

The image is a composite of three panels. The left panel shows a 3D rendering of a dog's head and upper body as a wireframe with numerous colored dots (red, green, blue) attached to its surface, likely representing tracked feature points. The middle panel is a code snippet in C++ for calculating wavelet coefficients. The right panel is a video frame from a surveillance camera showing a black and white dog standing in front of a blue metal kennel.

```
/*---- data members ----*/
const FCurveUniformSamples::Container& _waveletCoefficients;
static FCurveUniformSamples::Container _waveletMultiplier;
};

FCurveUniformSamples::Container HaarWaveletOrdering::_waveletMultiplier;

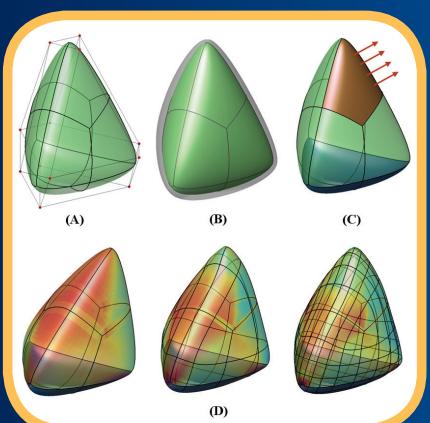
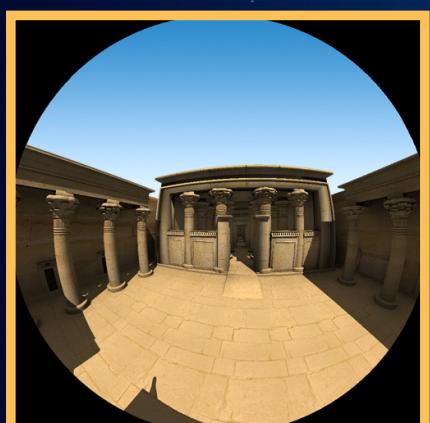
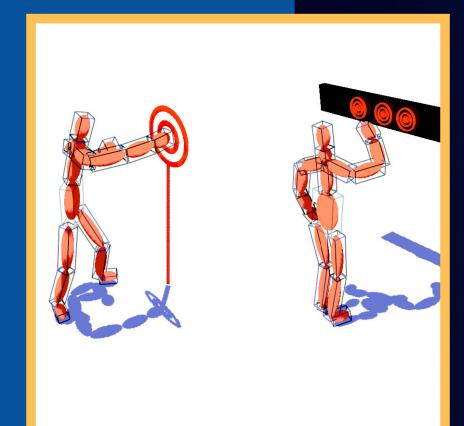
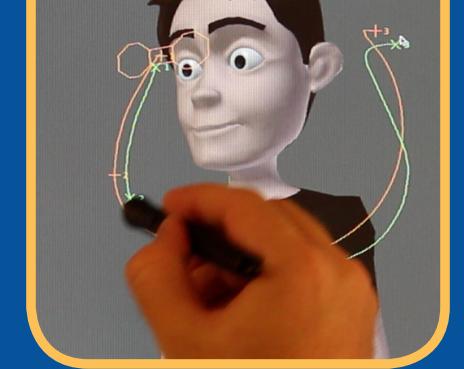
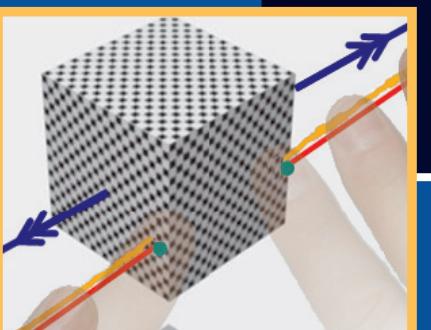
class CubicWaveletOrdering
{
```

[www.graphicsinterface.org](http://www.graphicsinterface.org)  
[www.crcpress.com](http://www.crcpress.com)

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The logo consists of the letters "CRC" in a bold, italicized, sans-serif font, all contained within a thick white circle.



# Graphics Interface 2012

28 - 30 May 2012  
Toronto, Ontario, Canada

# Canadian Human-Computer Communications Society/ Société canadienne du dialogue humain-machine CHCCS/SCDHM)



```
Curve->resampleLinear( result, VM::toInt( state, 2 ) );
CurveUniformSamplesVM::push( state, result );
return 1;

eleTransformFwdHaarVM
IState* state )

CP<const FCurveUniformSamples> curve( FCurveUniformSamplesVM::toConst( state, 1 ) );
CP<FCurveUniformSamples> result;
rve->waveletTransformFwdHaar( result );
CurveUniformSamplesVM::push( state, result );
return 1;

eleTransformRevHaarVM
IState* state )

CP<const FCurveUniformSamples> curve( FCurveUniformSamplesVM::toConst( state, 1 ) );
CP<FCurveUniformSamples> result;
rve->waveletTransformRevHaar( result );
CurveUniformSamplesVM::push( state, result );
return 1;

eleTransformPartialRevHaarVM
IState* state )

Proceedings
Graphics
Interface
```

# Cover Image Credits

## LEFT TO RIGHT (STARTING ON BACK LEFT):

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Input Finger Detection for Nonvisual Touch Screen Text Entry in *Perkinput*; Shiri Azenkot, Jacob O. Wobbrock, Sanjana Prasain, Richard E. Ladner (Page 121).

The Effect of Perspective Projection in Multi-Touch 3D Interaction; Bjorn Bollendorff, Uwe Hahne, Marc Alexa (Page 165).

Embroidery Modeling and Rendering; Xinling Chen, Michael McCool, Asanobu Kitamoto, Stephen Mann (Page 131).

