research Center, and David Luebke, NVIDIA Research. Additionally, Amy would like to thank David Mould for covering the Program Committee Meeting and all that it entails in her absence.

Lastly, we wish to thank several people whose efforts were indispensable in making Graphics Interface 2009 happen: William Cowan, Kellogg S. Booth, James Stewart, Torsten Möller, Arthur Kirkpatrick, Jeremy Long, and Meghan Haley.

For further information about the conference series we invite you to visit the web site, http://www.graphicsinterface.org.

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University of Victoria, Canada

Melanie Tory
Department of Computer Science
University of Victoria, Canada

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Michael A. J. Sweeney Award 2009

Canadian Human Computer Communications Society /
Société Canadienne du Dialogue Humaine Machine

The CHCCS/SCDHM honours the memory of Michael A. J. Sweeney through an annual award to the best student paper(s) presented at each year's Graphics Interface conference. The winning paper(s) selected by the program committee are chosen from among the papers accepted for the conference for which one or more student authors are presenting the paper.

Best Student Paper 2009

In Memory
Michael A. J. Sweeney, 1951-1995

Graphics 2009 Award Winner

"Parallax Photography: Creating 3D Cinematic Effects from Stills" by Ke Zheng, Alex Colburn, Aseem Agarwala, Maneesh Agrawala, Brian Curless, David Salesin, Michael Cohen.

Biographies

Colin Zheng received a Ph.D. in Computer Science & Engineering from the University of Washington in the fall of 2008. His areas of research are computer graphics, computer vision, and computational imaging.

Alex Colburn is a graduate student in the University of Washington's Computer Science & Engineering department where he is working on computer graphics & computer vision. Prior to graduate school, Alex spent 10 years at Microsoft Research.

Aseem Agarwala is a senior research scientist at Adobe Systems, Inc. and an affiliate assistant professor at the University of Washington. He completed his Ph.D. in 2006 at the University of Washington, and his B.S. and M.Eng. at MIT in 1999.

Maneesh Agrawala is an Assistant Professor in Electrical Engineering and Computer Science at the University of California, Berkeley. He works on visualization, computer graphics and human computer interaction.

Brian Curless received the B.S. degree in Electrical Engineering at the University of Texas at Austin in 1988 and the Ph.D. degree from Stanford University in 1997. He is an associate professor in the Department of Computer Science & Engineering at the University of Washington.

David Salesin is a Professor of Computer Science & Engineering at the University of Washington, and a Senior Principal Scientist at Adobe Systems, where he leads the Creative Technologies Lab. He received the 2000 ACM SIGGRAPH Computer Graphics Achievement Award for pioneering the field of non-photorealistic rendering.

Michael F. Cohen is a Principal Researcher at Microsoft Research. Michael received the 1998 SIGGRAPH Computer Graphics Achievement Award for his contributions to the Radiosity method for image synthesis.

HCI 2009 Award Winner

"Determining the Benefits of Direct-Touch, Bimanual, and Multifinger Input on a Multitouch Workstation" by Kenrick Kin, Maneesh Agrawala, Tony DeRose.

Biographies

Kenrick Kin received a B.S.E. in Computer Science from Princeton University. He is currently pursuing a Ph.D. in Computer Science at the University of California, Berkeley (UC Berkeley), where he is working with Professor Maneesh Agrawala on multitouch interaction techniques and is part of the Computer Graphics Group. He also works part time at Pixar Animation Studios.

Maneesh Agrawala is an Assistant Professor in Electrical Engineering and Computer Science at the University of California, Berkeley. He works on visualization, computer graphics and human computer interaction.

Tony DeRose is currently a Senior Scientist at Pixar Animation Studios. He received a B.S. in Physics in from the University of California, Davis, and a Ph.D. in Computer Science from UC Berkeley. From 1986 to 1995 Dr. DeRose was a Professor of Computer Science and Engineering at the University of Washington. In 1998, he was a major contributor to the Oscar winning short film "Geri's game", in 1999 he received the ACM SIGGRAPH Computer Graphics Achievement Award, and in 2006 he received a Scientific and Technical Academy Award for his work on surface representations.

Alain Fournier Award 2008

Canadian Human Computer Communications Society / Société Canadienne du Dialogue Humaine Machine

On August 14th, 2000, Dr. Alain Fournier passed away. He was a leading international figure in computer graphics, and a strong and frequent contributor to the Graphics Interface conference. His insights, enthusiasm, wisdom, vast knowledge, humour, and genuine friendship touched everyone he met.