3D Rasterization: A Bridge between Rasterization and Ray Casting; Tomáš Davidovič, Thomas Engelhardt, Iliyan Georgiev, Philipp Slusallek, Carsten Dachsbacher (Page 201).

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28 - 30 May 2012

## Proceedings

Edited by

Stephen Brooks

Kirstie Hawkey



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# President's Welcoming Letter



Canadian Human-Computer Communications Society /  
Société canadienne du dialogue humain-machine

---

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

The Canadian Human-Computer Communications Society (CHCCS) / Société canadienne du dialogue humain-machine (SCDHM) is a Special Interest Group within the Canadian Information Processing Society. It is a non-profit organization formed to advance education and research in computer graphics, visualization, and human-computer interaction.

Each year CHCCS/SCDHM sponsors Graphics Interface, the longest-running regularly scheduled conference in interactive computer graphics. Most years it is co-located and co-organized with two other conferences, Artificial Intelligence (AI), and Computer and Robotic Vision (CRV). This year the AI/CRV/GI 2012 conference is located at York University in Toronto. Graphics Interface promises to be an exciting event, with a selection of high quality papers in computer graphics, visualization, and human-computer interaction.

Each year CHCCS/SCDHM sponsors five annual awards which are presented at the conference: the Michael A. J. Sweeney Awards for the best student papers at the conference, and the Alain Fournier and Bill Buxton Ph.D. Dissertation Awards presented for the year's best Canadian Ph.D. Dissertations in computer graphics and human-computer interaction respectively, the 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 provide an Achievement Award to Nadia Magnenat Thalmann and Daniel Thalmann. I wish to thank the Awards committee, which consists of Richard Bartels, University of Waterloo (emeritus), Chair, Kellogg Booth, University of British Columbia, and Eugene Fiume, University of Toronto, for their efforts in finding well-deserving recipients. This year's winner of the Alain Fournier Award is Gordon Wetzstein, and of the Bill Buxton Award is David Dearman. I would like to thank Pierre Poulin, who supervised the process of judging the many excellent dissertations that were submitted for the awards.

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 William Cowan, University of Waterloo, President, Kellogg Booth, 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 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/CRV/GI 2012. I also wish to thank Stephen Brooks and Kirstie Hawkey, the chairs of the program committee, along with 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 Chairs

---

Stephen Brooks  
Dalhousie University, Canada

Kirstie Hawkey  
Dalhousie University, Canada

You are holding the proceedings for Graphics Interface 2012. Graphics Interface is the oldest continuously-scheduled conference in computer graphics and human-computer interaction, now in its 38th year; the conference dates back to 1969, when it was the “Canadian Man-Computer Communications Seminar”. Graphics Interface was given its present name in 1982. In 2012, Graphics Interface takes place in Toronto, Ontario, from May 28th to May 30th.

The program for Graphics Interface 2012 features 25 regular papers. We received 34 (HCI) + 23 (Graphics) submissions and had some difficult decisions in arriving at the final selection. We have roughly equal numbers of papers for both tracks, with acceptance rates of 38% for the HCI track and 52% for the graphics track.

The GI committee comprised 21 experts from graphics and HCI. Each paper was formally reviewed by two committee members and at least two external reviewers, and often received informal reviews from more. A fully double-blind reviewing process was used: the identity of the paper authors was known only to the program committee chairs and to the primary committee member assigned to the submission. We thank the program committee and the external reviewers for ensuring rigor and integrity in the reviewing process.

We are proud to include keynote talks from two invited speakers, Hans-Peter Seidel, Max-Planck-Institut für Informatik, and Chris North, Virginia Tech. Both speakers are well known for their exemplary contributions to their disciplines. Also, our congratulations to Nadia Magnenat Thalmann, Nanyang Technological University and University of Geneva, and Daniel Thalmann, Nanyang Technological University in Singapore, this year’s co-recipients of the Canadian Human-Computer Communication Society’s Achievement Award.

We would like to thank various people who contributed to the behind-the-scenes conference organization, especially Steve Mann, William Cowan, Brian Wyvill, Kellogg Booth, Pierre Poulin, Joaquim A. Jorge, and Meghan Haley. Thanks also go out to Joel Glanfield, who was the poster chair, and Ankur Gupta, who assisted with publicity. Lastly, we owe a great debt to James Stewart and Precision Conference Solutions for handling the electronic submission and review system; James’s patience and responsiveness made the process run as smoothly as we could have hoped.

For further information about the conference series, you can visit the official web site, <http://www.graphicsinterface.org>.

## Organization

---

### PROGRAM CHAIRS

Stephen Brooks  
Dalhousie University, Canada  
  
Kirstie Hawkey  
Dalhousie University, Canada

### LOCAL ARRANGEMENTS CHAIR

Mike Jenkin  
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### POSTERS CHAIR

Joel Glanfield  
Dalhousie University, Canada

## Program Committee

---

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Switzerland

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Anthony Tang  
University of Calgary, Canada

Richard Zhang  
Simon Fraser University, Canada

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---

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Konstantin Beznosov	Shigeru Kuriyama	Fei Yang
Bernd Bickel	Benjamin Lafreniere	Herb Yang
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Frederick Bonato	Edward Lank	James Young
Antoine Bouthors	Joseph LaViola	Hao (Richard) Zhang
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John Brosz	Ligang Liu	
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Xida Chen	Gregor McEwan	
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Alec Jacobson	Robert Teather	
Josh Johnston	Matthew Thorne	
Brett Jones	Melanie Tory	
Mubbasis Kapadia	Khai Truong	

# Michael A. J. Sweeney Award 2012



Canadian Human-Computer Communications Society /  
Société canadienne du dialogue humain-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 2012

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

### Graphics 2012 Award Winner

"Inverse Kinodynamics: Editing and Constraining Kinematic Approximations of Dynamic Motion" by Cyrus Rahgoshay, Amir Rabbani, Karan Singh, Paul G. Kry.