The "Alain Fournier Memorial Fund" was created to celebrate his life, to commemorate his accomplishments, and to honour his memory. It rewards an exceptional computer graphics Ph.D. thesis defended in a Canadian University over the past year. The winning thesis is selected through a juried process by a selection committee consisting of accomplished researchers in computer graphics.

For more information about the "Alain Fournier Memorial Fund", and information about donation, please visit http://www.cs.ubc.ca/~fournier.

Samuel Hasinoff

University of Toronto, Canada

CHCCS/SCDHM Alain Fournier Award Recipient 2008

This year's recipient of the Alain Fournier Ph.D. Thesis Annual Award is Samuel Hasinoff. His 2008 thesis, "Variable Aperture Photography", completed at the University of Toronto under the supervision of Professor Kyros Kutulakos, makes several significant contributions to the field of computational photography. By combining multiple captures of the same scene with varying exposure, focus, and aperture settings – all taken by a single, conventional digital camera – Sam's techniques are able to

- create a pixel-resolution depth map that works even for complicated images,
- allow the photographer to defer the application of several camera settings (e.g., depth-of-field) until post-production,
- reproduce an exposure with a synthesized depth-of-field in less time than a conventional single exposure, and
- given time and depth-of-field constraints, find an optimal sequence of exposures.

The thesis is well-organized and well-written. Sam's dedication to thoroughness and attention to both mathematical and experimental details are exemplary. In the coming years, this work is likely to have significant impact on camera design and photography in general.

Sam completed his B.Sc. at the University of British Columbia in 2000 and his M.Sc. at the University of Toronto in 2002 (also under Professor Kutulakos). He has received numerous scholarships from NSERC and other organizations and is currently an NSERC Postdoctoral Fellow at MIT.

For more information, please visit: http://www.cs.toronto.edu/~hasinoff/

Achievement Award 2009

Canadian Human Computer Communications Society / Société Canadienne du Dialogue Humaine Machine

The CHCCS/SCDHM Achievement Award is presented periodically to a Canadian researcher who has made a substantial contribution to the fields of computer graphics, visualization, or human-computer interaction. Awards are recommended by the CHCCS/SCDHM Awards Committee, based on nominations received from the research community. The 2009 members of the Awards Committee are Richard Bartels, Eugene Fiume, and Kellogg Booth.

Przemyslaw Prusinkiewicz

University of Calgary, Canada

CHCCS/SCDHM Achievement Award Recipient 2009

Professor Prusinkiewicz is Professor of Computer Science at the University of Calgary and is the head and founder of the Biological Modeling and Visualization research group at that institution. Professor Prusinkiewicz received his M.S. (1974) and Ph.D. (1978) in Computer Science from the Technical University of Warsaw. He held Assistant Professorships at the Technical University of Warsaw and at the University of Science and Technology of Algiers before joining the University of Regina in 1982. He was appointed to his current position at the University of Calgary in 1991.

While at the University of Regina, Professor Prusinkiewicz took an active interest in the formalism of L-systems developed by Aristid Lindenmayer, a theoretical biologist. An L-system is a type of formal grammar that is invoked iteratively on an initial configuration of elements and is characterized by the simultaneous parallel use of all applicable production rules at each iteration to successively transform the configuration. Lindenmayer had proposed L-systems as a model for studying the growth of organisms. Professor Prusinkiewicz had the insight that the formal configurations of symbols produced by the grammar could be interpreted with graphical elements depicting features of plants. His first result on this topic, part of a list of over 150 papers authored or co-authored by Professor Prusinkiewicz, appeared in 1986 as the paper "Graphical Applications of L-Systems" delivered to our very own Graphics Interface Conference of that year. His work has also been presented in the classical and influential books, The Algorithmic Beauty of Plants and Lindenmayer Systems, Fractals, and Plants.

The pioneering work by Professor Prusinkiewicz has led to the visual richness of nature we see in Hollywood's computer-generated imagery. But his work has not been restricted to the visual alone. Professor Prusinkiewicz and his students have collaborated with scientists around the world to explore the use of L-systems in music generation, develop models of fracture formation, build software environments for geometric and biological modeling (LEGO, GeneVis, Virtual Laboratory, L-Studio and the L+C language), analyze processes of biochemical transport, and study the relationships between plants and their insect pests as well as the impact of microclimates on the growth of plant communities. His current research is focused on computational models of development that link plant genetics to their macroscopic forms.