### BIOGRAPHIES

Cyrus Rahgoshay completed his B.Sc. in the University of Nottingham and University of British Columbia in computing and information systems and his M.Sc. in computer science at McGill University. He is currently working at CMLabs Simulations Inc. as RnD software developer, designing and coding simulators used for training operators in different domains such as heavy equipment, remotely operated vehicle/robots and ground vehicle operations.

Amir Hossein Rabbani is presently pursuing his Ph.D. in computer science at McGill University. He holds an M.Sc. Electrical Eng. from Sherbrooke University, and a B.Sc. Computer Engineering Azad Tehran. His current research interests include physically based simulation, and control for character balancing.

Karan Singh is an Associate Professor in Computer Science at the University of Toronto. He holds a BTech. from IIT Madras, MS, PhD from the Ohio State University. His research interests lie in artist driven interactive graphics, spanning character animation, anatomic modeling, geometric shape design and sketch-based interfaces. He has been a technical lead for the Oscar winning animation system Maya. He co-directs the graphics and human computer interaction lab, DGP and was the R&D Director for the 2005 Oscar winning Animation film "Ryan".

Paul Kry is an assistant professor in the School of Computer Science at McGill University since 2008. He holds a B.Math. from the University of Waterloo, M.Sc. and Ph.D. from the University of British Columbia, and he spent two years in Grenoble at INRIA as a postdoctoral researcher. His research interests include physically based simulation, character animation, interaction, motion capture, and a variety of related topics.

### HCI 2012 Award Winner

"Individual Differences in Personal Task Management: A Field Study in an Academic Setting" by Mona Haraty, Diane Tam, Shathel Haddad, Joanna McGrenere, Charlotte Tang.

### BIOGRAPHIES

Mona Haraty is a PhD student in the Department of Computer Science at the University of British Columbia. Her research interests include personalization, personal information and task management, and technologies that encourage and support reflection.

Diane Tam is currently pursuing her M.Sc. in Computer Science at the University of British Columbia. Her main research interests include human-computer interaction with a focus on haptics.

Shathel Haddad is pursuing his Masters in Human Computer interaction at the University of British Columbia. His main research interests are cross-cultural interface design, affective design and human computer interaction for development.

Joanna McGrenere is an Associate Professor in Computer Science at the University of British Columbia. Her main research areas are personalized user interfaces, universal usability, and interactive technologies for older users and people with cognitive disorders.

Charlotte Tang is a Postdoctoral Research Fellow in Computer Science at the University of British Columbia. Her main research interests are health information technologies and interactive technologies for children and older users.

# Alain Fournier Award 2011



Canadian Human-Computer Communications Society /  
Société canadienne du dialogue humain-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. dissertation defended in a Canadian University over the past year. The winning dissertation 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>.



**Gordon Wetzstein**

MIT Media Lab, USA  
CHCCS/SCDHM Alain Fournier  
Award Recipient 2011

This year, Gordon Wetzstein is the recipient of the Alain Fournier Ph.D. Dissertation Award. His dissertation, entitled “Computational Plenoptic Image Acquisition and Display”, made several outstanding research contributions to computer graphics, more specifically to the fields of computational optics and photography, with exciting new multidisciplinary applications.

Gordon has worked on several inter-related projects for his dissertation, and has delivered impressive contributions. Underlying Gordon’s research is the insight that jointly designing optical components and processing algorithms allow for the development of new cameras and displays with interesting properties. For example, he has introduced new multi-layered designs for autostereoscopic 3D displays, the most recent one with dynamic displays and polarization to improve on transparency. On another project, he used an LCD as an aperture filter, thus allowing image analysis to preserve frequencies of projected images. Next, his encoding of positional-directional light patterns in color channels enabled the recovery of shapes from refractive objects. A transparent display is also used through local modulation to improve human visual system perception in different tasks. Finally, he developed a plenoptic framework to compare and provide new insights for different imaging approaches. All these contributions have appeared in top venues.

Gordon completed in 2006 a Diplom at Bauhaus-Universität in Weimar, Germany, under the supervision of Professor Oliver Bimber, and a Ph.D. in Computer Science at the University of British Columbia under the supervision of Professor Wolfgang Heidrich. He is already a workshop co-organizer of a CVPR workshop on computational cameras and displays, has served on four international conference program committees, and is a frequent paper reviewer. He

has been an active volunteer in several university and conference committees. Gordon is now a postdoctoral associate at the MIT Media Lab, where he works in collaboration of Dr. Ramesh Raskar.

# Bill Buxton Dissertation Award 2011



Canadian Human-Computer Communications Society /  
Société canadienne du dialogue humain-machine

The award is named in honour of Bill Buxton, a Canadian pioneer who has done much to promote excellence, both within Canada and internationally, in the field of Human-Computer Interaction. Bill truly advocates HCI. He challenges how academics and practitioners think, and inspires them to do things differently. This is why we are proud to name this award after him.

The winning dissertation is selected through a juried process by a selection committee consisting of accomplished researchers in Human-Computer Interaction.



**David Dearman**

Nokia Research Center  
CHCCS/SCDHM Achievement  
Award Recipient 2011

The recipient of the 2011 award for the best doctoral dissertation completed at a Canadian university in the field of Human-Computer Interaction is Dr. David Dearman.

His dissertation, *Using Community-Authored Content to Identify Place-Specific Activities*, demonstrates a novel set of techniques to gather social media content such as restaurant reviews and other sources and automatically extract from them a list of activities that people might engage in at specific places within a city. The initial design followed a diary study in which participants logged their information needs for over a month, from which a framework emerged for the types of mobile information people might want. The framework was then used to design a web-based service providing structured access to activity data in support of location-based mobile applications. The method was validated through studies of two applications that used the service and a user study that compared the algorithm's list of activities with those described by participants. A design contest was conducted to identify types of applications that might benefit from the service as well as challenges for future research.