Professor Prusinkiewicz has received numerous awards for his innovative research, including the 1997 ACM SIGGRAPH Computer Graphics Achievement Award. The Canadian Human Computer Communications Society is pleased to add our achievement award to his list of honors and recognitions.

For more information, please visit: http://pages.cpsc.ucalgary.ca/~pwp/

Invited Speaker

Semantic Graphics for More Effective Visual Communication

Vidya Setlur

Nokia Research Center, USA

Abstract

Computers are becoming faster, smaller and more interconnected, creating a shift in their primary function from computation to communication. This trend is exemplified by ubiquitous devices such as mobile phones with cameras, personal digital assistants with video, and information displays in automobiles. As communication devices and viewing situations become more plentiful, we need imagery that facilitates visual communication across a wide range of display devices. In addition, producing effective and expressive visual content currently requires considerable artistic skill and can consume days. There is a growing need to develop new techniques and user interfaces that enhance visual communication, while making it fast and easy to generate compelling content. New algorithms in semantic graphics, i.e. combining concepts and methods from visual art, perceptual psychology, information processing, and cognitive science, help facilitate users in creating, understanding and interpreting computer imagery. In this talk, Vidya Setlur will present the usage of semantic graphics for various information visualization goals.

Biography

Vidya Setlur is a research scientist in the User Interfaces Group, at Nokia Research Center, Palo Alto. She is also an adjunct professor at Carnegie Mellon University, Silicon Valley. After graduating from Northwestern University in 2005 with a Ph.D. in computer graphics, Vidya initially started her stint with Nokia at their lab in Dallas, but later moved to Palo Alto in 2006. Her work at Nokia involves researching novel rendering algorithms particularly targeted for mobile computational devices for enhancing visual communication.

For more information, please visit: http://research.nokia.com/people/vidya_setlur/

Invited Speaker

Graphics Hardware & GPU Computing: Past, Present, and Future

David Luebke

Manager, NVIDIA Research
NVIDIA Corporation, USA

Abstract

Modern GPUs have emerged as the world's most successful parallel architecture. GPUs provide a level of massively parallel computation that was once the preserve of supercomputers like the MasPar and Connection Machine. For example, NVIDIA's GeForce GTX 280 is a fully programmable, massively multithreaded chip with up to 240 cores, 30,720 threads and capable of performing up to a trillion operations per second. The raw computational horsepower of these chips has expanded their reach well beyond graphics. Today's GPUs not only render video game frames, they also accelerate physics computations, video transcoding, image processing, astrophysics, protein folding, seismic exploration, computational finance, radioastronomy - the list goes on and on. Enabled by platforms like the CUDA architecture, which provides a scalable programming model, researchers across science and engineering are accelerating applications in their discipline by up to two orders of magnitude. These success stories, and the tremendous scientific and market opportunities they open up, imply a new and diverse set of workloads that in turn carry implications for the evolution of future GPU architectures.

In this talk I will discuss the evolution of GPUs from fixed-function graphics accelerators to general-purpose massively parallel processors. I will briefly motivate GPU computing and explore the transition it represents in massively parallel computing: from the domain of supercomputers to that of commodity "manycore" hardware available to all. I will discuss the goals, implications, and key abstractions of the CUDA architecture. Finally I will close with a discussion of future workloads in games, high-performance computing, and consumer applications, and their implications for future GPU architectures.

Biography

David Luebke helped found NVIDIA Research in 2006 after eight years on the faculty of the University of Virginia. Luebke received his Ph.D. under Fred Brooks at the University of North Carolina in 1998. His principal research interests are GPU computing and real-time computer graphics. Luebke's honors include the NVIDIA Distinguished Inventor award, the NSF CAREER and DOE Early Career PI awards, and the ACM Symposium on Interactive 3D Graphics "Test of Time Award". Dr. Luebke has co-authored a book, a SIGGRAPH Electronic Theater piece, a major museum exhibit visited by over 110,000 people, and dozens of papers, articles, chapters, and patents.

For more information, please visit: http://luebke.us/