Dr. Dearman's work builds upon a clever but simple idea by carefully characterizing the needs of actual users and then showing how a technical solution could be applied and exploited in practice. The dissertation showcases how both quantitative and qualitative research methods were employed at different stages of the research. It also describes a vocabulary-based algorithm for matching places with activities and an API to support application development. Portions of the research have been reported in four peer-reviewed conferences papers. As the external examiner notes, "The elegance of the work is in simplicity -- the concept underlying the dissertation is both unique and exciting, and it was a pleasure to read the thesis."

David completed his Bachelor of Computer Science in 2003 at Dalhousie University. He earned his Master of Computer Science in 2006 at Dalhousie University under the supervision of Dr. Kori Inkpen, and his Doctorate in Computer Science in 2011 at the University of Toronto under the supervision of Dr. Khai Truong. During his graduate work he was a research intern at IBM Research in Almaden, California, and Microsoft Research in Redmond, Washington. David currently holds a position as a Senior Research Scientist at Nokia Research Center in Palo Alto, California. He has published five papers in refereed journals and 20 papers and notes at peer-reviewed conferences.

Funding from an anonymous donor established this award in 2011 in honour of Bill Buxton, a Canadian researcher, designer, and musician who has done much to promote excellence in the field of Human-Computer Interaction, both within Canada and internationally. Bill challenges how academics and practitioners think, and he inspires them to do things differently. He is a true advocate for HCI.

The award is determined through a juried process by a selection committee consisting of accomplished researchers in Human-Computer Interaction. This year, the jury was Drs. Pourang Irani (University of Manitoba), Celine Latulipe (University of North Carolina at Charlotte), and Michael Terry (University of Waterloo).

# Achievement Award 2012



Canadian Human-Computer Communications Society /  
Société canadienne du dialogue humain-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 2012 members of the Awards Committee are Richard Bartels, Eugene Fiume, and Kellogg Booth.

The 2012 CHCCS/SCDHM Achievement Award of the Canadian Human Computer Communications Society is presented jointly to Daniel Thalmann and Nadia Magnenat Thalmann in recognition of their pioneering work in the development of lifelike, synthetic human models for computer animation. In giving this award the Canadian Human Computer Communications Society recognizes that it is honoring only a portion of the rich legacy of these two researchers, both jointly and individually. Their output approaches a thousand scholarly articles, contributions to numerous books, and over sixty short films. So it is with some apology that we are choosing to focus only on their joint efforts in physical modeling and computer animation that they have directed towards developing realistic virtual actors. They began this work in the 1980s at the University of Montréal in Quebec, and they have continued since 1988 at the University of Geneva in Switzerland, for Nadia, at the École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland, for Daniel, and more recently at the Institute for Media Innovation, at the Nanyang Technological University (NTU) in Singapore, for both.

Professor Nadia Magnenat Thalmann is currently Director of the research laboratory MIRALab, at the University of Geneva and Director of the Institute for Media Innovation, at NTU in Singapore. Her formal training includes a PhD in Quantum Physics (1977) from the University of Geneva, two Postgraduate Certificates in Computer Science, one jointly in Mathematics (1977) from EPFL, Switzerland, and one jointly in Statistics (1975) from the University of Geneva, and three Master's degrees, in Biochemistry (1972), Biology (1966), and Psychology (1966) from the University of Geneva. She has been given two honorary doctorates, one from Leibniz University of Hannover in Germany (2009) and another one from Ottawa University in Canada (2011).

Professor Daniel Thalmann is now with the Institute for Media Innovation, at NTU in Singapore. He was Director of The Virtual Reality Lab at EPFL until 2011. His formal training includes a PhD in Computer Science (1977) from the University of Geneva, a combined Certificate in Statistics and Computer Science (1972) from the University of Geneva, and a Master degree in Nuclear Physics (1970) from the University of Geneva. He has also been given an honorary doctorate (2003) from the University Paul-Sabatier in Toulouse, France.



**Nadia Magnenat Thalmann**

Nanyang Technological University, Singapore & University of Geneva, Switzerland



**Daniel Thalmann**

Nanyang Technological University, Singapore  
CHCCS/SCDHM Achievement Award Recipients 2012

Daniel and Nadia arrived in Canada in 1977, and by 1979 they had taken positions as Assistant Professors at the University of Montréal, where Nadia founded MIRALab. They became interested in the realistic computer modeling and rendering of the human form, in motion, including lifelike facial expressions. Their films began with "Dream Flight" in 1982 (in cooperation with Philippe Bergeron), which provided them with the basic experience in making a computer generated short film using a wire-frame synthetic actor and key-framing. This was followed by "Rendez-vous à Montréal," which is widely regarded as the first computer film to employ synthetic actors, in this case Humphrey Bogart and Marylin Monroe. By this time they had developed a more complete system for key-framing body motion, body representation with smooth surfaces, and the beginnings of infrastructure for animating facial expressions. Some of their students and collaborators, Philippe Bergeron, Pierre Lachapelle, Daniel Langlois and Pierre Robidoux, built upon this groundwork to produce the film "Tony de Peltrie," shown at SIGGRAPH '85, which gained wide acclaim as the first film in which a synthetic actor was able to convey complex emotions. Above all else, Nadia and Daniel served in a major way as a focus and inspiration for the use of computers in animation that flourished in the Montréal area in the 1980s, a time of great activity that saw computer animation interest by the National Film Board, headquartered in Montréal, and the founding of successful commercial enterprises in that city to develop modeling and animation systems.

By the mid-1980s, Nadia and Daniel had begun to confront more difficult issues in creating lifelike synthetic

actors. Their publications engaged mathematical tools for dynamics, better surface models suitable for faces and hands, the animation of realistically deformable objects, and more naturally articulated skeletons and joints. They had also begun spreading their ideas throughout Canada and beyond by chairing conferences, notably Graphics Interface '85, and through editorial positions, notably for The Visual Computer and the Journal of Computer Animation and Virtual Worlds.

In 1989 they moved back to Switzerland to take positions at the University of Geneva and École Polytechnique Fédérale de Lausanne. Nadia recreated MIRALab at the University of Geneva, while Daniel created The Virtual Reality Lab at EPFL, and the work begun in Canada progressed further in a European setting. In 1992 they founded the Computer Graphics Society with two other pioneers of computer graphics; Professors Rae Earnshaw (UK) and Toshiyuki L.Kunii (Japan). Through the society they founded four long running conference series; Computer Graphics International, Computer Animation, Pacific Graphics, and MultiMedia Modeling.

The early 1990s saw Nadia publish papers on the physical modeling of cloth and the use of finite elements and operations tied to joints to address the clothing of synthetic actors and the realistic deformations of their bodies and limbs. Later in the 1990s, the physical modeling of hair was added to her repertoire as was the simulation of facial muscles through free-form deformations, as well as the synchronization of lips with speech. Daniel focused his research on behavioral animation of Virtual Humans, introducing the concept of synthetic vision for Virtual Humans, and developing methods for realistic gait modeling. The early 2000s saw Nadia and Daniel release VHD++, a real-time development framework for virtual character simulation, and they began exploring the techniques of motion capture and methods of registering the captured motion onto actors inside surrounding environments. The capture of motion led further Nadia to the use of medical data to enable more realistic 3D simulation of joint and skeletal models. Notable were her publications on studies of the hip joint via MRI scans, where she and her students received the first Eurographics medical award (2008). In the late 1990s, Daniel launched the first project on crowds of virtual humans, initiating a new field of animation that now attracts many researchers. Rendering of tens of thousands of agents, collision detection and generation of varieties of individual people became important issues. Nadia has progressed through various versions of a model for Marilyn Monroe, each more realistic than the last, and in 1995 the film "Marilyn by the Lake" is one of her first presentations of a virtual Marilyn appearing with live actors in an actual outdoor setting. Two films that combined the techniques that Nadia explored in cloth, hair, body, joint, environment placement, and character-character interaction were "Rêves d'un Mannequin" and "Virtual Life in Pompeii," both directed in 2003. Nadia's work on computer generated clothing led to the first virtual fashion show, and in 2007 she and her team in Geneva made an award winning movie, "High Fashion in Equations." Tailored out

of exquisite materials and artfully designed patterns, high fashion garments constitute the most sophisticated kind of clothing. The uniquely manufactured pieces, only affordable for a small circle of clientele, are not only envelopes for the human body, but artworks that make visible cultural aspects, tendencies and trends. Historical haute couture garments are characterized by an additional aspect: for time-specific garment details affiliated with certain époques to become evident, the complexity of the models used must become even greater than for ordinary garments.

The research that both separately and together have done has now broadened to contribute not only to computer animation, but it currently explores how their results can assist in medicine by exploiting MRI data, how it may be used to recreate historical scenes, where the models can assist in the fashion industry, and what implications there are for Virtual Reality. Daniel and Nadia's contributions have gone far beyond the release of short films and academic papers. Both have been active in organizing and chairing over fifty international graphics conferences as well as engaging in editorial duties for over a dozen international journals. The Canadian Human Computer Communications Society is happy to recognize that all this has flourished from beginnings at the University of Montréal and spread from there throughout the international community.

# Prix Réalisations exceptionnelles 2012



Canadian Human-Computer Communications Society /  
Société canadienne du dialogue humain-machine

La Distinction Honorifique pour Accomplissements est présentée à un/e chercheur/euse canadien/ne à la conférence «Graphics Interface» pour lui offrir la reconnaissance de ses contributions importantes dans les domaines d'infographie, de la visualisation, et/ou du dialogue humain machine. Les Distinctions Honorifiques sont recommandées par le Comité de la SCHDM, basées sur des nominations reçues de la communauté de chercheurs. Les membres actuels du comité sont Richard Bartels, Eugene Fiume, and Kellogg Booth.

Le Prix Réalisations exceptionnelles 2012 de la Société canadienne du dialogue humain-machine (SCDHM/CHCCS) est décerné conjointement à Daniel Thalmann et à Nadia Magnenat Thalmann en reconnaissance de leur travail de pionniers dans le développement de modèles d'humains de synthèse réalistes pour l'animation par ordinateur. En leur remettant ce prix, la Société canadienne du dialogue humain-machine sait qu'elle n'honore qu'une partie de l'inestimable héritage, à la fois collectif et individuel, de ces deux chercheurs. Ce dernier englobe environ un millier d'articles scientifiques, des contributions à de multiples ouvrages et plus de soixante courts-métrages. Vous nous excuserez donc de concentrer notre attention principalement sur les efforts qu'ils ont conjointement fournis en modélisation physique et en animation par ordinateur dans le but de créer des acteurs virtuels réalistes. Ils ont lancé leurs travaux dans les années 1980 à l'Université de Montréal au Québec avant de les poursuivre, dès 1988, à l'Université de Genève en Suisse, dans le cas de Nadia, et à l'École Polytechnique Fédérale de Lausanne (EPFL) en Suisse, dans celui de Daniel, et plus récemment pour les deux, à l'Institute for Media Innovation, de l'Université Technologique de Nanyang (NTU) à Singapour.

La professeure Nadia Magnenat Thalmann est actuellement directrice du laboratoire de recherche MIRALab, à l'Université de Genève, et directrice de l'Institute for Media Innovation, à la NTU, à Singapour. Sa formation académique comprend un doctorat en physique quantique (1977) de l'Université de Genève, deux diplômes postgrade en informatique, dont l'un concernait également les mathématiques (1977) auprès de l'EPFL, Suisse, et l'autre la statistique (1975) auprès de l'Université de Genève, ainsi que trois maîtrises respectivement en biochimie (1972), en biologie (1966) et en psychologie (1966), toutes trois auprès de l'Université de Genève. Elle s'est vue décerner deux doctorats honorifiques, le premier par l'Université Leibniz d'Hanovre en Allemagne (2009) et le second par l'Université d'Ottawa au Canada (2011).

Le professeur Daniel Thalmann œuvre désormais à l'Institute for Media Innovation à NTU à Singapour. Il a dirigé le Laboratoire de Réalité Virtuelle (VRlab) de l'EPFL jusqu'en 2011. Sa formation académique comprend un doctorat en informatique (1977) de l'Université de Genève (1977), un certificat universitaire combinant la statistique et l'informatique (1972) de l'Université de Genève ainsi qu'une



**Nadia Magnenat Thalmann**

l'Université de Genève, Suisse & l'Université Technologique de Nanyang, Singapour



**Daniel Thalmann**

l'Université Technologique de Nanyang, Singapour

CHCCS/SCDHM Les récipiendaires des prix d'excellence 2012

maîtrise en physique nucléaire (1970) de l'Université de Genève. Il a également reçu un doctorat honorifique (2003) de l'Université Paul-Sabatier de Toulouse, en France.

Daniel et Nadia ont débarqué au Canada en 1977 et, dès 1979, ils étaient tous deux professeurs adjoints à l'Université de Montréal où Nadia a fondé le MIRALab. Ils se sont pris d'intérêt pour la modélisation informatique réaliste de la forme humaine, notamment la modélisation d'expressions faciales semblables à celles des êtres humains. Leur création cinématographique a commencé avec « Vol de rêve » en 1982 (en collaboration avec Philippe Bergeron), lequel leur a fourni l'expérience de base dont ils avaient besoin pour créer des courts-métrages générés par ordinateur et mettant en jeu un acteur de synthèse fil de fer et l'animation par image-clé. Leur court métrage suivant fut « Rendez-vous à Montréal » généralement considéré comme étant le premier film généré par ordinateur à utiliser des acteurs de synthèse, soit Humphrey Bogart et Marylin Monroe. Ils avaient réussi à mettre au point un système plus poussé d'animation par image clé des mouvements corporels, de représentation du corps au moyen de surfaces lisses et jeté les bases de l'infrastructure d'animation des expressions faciales. Quelques-uns de leurs étudiants et collaborateurs, Philippe Bergeron, Pierre Lachapelle, Daniel Langlois et Pierre Robidoux, ont mis à profit ce travail préparatoire pour produire le film « Tony de Peltre » projeté dans le cadre de SIGGRAPH '85, lequel a la réputation d'être le premier film d'animation dans lequel un acteur de synthèse a exprimé des émotions complexes. Par-dessus tout, Nadia et Daniel constituaient une plaque tournante et une source d'inspiration en matière d'utilisation des ordina-

teurs dans le domaine de l'animation, un secteur florissant dans l'agglomération montréalaise des années 1980; ce fut une période d'intense activité où l'animation par ordinateur a capté l'intérêt de l'Office national du film - dont le siège se trouve à Montréal - et où des entreprises commerciales prospères ont été démarquées en vue de développer des systèmes de modélisation et d'animation.

Vers le milieu des années 1980, Nadia et Daniel se sont attaqués à des enjeux plus complexes liés à la création d'acteurs de synthèse se rapprochant davantage de la réalité. Leurs publications concernaient des outils mathématiques liés à la dynamique, de meilleurs modèles de surfacage pour la représentation des visages et des mains, l'animation d'objets à déformations réalistes et l'animation plus naturelle des squelettes et des articulations. Ils diffusaient continuellement leurs idées à l'échelle du Canada et à l'étranger en présidant des conférences, notamment Graphics Interface '85, et en occupant des postes de rédaction, particulièrement auprès du Visual Computer et du Journal of Computer Animation and Virtual Worlds.

Puis, en 1989, ils sont retournés en Suisse où ils avaient accepté des postes à l'Université de Genève et à l'école Polytechnique Fédérale de Lausanne. Nadia a recréé le MIRALab à l'Université de Genève tandis que Daniel fondait le Laboratoire de Réalité Virtuelle (VRLab) à l'EPFL, deux pôles où les travaux démarqués au Canada ont pu progresser dans un contexte européen. En 1992, ils ont fondé la Computer Graphics Society en collaboration avec deux autres pionniers d'infographie, les professeurs Rae Earnshaw (R.-U.) et Tosiyasu L. Kunii (Japon). Ils ont créé, par son intermédiaire, les quatre séries de conférences suivantes de longue affiche : Computer Graphics International, Computer Animation, Pacific Graphics, et enfin, MultiMedia Modeling.

Durant la première moitié des années 1990, Nadia a publié divers articles sur la modélisation physique des tissus et sur l'utilisation d'opérations et d'éléments finis reliés aux articulations afin d'aborder la problématique des vêtements portés par les acteurs de synthèse et les déformations réalistes des surfaces des habits. Pendant la seconde moitié de la décennie 1990, la modélisation physique des cheveux est venue s'ajouter à son répertoire de même que la simulation des muscles faciaux par l'intermédiaire de déformations à structure libre et de la synchronisation lèvres-paroles. Daniel a concentré ses propres recherches sur l'animation comportementale des humains virtuels et a introduit le concept de vision synthétique pour ces derniers et a développé des méthodes de modélisation réaliste de la démarche. Au début des années 2000, Nadia et Daniel ont publié VHD++, une plateforme en temps réel pour la simulation avancée d'humains virtuels, et ont commencé à explorer les techniques de capture de mouvements et les méthodes de rendu des mouvements chez les acteurs virtuels et ce, dans leur environnement. La capture de mouvements a amené Nadia à examiner l'utilisation de données médicales en vue de produire une simulation 3D plus réaliste des modèles d'articulations et de squelettes. Ses publications sur des études relatives à l'articulation de la hanche basées sur l'imagerie par

résonance magnétique ont été particulièrement remarquées puisqu'elles lui ont mérité, ainsi qu'à ses étudiants, le premier prix médical Eurographics (2008). à la fin des années 1990, Daniel a lancé son premier projet sur les foules virtuelles, instituant par là même un nouveau domaine d'animation qui attire dorénavant bon nombre de chercheurs. Le rendu de dizaines de milliers d'agents, la détection de collisions et la génération de quantités d'individus sont devenus des enjeux importants. Nadia a mis au point diverses versions du modèle de Marilyn Monroe, chacune plus réaliste que la précédente, et le film « Marilyn by the Lake », produit en 1995, est une de ses premières présentations de Marilyn la virtuelle côtoyant des acteurs bien vivants dans un décor extérieur véritable. Deux films qui alliaient les techniques explorées par Nadia sur le rendu des vêtements, des cheveux, du corps, des articulations, du positionnement dans l'environnement et des interactions entre personnages furent « Rêves d'un Mannequin » et « Virtual Life in Pompeii », tous deux réalisés en 2003. Les travaux de Nadia sur la génération des vêtements par ordinateur ont abouti à la tenue du premier défilé de haute couture virtuel et, en 2007, elle et son équipe de Genève ont réalisé un film primé intitulé « High Fashion in Equations ». Confectionnés dans des tissus exquis et à partir de motifs artistiques, les vêtements de haute couture sont les plus sophistiqués de tous les habits. Ces articles de facture originale que seule peut se permettre une clientèle fort restreinte ne sont pas de simples enveloppes du corps humain mais encore des œuvres d'art manifestant des tendances et aspects culturels. Les vêtements haute couture historiques se caractérisent par une dimension supplémentaire : la manifestation des détails vestimentaires associés à des époques particulières exige des modèles d'une complexité bien plus grande que ceux utilisés pour les vêtements ordinaires.

Les recherches que Daniel et Nadia ont effectuées individuellement et collectivement se sont élargies pour dépasser le seul domaine de l'animatique; elles explorent, dorénavant, la manière dont leurs résultats peuvent faire progresser la médecine en exploitant les données obtenues par IRM, celle dont elles peuvent faciliter la reconstitution de scènes historiques, celle dont leurs modèles peuvent être utiles à l'industrie de la mode et enfin, leurs répercussions sur le plan de la réalité virtuelle. Les contributions de Daniel et de Nadia ne se limitent pas à la sortie de courts métrages et à la publication d'articles scientifiques. Ils ont tous deux joué un rôle actif au niveau de l'organisation et de la direction d'une bonne cinquantaine de conférences internationales en infographie et ont assumé des fonctions de rédacteur et rédactrice pour le compte d'une douzaine de revues scientifiques internationales. La Société canadienne du dialogue humain-machine est ravie de reconnaître que tout ceci a son origine dans leurs débuts à l'Université de Montréal et que de là, leur influence s'est étendue à travers le monde.

# Keynote Speaker

## 3D Image Analysis and Synthesis -- The World Inside the Computer

### Hans-Peter Seidel

Max-Planck-Institut für Informatik and Universität des Saarlandes, Germany



#### ABSTRACT

During the last three decades computer graphics established itself as a core discipline within computer science and information technology. Ten years ago, most digital content was textual. Today it has expanded to include audio, images, video, and a variety of graphical representations. New and emerging technologies such as multimedia, social networks, digital television, digital photography and the rapid development of new sensing devices, telecommunication and telepresence, virtual reality, or 3D-internet further indicate the potential of computer graphics in the years to come. Typical for the field is the coincidence of very large data sets with the demand for fast, and possibly interactive, high quality visual feedback. Furthermore, the user should be able to interact with the environment in a natural and intuitive way.

In order to address the challenges mentioned above, a new and more integrated scientific view of computer graphics is required. In contrast to the classical approach to computer graphics which takes as input a scene model -- consisting of a set of light sources, a set of objects (specified by their shape and material properties), and a camera -- and uses simulation to compute an image, we like to take the more integrated view of 3D Image Analysis and Synthesis for our research. We consider the whole pipeline from data acquisition, over data processing to rendering in our work. In our opinion, this point of view is necessary in order to exploit the capabilities and perspectives of modern hardware, both on the input (sensors, scanners, digital photography, digital video) and output (graphics hardware, multiple platforms) side. Our vision and long term goal is the development of methods and tools to efficiently handle the huge amount of data during the acquisition process, to extract structure and meaning from the abundance of digital data, and to turn this into graphical representations that facilitate further processing, rendering, and interaction.

In this presentation I will highlight some of our ongoing research by means of examples. Topics covered include 3D Reconstruction and Digital Geometry Processing (both for urban and non-urban environments), Motion and Performance Capture, 3D video processing, and Multimodal Music Processing.

#### BIOGRAPHY

Hans-Peter Seidel is the scientific director and chair of the computer graphics group at the Max Planck Institute (MPI) for Informatics and a professor of computer science at Saarland University, Saarbrücken, Germany. Seidel's group has done pioneering work in the newly emerging area of 3D image analysis and synthesis, on the intersection between computer graphics and computer vision, considering the whole pipeline from data acquisition to rendering. His long term goal has been the development of methods and tools to efficiently handle the huge amount of data during the acquisition process (geometry, appearance, time-varying data), to extract structure and meaning from this abundance of digital data, and to turn this into graphical representations that facilitate further processing, rendering, and interaction. For his work Seidel has been awarded the DFG Leibniz Prize in 2003.

Seidel has been on the program committee of all major international graphics conferences, and chaired several of these events. He has extensively published in the field (including more than 30 papers at ACM Siggraph and more than 50 papers at Eurographics), and more than 20 former members of his group have received offers for tenured faculty positions, in Germany and abroad.

Seidel is co-chair of the Max Planck Center for Visual Computing and Communication (MPC-VCC) (since 2003), and he is the scientific coordinator of the Cluster of Excellence on Multimodal Computing and Interaction (M2CI) that was established by the German Research Foundation (DFG) within the framework of the German Excellence Initiative in 2007.

# Keynote Speaker

(Display) Space: The Final Frontier (for Interactive Visual Analytics)

## Chris North

Virginia Polytechnic Institute and State University, USA



### ABSTRACT

These are exciting times in the universe of user interfaces. New directions in the field are coming together to significantly advance frontiers in enabling people to make sense of large amounts of information. Visual Analytics has established itself as a field that brings together the human intuition of interactive visualization and the computational power of data mining. At the same time, the onset of large high-resolution displays and interaction technologies has the potential to offer vast new opportunities for interactive visual analytics.

How can large high-resolution display spaces help users throughout their analytic processes? What new interaction opportunities are afforded? How and why is interacting with large display spaces fundamentally different than standard desktop displays? How should we design the display systems, visualizations, and interaction techniques to maximize human performance and exploit embodied cognition? What is the relationship between display space and computational data mining? How does this open up new worlds of interaction between humans and mining algorithms?

We will explore recent empirical results of experiments on these questions, seek out new user interface design philosophies, and boldly discuss future directions for visual analytics in the large.

### BIOGRAPHY

Dr. Chris North is an Associate Professor of Computer Science at Virginia Tech. He leads the Information Visualization research group in the Center for Human-Computer Interaction, and directs the GigaPixel Display Laboratory, one of the most advanced display and interaction facilities in the world. He was General Chair of the IEEE Information Visualization (InfoVis) Conference, and an associate editor of IEEE Transactions on Visualization and Computer Graphics. He currently serves on the editorial board of the Information Visualization journal, and is a member of the DHS supported VACCINE Visual Analytics Center of Excellence. He was awarded Faculty Fellow of the College of Engineering at Virginia Tech. He regularly teaches graduate courses on Information Visualization and undergraduate courses on Human-Computer Interaction. His research expertise is in human-computer interaction, information visualization, and visual analytics. His recent interests focus on insight-based evaluation methods for visualization, user interfaces for large high-resolution display spaces, and combining interactive visualization with computational data mining. He earned his Ph.D. at the University of Maryland, College Park, in 2000.

# Invited Speakers

## The Physiological Virtual Human

### Nadia Magnenat Thalmann

Nanyang Technological University, Singapore & University of Geneva, Switzerland



#### BIOGRAPHY

Prof. Nadia Magnenat Thalmann has pioneered research into virtual humans over the last 30 years. She obtained several Bachelor's and Master's degrees in various disciplines (Psychology, Biology and Biochemistry) and a PhD in Quantum Physics from the University of Geneva in 1977. From 1977 to 1989, she was a Professor at the University of Montreal in Canada. From 1989 to 2010, she has been a Professor at the University of Geneva where she founded the interdisciplinary research group MIRALab. Together with her PhD students, she has published more than 550 papers on virtual humans and virtual worlds with applications in 3D clothes, hair, body modelling, emotional virtual humans and social robots and medical simulation of articulations. In 2009, she received a Dr Honoris Causa from the Leibniz

University of Hanover in Germany and in May 2010, the Distinguished Career Award from the Eurographics. In June 2010, she received an Honorary Doctorate of the University in Ottawa in Canada. She is presently Professor and Director of the Institute for Media Innovation (IMI) at Nanyang Technological University, Singapore and Director of MIRALab at the University of Geneva, Switzerland. She is a life member of the Swiss Academy of Engineering Sciences (SATW).

## Virtual Humans: From One to Many

### Daniel Thalmann

Nanyang Technological University, Singapore



#### BIOGRAPHY

Prof. Daniel Thalmann is with the Institute for Media Innovation at the Nanyang Technological University in Singapore. He is a pioneer in research on Virtual Humans. His current research interests include Real-time Virtual Humans in Virtual Reality, crowd simulation, and 3D Interaction. Daniel Thalmann has been the Founder of The Virtual Reality Lab (VRlab) at EPFL. He is coeditor-in-chief of the Journal of Computer Animation and Virtual Worlds, and member of the editorial board of 6 other journals. Daniel Thalmann was member of numerous Program Committees, Program Chair and CoChair of several conferences including IEEE VR, ACM VRST, and ACM VRCAI. Daniel Thalmann has published more than 500 papers in Graphics, Animation, and Virtual Reality. He is coeditor of

30 books, and coauthor of several books including 'Crowd Simulation' and 'Stepping Into Virtual Reality', published in 2007 by Springer. He received his PhD in Computer Science in 1977 from the University of Geneva and an Honorary Doctorate (Honoris Causa) from University Paul-Sabatier in Toulouse, France, in 2003. He also received the Eurographics Distinguished Career Award in 2010.

